

Antecedents and outcomes of income diversification in higher education:
A resource-based view

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Abstract

Research from multiple disciplines confirms that income diversification is a common strategic response to challenges in the external environment and is recognised as a measure of financial health. Whilst universities under financial pressure can hardly be considered a new phenomenon, regulatory changes and increased competition in England have brought this pressure into sharp relief. The realisation that the sector is keenly sensitive to external factors has led universities to seek to diversify their funding base and reduce their dependence on any one source of income.

However, not all universities appear equally able to generate additional revenues. This research focuses on understanding the antecedent factors underpinning this variance so that university leaders are better equipped to develop strategies to improve their long-term financial sustainability, and policymakers are better informed to support them.

Whilst the available literature suggests income diversification in higher education is of importance to theory and practice, there appears to be a lack of an explicit measurement of it, and a generalisable explanation of the necessary factors to achieving it. This study employs an explanatory sequential mixed method design to offer a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in developing a diversified income portfolio. By using the qualitative findings to interpret the quantitative results, a richer explanation of any causal effect is developed.

Adopting a resource-based view as the theoretical framework to drive the inquiry, this study tests 13 hypotheses derived from extant research that link attributes of a university's resources and capabilities to its level of income diversification. In developing the dependent variable, a model for measurement and a national income diversification index is also produced. The hypotheses are tested using secondary and archival data from 2012/13 to 2016/17 for all publicly-funded, non-specialist universities in England. This is supported by 16 interviews conducted with vice-chancellors, pro-vice-chancellors, and directors of finance from universities in this focal population.

The findings suggest a university's focus on research provides the dominant explanation for a more balanced income portfolio and consequently, a higher income diversification index score. The scale of income that research can generate can be large enough to have a meaningful impact on creating more balance in the portfolio. Moreover, income from

research can register against a number of income categories thus increasing its balancing effect. The research intensity of a university also builds reputation that has a 'halo' effect on all other areas of income generation. The findings also show that universities need to be organised to exploit their research. Incentivising staff to seek commercial opportunities and having staff dedicated to business engagement contribute to explaining the variance in levels of income diversification.

The study concludes by highlighting its contributions to theory, knowledge, and practice, and making recommendations for university leaders and policymakers.

Declaration of original content

I declare that, except where noted and credited, the content of this thesis is my own work. I further declare that this DBA thesis was created in accordance with the regulations and guidelines of the University of Gloucestershire. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views and opinions expressed in this DBA thesis are those of the researcher herself and in no way represent those of the University of Gloucestershire.

Signed: Date: 24 July 2019

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List of Abbreviations and Acronyms

CPD	Continuing Professional Development
CE	.....	Continuing Education
CAQDAS	.....	Computer Assisted Qualitative Data Analysis Software
DAR	.....	Development and Alumni Relations
DARO	.....	Development and Alumni Relations Office
e.g.	.....	exempli gratia
etc.	.....	et cetera
EU	.....	European Union
FRS	.....	Financial Reporting Standards
FTE	.....	Full Time Equivalent
HE-BCI	.....	Higher Education Business and Community Interaction
HEFCE	.....	Higher Education Funding Council for England
HEI	.....	Higher Education Institution
HEP	.....	Higher Education Provider
HESA	.....	Higher Education Statistics Agency
HHI	.....	Hirschman-Herfindahl Index
i.e	.....	id est
IP	.....	Intellectual Property
KE	.....	Knowledge Exchange
KT	.....	Knowledge Transfer

LEP	.....	Local Enterprise Partnership
OfS	.....	Office for Students
OLS	.....	Ordinary Least Squares
PACEC	.....	Public and Corporate Economic Consultants
QR	.....	Quality Related
QDA	.....	Qualitative Data Analysis
RBV	.....	Resource-Based View
RESET	.....	Regression Equation Specification Error Test
SE	.....	Standard Error
SORP	.....	Statement of Recommended Practice
STEMM	.....	Science, Technology, Engineering, Maths and Medicine
TT	.....	Technology Transfer
TTO	.....	Technology Transfer Office
UFC	.....	Universities Funding Council
UGC	.....	University Grants Committee
UKCI	.....	United Kingdom Competitive Index
VIF	.....	Variance Inflation Factor
VRIN	.....	Valuable Rare Inimitable Non-substitutable
VRIO	.....	Valuable Rare Inimitable Organised

Chapter 1: Income Diversification in Higher Education

1.1 Chapter introduction

The purpose of this initial chapter is to provide an overview of the entire research project and to provide important background information to position the significance of the research problem.

This chapter outlines the overall aim of the research and presents the research questions to be addressed, and the objectives to be met. The theoretical framework, research methodology and methods are also summarised. Firstly, the research domain and the focal population are briefly described.

1.2 Research domain

This research is located in the domain of higher education policy and management. It does, however, draw on occasion from the non-profit, financial and strategic management literatures.

1.3 The focal population

The focal population for this study is all the publicly-funded, non-specialist universities in England. Therefore, it does not include highly-specialised institutions such as theological colleges or musical conservatoires, nor those universities focused only on postgraduate study or via non-standard delivery such as distance learning. In common with Boliver (2016) and Jenkins and Wolf (2016), the focus is on ‘generalist’ universities. This means each institution in the focal population is able to draw from similar sources of income and market sizes; and so, have similar opportunities to develop a diversified income portfolio. Except for one newer institution (whose complete 5-year financial data were not available due to changes in ownership structure), this focal population forms the sample for the study. For clarity, some definitions are provided.

The Higher Education Funding Council for England (HEFCE) defined a publicly-funded provider as “any provider of higher education which also receives direct, recurrent public funding for any purpose.” (HEFCE, 2018a). Note: as a result of the Higher Education and

Research Act 2017, HEFCE was replaced by the Office for Students (OfS) and UK Research and Innovation. The focal population does not include the growing body of alternative higher education providers that are defined as providers not funded by regular government grants. This includes the small number of private universities and institutes in England (HEFCE, 2018a).

Universities are defined as higher education providers that have been instituted and granted university title by Royal Charter, Act of Parliament, Papal Bull or by Order of the Privy Council (QAA, 2018). Specialised institutions are defined as those that have 60% or more of their courses in one or two subject areas only (HEFCE, 2018a).

England is the focal nation, due to the fact that Wales, Scotland and Northern Ireland have different funding arrangements. Pilbeam (2012) similarly ruled out institutions outside of England for a lack of common funding structures.

1.4 Background to the research problem

The purpose of this section is to highlight the importance of income diversification in the higher education sector before presenting the research problem to be addressed. This section draws largely from the available academic literature and public-sector reports with occasional reference to the mainstream media.

Across much of the world, participation in higher education has soared, both in terms of total numbers and as a percentage of the cohort (Jenkins & Wolf, 2016). In England, demand for higher education continues to increase overall, although some modes of study are seeing a decline. The most recent figures reported by the Higher Education Statistics Agency (HESA) show over the most recent five-year period (2013/2014 to 2017/18); full-time undergraduate numbers have been steadily rising. The rate of increase was accelerated as a result of government reforms when the cap on student numbers was raised in 2014/15 and fully lifted 2015/16. Postgraduate numbers are also rising albeit more gradually. However, part-time undergraduate numbers have been steadily declining over the period. Part-time postgraduate numbers have been relatively flat over the period but also show a decline in 2017/18 (HESA, 2019b). The decline in part-time undergraduate students has been attributed to the general economic downturn and reforms to undergraduate funding (UUK, 2014).

Student demand may be increasing overall, but so is the competition for their recruitment. Universities are increasingly competing both nationally and internationally for students (HEFCE, 2018b; Office for Students, 2019). Whilst nationally, data from the Higher Education Students Early Statistics (HESES) Survey for 2017/18 shows a rise in student numbers on 2016/17 levels, this is masking considerable variation in levels of placed applicants across the sector “with an average decline of 8 percent for those 60 institutions where data indicate that recruitment has declined this year” (HEFCE, 2018b, p. 13).

Much of the increasingly competitive environment has been stimulated by a number of national reforms designed to encourage competition and drive up quality (although the degree to which the competitive environment is driving up quality is currently being challenged (National Audit Office, 2017; House of Commons, 2018a)).

As Taylor notes for the UK:

Since 2010 the policy stance has been drastic reduction in government funding, a strong shift toward being more self-reliant and funded primarily through fees paid by students and increased competition in the sector both through mechanisms designed to engender competition for student recruitment and through deregulating and opening up the sector to new providers. (2013, p. 142)

The government rationale for removing the cap on the number of students an institution could accept from 2015/16 was to allow popular providers to expand and therefore more young people to access higher education (House of Commons, 2018a). This has led to increasing competition among providers (Shaw, 2016).

Moreover, the Higher Education Act 2017 introduced reforms making it “quicker and simpler for new providers to enter the market, with an expectation that greater competition may mean some providers will exit” (National Audit Office, 2017, p. 5). As a result, there have been significant increases in higher education provision from new alternative providers (UUK, 2014).

However, some of the current competitive environment can also be attributed to other external factors outside the control of universities. Firstly, neither universities nor the government have control over the number of 18-year olds in the UK population at any one time. According to UCAS data, although the proportion of 18-year olds entering higher education in 2018 is at record levels (33%), there is a smaller pool of 18-year olds to draw from. This demographic dip means there are actually fewer 18-year olds going to university

than in 2017 (in England the figures are 14,600 less). The overall trend in the number of 18-year-olds has been steadily declining since 2009 and is expected to continue to decrease until 2021 (Best, 2018). Except for the Netherlands and Luxembourg, the picture is similar in the rest of the European Union (EU), where the number of 18-year olds in the population has been declining since 2014 (HEFCE, 2015). This suggests universities in England are competing for their share of a smaller pool of both home and EU undergraduate students.

Furthermore, global opportunities are encouraging domestic students to study overseas (Shin & Harman, 2009; Jenkins & Wolf, 2016). Thus, for home institutions, there is increasing competition from international markets for outwardly mobile students (HEFCE, 2018b).

The UK's impending withdrawal from the EU and visa restrictions for international students are also external factors affecting the financial outlook for universities due to their impact on student recruitment (Office for Students, 2019). According to UCAS, acceptances by EU students for undergraduate study dipped in 2017, although data for 2018/19 entry shows a rise of 2% on the previous year (Best, 2018). However postgraduate numbers appear to be being more negatively affected. Data collected by Russell Group universities show that EU students commencing postgraduate taught courses (such as master's) were down 5% for 2018/19 compared with the previous year, and postgraduate research was down 9%. This is being attributed to the uncertainty over the UK's future relationship with Europe and the potential wavering in the appeal of coming to the UK to study or research (Grove, 2019).

In a study commissioned by The Guardian and in partnership with Universities UK, Moran and Powell (2018) find vice-chancellors state that the UK's impending withdrawal from the EU as creating uncertainties that make strategic planning difficult "when combined with a restriction on, and coverage of, student immigration into the UK, this was felt to have damaged the brand of the UK HE sector internationally" (p.6). Both of these factors may be affecting the UK's ability to compete in these markets.

Finally, there are further funding reforms on the horizon. The recommendations to reduce the cap on tuition fees as proposed by *The Review of Post-18 Education and Funding*, chaired by Sir Philip Augar, are still being debated at time of writing. The lack of clarity as to whether the difference would be made up by public funding is naturally causing concern in the sector (Coughlan, 2019a). Additional funding reforms could further intensify competition as universities fight to remain viable, as a vice-chancellor comments in Moran

and Powell (2018, p. 8) “for some it would take a very small change to have a significant impact on the future of their institution”. To compound the concerns, in December 2018 when the Office for National Statistics (ONS) announced that student loans were to be reclassified as government spending, the sector raised concerns this would tempt ministers to cut tuition fees because it will look better for the national deficit (Jarvis, 2018). Moreover, a report published by the Institute of Fiscal Studies (Britton, van de Erve, Shephard, & Belfield, 2019) projects the likely cost to the government of student loans not being repaid at some £8.6bn per cohort; further fuelling concerns that the government would seek to reduce the cost to the public purse. The report notes it is the post-1992 universities that will cost the government the most due to their undergraduate focus, the lower future wage potential of the types of subjects studied at these institutions, and the higher risk of non-completion (Felix & Kernohan, 2019).

Each year, the regulator publishes a report on the financial health of the sector in England. In 2016 HEFCE commented that the 2014/15 financial results “showed a sound financial position overall” but that this masked wide variation in individual institutional performance. HEFCE additionally commented that the forecast growth projections may be difficult to achieve in light of increased competition, the decline in 18-year-olds in England and uncertainties over the UK’s withdrawal from the European Union (HEFCE, 2016a, p. 6). In 2017 HEFCE commented once again that the 2015/16 financial results “showed a sound financial position overall”, but this masked wide variation, and that some providers may find it difficult to achieve their recruitment projections for the same reasons cited the previous year (HEFCE, 2017a, p. 2). In 2018 HEFCE commented the financial results for the sector in 2016/17 “are sound overall” but that this masked a wide variation between individual institutions. The HEFCE report warned again of the uncertainties and challenges of increased competition, the UK’s pending withdrawal from the European Union, the pending policy outcomes of the review of post-18 education and declining numbers of 18-year olds. The most recent 2019 report from the now, Office for Students, entitled *Financial Sustainability of Higher Education Provider in England*, is notable for its change of tone. This time stating that “the sector overall is currently in reasonable health”, commenting again that this “masks considerable variation” in the performance of individual providers (Office for Students, 2019, p. 3). The report raises concerns about the reliability of the forecast data and the likelihood of achieving the forecasted growth in student numbers in light of increased competition, declining numbers of 18-year-olds and uncertainties over the

UKs pending withdrawal from the European Union and the policy outcomes of the post-18 education review. Stating that “a provider whose financial viability and sustainability is underpinned by reliance on fee income based on student recruitment targets which prove to be unrealistic is exposing itself to significant risk” (Office for Students, 2019, p. 5).

This complex and competitive environment creates challenges for all institutions. It leads to increased volatility in student recruitment (UUK, 2014; FSSG, 2016; Office for Students, 2019); thus, the income for universities are less predictable (Bolton, 2019). However, as the latest report from the Office for Students acknowledges, some institutions are more exposed to the risks associated with this instability in tuition fee income than others. Namely those for whom tuition fees comprise the majority of their income (Office for Students, 2019). A higher dependency on income from tuition fees suggests greater vulnerability to changes in market fortune and the pressures of market competition (Marginson & Considine, 2000). Martin and Samels (2013) define a financially distressed institution as one that is overly dependent on tuition fees or government funding i.e. their income portfolio is highly concentrated on a single source.

Towards the end of 2017, Times Higher Education, in association with accountants Grant Thornton, published *University financial health check 2017: Future prospects?* The report analysed UK 2015/16 financial data provided by HESA. Whilst as a sector, income from tuition fees accounted for around half of all income, for some individual institutions the dependence was much higher [suggesting for some it is much less]. Fees accounted for more than two-thirds of total income in 42% of UK universities, and for 22 institutions, more than three-quarters of their 2015/16 income was derived from tuition fees. With a growing list of factors that threaten the ability to meet recruitment targets, the report states that “the risks of this are obvious: a sudden drop in student demand, even spread over a few years, could be catastrophic” (Baker, 2017).

Albeit writing before the cap on student numbers was lifted, Taylor observes:

The strong reliance on teaching income in the UK HEI sector brings its own risks, namely that of instability in home/EU or overseas student recruitment. Coming on top of government policy to increase competition between HEIs for students and to deregulate the market in undergraduate education and open the system up to new providers (BIS 2011), this provides an extremely challenging environment. (2013, p. 145)

As a UCAS report notes, competition is increasing in the market, causing a squeeze on lower tariff providers (Best, 2018). Moran and Powell find vice-chancellors stating that increased competition for student recruitment to be their number one concern, specifically domestic recruitment “The removal of the student numbers cap seems to have brought increasing levels of aggressive competition, with many Post-92 institutions (though not exclusively) feeling the effects of higher tariff competitors lowering tariffs and the increasing use of unconditional offers” (2018, p. 6).

Unlike a conventional market place, it appears universities are unable or at least unwilling to compete on price. Although the £9,000 fee introduced in 2012/13 was supposed to be viewed as a maximum cap on the basic threshold of £6,000, all bar a handful of institutions charge the maximum. To charge less is perceived as a reputational risk as students equate higher fees with prestige (Marginson, 2018).

To compound the issue, universities feel they need to invest in improving the student experience, student outcomes, and overall appeal in efforts to compete for students (FSSG, 2016; Jabbar, Analoui, Kong, & Mirza, 2017). The lower and middle-ranking universities are reported as spending disproportionately significant sums to try and attract students (Hall & Weale, 2019). This is at a time when for some, costs are exceeding income (Office for Students, 2018), capital grants are diminishing (HEFCE, 2018b). According to HEFCE (2018) the sector’s surplus fell by 28% from £1.5 billion in 2015/16 to £1.1 billion in 2016/17. And again to £1.0 billion in 2017/18 (Office for Students, 2019). The number of institutions reporting a deficit increased from 40 in 2016/17 to 47 in 2017/18 (Office for Students, 2019).

Some universities appear to be in a better position than others to compete for students. When the cap on student numbers was lifted, there was a concern in the sector that the over-subscribed ‘selective’ universities would substantially increase their numbers (Jenkins & Wolf, 2016). According to Frank, Gowar, and Naef (2019) analysis of HESA data, there has been a steady expansion in pre-1992 universities at the expense of the post-1992 institutions. The rise (and decline) is noticeable from 2014/15 which is when the cap on student numbers was first increased by 30,000 and then lifted altogether from 2015/16. From that point, universities have been able to recruit as many students as they choose. As Sir Anthony Seldon, vice-chancellor of the University of Buckingham remarked “there are a finite

number of students and if some universities take an ever-rising number, others will be left starved of fee income” (Coughlan, 2019a).

The Russell Group and remaining pre-1992 universities appear to be leveraging the competitive advantage of their prestige. Wolf (2015, p. 67) points out that “education is a positional good, in which your place relative to others is crucial, so students will seek out the most renowned institutional brands”. As Marginson argues, prospective students, their parents, and future employers rank a degree by the field of study and the institution at which it was studied; “the acid test is that when faced by a choice between a prestigious university with a known indifference to undergraduate teaching, and a lesser institution offering better classroom support, nearly everyone opts for prestige” (2006, p. 3). In uncertain economic times, students are being more selective in their university choices and seeking the institutions that will best position them in the job market and thus enhance social mobility (Cattaneo, Horta, Malighetti, Meoli, & Paleari, 2019).

The more prestigious universities can also attract higher proportions of international, higher-fee paying students (Jenkins & Wolf, 2016). Universities have a strong incentive to attract students for which the fees are not set by the government and charge them as high as the market will bear (Marginson, 2018). Jenkins and Wolf (2016) found that based on 2013/14 data, Russell group universities had on average more than £2,000 of additional teaching income per student, whereas the post-1992s had almost £1,500 less than the other pre-1992s. The margins on these higher fees are highly fungible and can be used for a variety of purposes, most commonly to cross-subsidise research, which in turn builds reputation, and so enables the charging of higher fees (Jenkins & Wolf, 2016).

Citing Altbach (2002), Martin and Samels (2013) note that open-markets for higher education can reinforce any inequality that exists in the system i.e. the strong get stronger. As the various reports from the regulators discussed previously highlight, there is marked variation in the financial performance of individual institutions. HEFCE (2018b) comments the main financial strength remains in a small number of institutions, moreover, the data highlights a continuing and growing disparity between institutions of different tariff groups.

The Office for Students report on 2017/18 data shows high average tariff providers achieving a slight increase in surplus as a percentage of total income on their 2016/17 figure (to just

over 4%) , whereas medium and low average tariff providers show a sharp decline from 2016/17 to 2017/18, to below 2% and 1% respectively (Office for Students, 2019).

In 2016/17 high average tariff providers experienced an increase of 2% in undergraduate applications for 2017/18, while low and medium-tariff providers saw declines of 5% and 2% respectively. (HEFCE, 2018b). Similar recruitment data are not reported in the latest 2019 report from the now, Office for Students.

As noted earlier, an overdependence on tuition fee income could be catastrophic if a university failed to achieve its recruitment targets. In an article for The Guardian newspaper, Fazackerly (2018) contends that some universities may be pushed to the brink of insolvency as prestigious universities are hoovering up students who may have traditionally gone to less highly-ranked institutions:

Competition has been absolutely cut-throat. There are institutions at the bottom who can't recruit enough students, so they drop their grades and let in students who can't cope with the course and will drop out after one or two years. It's just a slow death.

The narrative in this section suggests that it is the post '92 universities that are the most dependent on tuition fee income and yet it is the pre '92 institutions that are more successful in attracting it.

1.5 Income diversification as a strategy to reduce risk

Whilst it is not an immediate solution, income diversification presents a strategy for universities to mitigate the risks associated with an overdependence on any one source of income (Webb, 2015). An income portfolio reflecting a more balanced reliance between income from teaching, research, third-stream activity, public funding, and investments, is less vulnerable as all sources of income are unlikely to be challenged at once (Besana & Esposito, 2015). Financial stability is crucially important for universities operating in this increasingly competitive environment (Wellington, 2007; Taylor, 2013).

Whether a university's income portfolio is diversified or concentrated has also been noted as an important factor in evaluating the financial health of an institution (Shattock, 2010; Lucianelli & Citro, 2017). In their study of publicly-funded universities in Australia, Irvine and Ryan (2019) find income diversity to be a strong predictor of financial viability. The Financial Sustainability Strategy Group (FSSG) in their 2016 briefing document *Mind the*

Gap: Understanding the financial sustainability, also highlight income diversification as one of the factors influencing the financial sustainability of universities in the UK.

Building on the then Universities UK Security Index (now published by HESA) which measured ratios of i) historical surplus/deficit to total income, ii) ratios of general funds to total expenditure and iii) ratios of net liquid assets total expenditure. Wellington (2007) expanded the index adding three new indicators, iv) ratio of interest payable to total income, v) ratio of expenditure on repairs and maintenance to total expenditure, and most pertinent to this study, vi) the ratio of grants from HEFCE to total income. This last measure was to assess reliance on a single source of income as at this time the concern was dependence on state funding/ability to generate non-state funding. Note the HESA security index has since been updated to include the ratio of total long-term borrowings to total income. Analysing HESA data for 2004/05, Wellington found the top twenty institutions using the original UUK index to be comprised of six small, specialised colleges, six post-1992 universities, and five pre-1992 institutions. However, when using the expanded indicators, eleven of the top 20 positions were dominated by the pre-1992 universities. The author attributes this to lower levels of borrowing and less reliance on public-funding and raises concern at the large representation of post-1992 universities in the bottom 20 of the expanded index.

According to HEFCE, universities appear to be trying to find other sources of income to support ongoing operations “institutions failing to maintain these income streams are at greater risk of financial instability” (2018b, p. 10). Over the 2017/18 academic year higher education providers generated £1.4 billion from collaborative research, £1.3 billion from contract research, £471 million from consultancy, £228 million from facilities and equipment hire, £698 million from CPD and continuing education, £224 million from regeneration and development programmes, and over £207 million of income from intellectual property. Except for income from consultancy, all figures show a significant increase on 2016/17 (HESA, 2019a).

In January 2018, Boxhall and Woodgates published the findings from survey responses and interviews conducted with university vice-chancellors across the UK:

Asked about their strategic priorities, almost every respondent (94%) said their top priority for coming years would be protecting the financial viability and security of their institutions. The most favoured routes to this aim were...diversifying revenue streams (49%), growing new academic and business partnerships, and – perhaps optimistically – growing shares within current (flat) markets. (2018, p. 16)

Whilst the literature and industry narrative supports the importance of income diversification, several studies suggest some universities appear to be more successful than others in achieving a diversified income portfolio (De Zilwa, 2005; Shattock, 2009; Estermann & Pruvot, 2011; Teixeira & Koryakina, 2013; Teixeira, Rocha, Biscaia, & Cardoso, 2014). Although tentative explanations are offered, no studies to date have applied an established measure of income diversification, to then empirically test the factors that may influence it. Thus, from a review of the literature emerges the research problem to be addressed by this study.

1.6 The research problem

In considering reasons why not all universities appear equally successful in diversifying their income, some studies are concerned with international comparisons and so have a focus on external factors that influence income diversification such as institutional autonomy (De Dominicis, Pérez, & Fernández-Zubieta, 2011) or financial regulation within a national framework (Stachowiak-Kudła & Kudła, 2017). However, the majority of studies are concerned with the internal factors that are more within the control of the university. It is these internal factors that are the focus of this study and thus the narrative continues on this basis.

A wide range of internal antecedent factors, ranging from university policies and structures (De Zilwa, 2005; Prince, 2007; Shattock, 2009; Estermann & Pruvot, 2011; Teixeira & Koryakina, 2013), to prestige and reputation (Pilbeam, 2006; Prince, 2007; Teixeira & Koryakina, 2013), have been suggested by the extant research to have an influence on an institution's level of income diversification.

There are, a number of limitations to these studies that create a gap in the knowledge to suggest why some universities are more successful than others in achieving a diversified income portfolio and point to the absence of a nomothetic explanation.

Firstly, there is a lack of systematic testing of the antecedent factors against an established measure of income diversification that reflects the income portfolios of publicly-funded universities. In the context of the focal population for this study. Moreover, it should also be noted that levels of income diversification have not previously been evaluated for higher education institutions in England; consequently, neither has any relationship to the

antecedent factors been tested. This research will therefore additionally be testing the findings of prior studies.

Secondly, the studies as a collection provide a disjointed view and are largely atheoretical, this creates a deficiency in providing a grounded explanation.

Thirdly, the available research is somewhat dated, raising concerns about its contemporary relevance. The most recent studies to focus on the factors that influence income diversification were both based on financial data up to 2009 (Estermann & Pruvot, 2011; Teixeira et al., 2014).

Finally, the literature itself calls for more research. Teixeira et al. (2014) conclude that as the need for universities to be financially diversified continues to be reinforced by circumstance, further research into the factors that influence success is necessary and important.

Thus, the research problem can be summarised as the lack of an established approach to measuring income diversification in publicly-funded universities and the absence of a contemporary, nomothetic explanation to explain the variance.

1.7 The significance of addressing the problem

As Estermann and Pruvot (2011) suggest it is important to understand the antecedent factors that positively influence a university's ability to act strategically in regards to income diversification. With a more nomothetic explanation of the antecedent factors that influence levels of income diversification, university leaders are better equipped to develop strategies to reduce vulnerability and improve financial stability. They can prioritise strategic focus on those factors that will most influence their success in achieving a diversified income portfolio. Moreover, by developing a National Income Diversification Index (presented in appendix A), this study enables university leaders to evaluate their relative positions. Understanding the antecedents and outcomes of income diversification also helps guide policymakers to consider how they can support universities to be more financially sustainable.

Finally, more contemporary empirical testing of these concepts also advances the academic debate which currently may be considered to lack relevance in certain jurisdictions.

In addressing the problem, this study makes a number of original contributions to knowledge and practice; firstly, it offers a model for income diversification measurement, the adoption of which not only enables statistical testing, but means academic leaders and policymakers can monitor and benchmark performance. Secondly, it advances the debate by challenging the current definition of income diversification as being about moving away from dependence on public funds. Thirdly, the sequential explanatory mixed method design means that interpretation of the quantitative results is grounded in empirical evidence. And finally, this study brings the higher education and non-profit literatures closer together.

1.8 The theoretical lens through which the problem is viewed

In explaining why some universities are more successful than others in achieving a diversified income portfolio, this study adopts the resource-based view as the theoretical base to drive the inquiry. This positions the antecedent factors as the tangible and intangible resources a university may possess that confer an advantage in this regard. The framework places these resources as explanatory variables, with the level of income diversification as the dependent variable. Figure 1.1 shows the resource-based view positioned in the broader context of this research. Thus, this study additionally makes a contribution to theory by testing and confirming the resource-based view in a new context, thus extending its relevance.

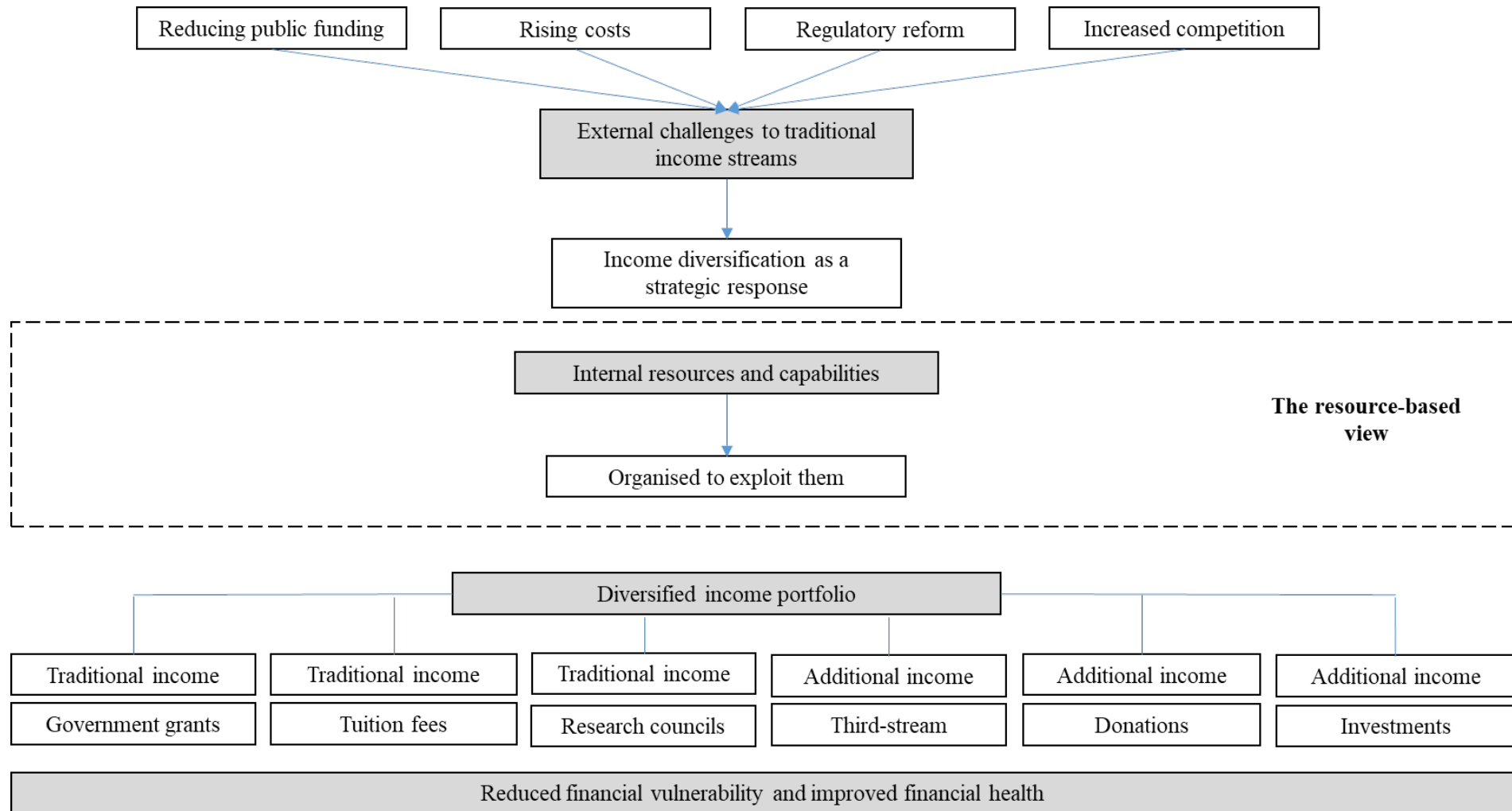


Figure 1.1: The resource-based view positioned within the context of this research.

1.9 The research aim

To confront the research problem, the aim of this study is to offer a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio.

1.10 The research questions

To achieve the aim of this research, three research questions are addressed:

Research question 1: How diversified are the income portfolios of publicly-funded, non-specialist universities in England?

Research question 2: Which resources and capabilities of a university have the greatest influence on achieving a diversified income portfolio?

Research question 3: Why do the resources and capabilities of a university have an influence on the level of income diversification achieved?

1.11 The research objectives

To address these questions, the following four objectives are met:

Objective 1: To develop a model for obtaining a more accurate measure of income diversification that takes into account third-stream income.

Objective 2: To establish a national income diversification index for publicly-funded, non-specialist universities in England (therefore creating the dependent variable).

Objective 3: To deduce the resources and capabilities of a university that have a statistically significant, positive effect on a university's level of income diversification (so creating the explanatory variables).

Objective 4: To inductively explore the underlying mechanisms behind any statistical relationships established, thus developing a richer explanation of any causal effect.

1.12 The research hypotheses

To meet the third objective and so address the second research question, several hypotheses grounded in prior studies and the resource-based view are advanced. Firstly, the hypotheses focus on establishing whether there is a relationship between a university's resource-set as a whole and then to test if it is specifically the capabilities of an institution that has the strongest relationship with a diversified income portfolio. In common with a number of resource-based studies, the hypotheses are paired, the second being a deeper view on the first. Note the hypotheses are directional in their language, as Creswell and Plano Clark (2011) comments, directional hypotheses are more popular and more definitive of the anticipated results.

Hypothesis 1a: A university's unique bundle of resources have a statistically significant, positive effect on its level of income diversification.

Hypothesis 1b: Within a university's unique bundle of resources, it is the capabilities of the institution that has the greatest statistically significant effect on its level of income diversification.

Secondly, 12 individual resources are analysed, firstly to establish if there is an individual relationship, and secondly to consider that relationship in combination with all the other resources. Hypotheses 2-13 are identical but for the resource under study, the first is presented as an illustration.

Hypothesis 2a: There is a statistically significant, positive relationship between a university's [regional location] and its level of income diversification.

Hypothesis 2b: The significant relationship persists when allowing for the combined effects of an institution's unique bundle of resources.

This hypothesis is replicated for the resources and capabilities as discussed in the following two chapters. Being based upon antecedent factors suggested by prior studies as having an influence on income diversification, these hypotheses are also testing the extant research.

1.13 The research methodology and methods

To address the research questions and achieve the research aim, this study is located in the post-positivistic paradigm. This reflects a more deterministic world-view of research where

some kind of causal relationship is assumed (Creswell, 2014). Research in the post-positive tradition progresses through hypotheses and takes a predominantly deductive approach to test previous knowledge and theory in new contexts to find the answer to a research problem (Bryman & Bell, 2015). Deductive approaches are typically associated with quantitative data and statistical analysis (Robson, 2011).

However, post-positivism is deemed a humbler form of positivism, contending that reality can only be imperfectly known (Phillips & Burbules, 2000). Post-positive researchers seek a deeper understanding of the causal relationships and recognise quantitative methods alone may not be sufficient to achieve a meaningful explanation (Guba & Lincoln, 1994). To make a meaningful contribution to practice, it is important to understand how and why a particular resource is having the influence it is having. This necessitates a more inductive, interpretive approach commonly associated with qualitative data and analysis (Collis & Hussey, 2014).

Whilst these two positions appear philosophically opposed, there is growing acceptance of the value of leveraging the benefits of both quantitative and qualitative data within one study (Teddlie & Tashakkori, 2009). In this research, qualitative data are used to inductively construct the reality to help explain the causal effects of the relationships deductively established. Thus, an explanatory sequential mixed method research design emerges; comprising a quantitative phase followed by a qualitative phase (Creswell, 2014). The outcomes of both are then integrated into the final discussion where the qualitative findings are used to explain the quantitative results. The quantitative phase is nevertheless dominant, this is commonly notated as $QUAN > qual$ in mixed method studies (Morse, 2016).

For the quantitative phase, data are collected from secondary and archival sources for all 102 universities in the focal population described at the beginning of this chapter. Data covering 2012/2013 to 2016/2017) are obtained from the following: sector Financial Reports and results of the Higher Education Community and Business Interaction (HE-BCI) survey, published by HESA; the results of the annual Ross-CASE Survey of Charitable Giving to Universities, published by the Council for Advancement and Support of Education (CASE); the UK Competitive Index (UKCI) published by the Centre for International Competitiveness and finally, The Sunday Times university league table data published by The Times & Sunday Times.

These quantitative data are analysed using univariate, bivariate and multivariate approaches. The univariate analysis presents the descriptive statistics e.g. measures of central tendency

and dispersion. Bivariate analysis is used to establish measures of association between the individual resources and levels of income diversification, and finally, multivariate analysis is used to determine the individual and combined effect of the resources on the levels of income diversification and to provide an estimate of the relative importance of each resource in explaining the variance. To achieve this, Ordinary Least Squares (OLS) multiple regression analysis is chosen as the estimation method. To test the range of hypotheses outlined earlier, a hierarchical (or sequential) regression approach is adopted within the OLS estimation method. Accordingly, the incremental changes in explanatory power can be assessed at each stage. The statistical analysis is conducted using IBM SPSS 24 and StataCorp Stata 15 software packages.

For the qualitative phase, data are collected through 16 semi-structured interviews with vice-chancellors, pro-vice-chancellors, and directors of finance from universities within the focal population. The transcriptions of the interviews are analysed using a template analysis approach. Template analysis is a more applied, structured form of thematic analysis. The analysis is conducted using NVivo 11 software package.

As noted, the findings of the quantitative and qualitative phases are brought together in the final discussion to offer a fuller explanation than either phase in isolation (Creswell & Tashakkori, 2007).

Figure 1.2 presents a diagram detailing the explanatory sequential mixed method design adopted in this study to address the research questions and achieve the research aim.

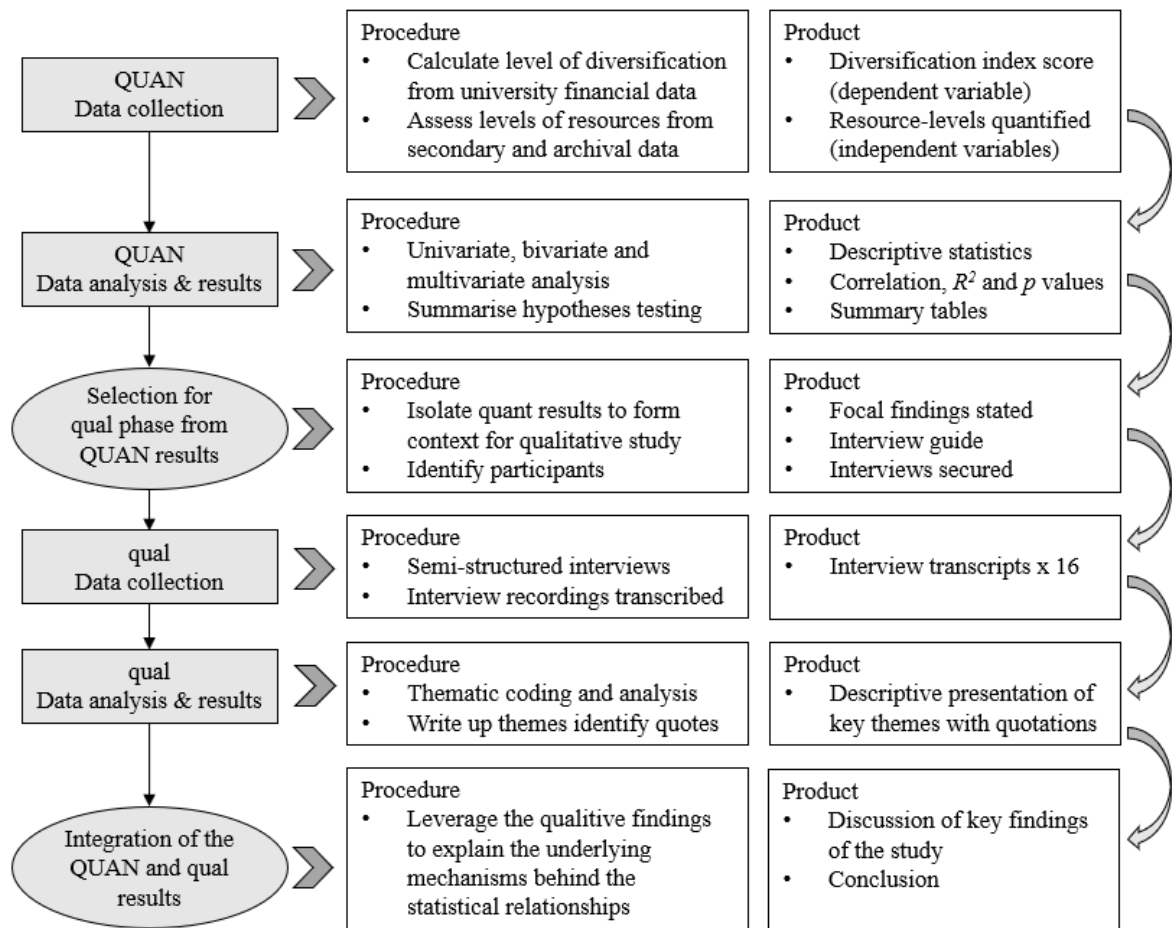


Figure 1.2: Detailing the explanatory sequential mixed method design of this study. Adapted from Creswell and Plano Clark (2011).

1.14 Thesis structure

This thesis utilises eight chapters to present the research, figure 1.3 visualises the chapters and indicates where the various research questions are fully explored. Building on this initial introduction chapter, the thesis is structured as follows.

Chapter two: A review of the literature. This chapter contextualises and justifies the need for this research by considering to what extent the available literature can address the research questions or what knowledge is still required in order to achieve the research aim. The review is also used to harvest antecedent factors suggested by prior research to have an influence on the level of income diversification.

Chapter three: Theoretical framework and hypotheses. This chapter presents the theoretical framework that drives the inquiry and develops the hypotheses to test the factors harvested from the extant research.

Chapter four: Research methodology and methods. Having created the theoretical framework for the study, this chapter discusses the most appropriate research design to meet the research objectives, address the research questions and achieve the research aim from the perspective of the philosophical paradigm underpinning the research. The chapter then moves on to discuss the most appropriate data collection and data analysis methods considering the research design.

Note: to reduce the complexities of presenting a mixed method study, the analysis and results of the quantitative and qualitative phases are presented within dedicated chapters rather than one ‘analysis and results chapter’. For consistency, each chapter follows the same structure with the same headings.

Chapter five: The quantitative phase. This chapter presents the quantitative phase in its entirety in terms of justification for the sample, operationalisation of the variables, description of the secondary and archival data collected, statistical analysis and results. This phase investigates the first and second research questions.

Chapter six: The qualitative phase. This chapter presents the qualitative phase in its entirety in terms of justification for the sample, selection of the quantitative results to explore, interview data collection process, thematic analysis, and findings. This phase investigates the third research question.

Chapter seven: Discussion of key findings. It is in this chapter that the findings of the two phases are integrated. The qualitative findings are used to interpret the quantitative results to help understand the underlying mechanisms and develop a richer explanation of any causal effect. The key findings of the study are synthesised with the available research discussed in the review of the literature (chapter two) and the theoretical framework (chapter three).

Chapter nine: In conclusion. This chapter summarises how the study has met the research objectives, addressed the research questions and therefore achieved the research aim. It is in this chapter that the nomothetic explanation is articulated. The chapter also discusses the contribution of the research to theory, knowledge, methodology, policy and practice; alongside recommendations for practice aimed at university leaders and policymakers. Finally, the chapter discusses the strengths and limitations of the study with suggestions for future research.

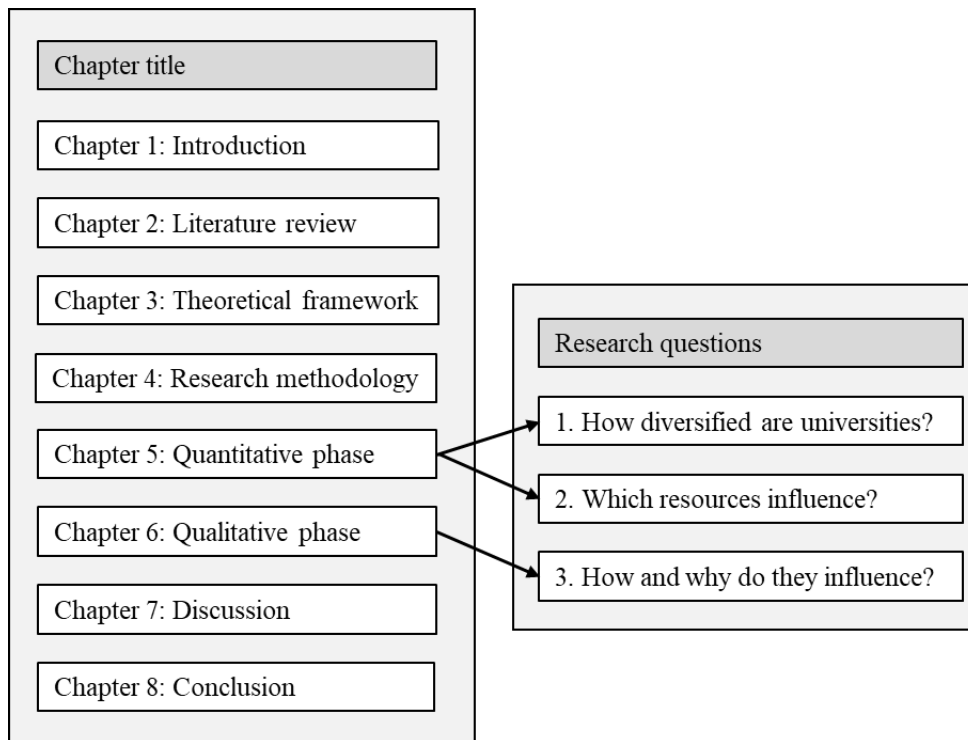


Figure 1.3: Illustrating which thesis chapters explore which research questions.

1.15 Chapter conclusion

This introductory chapter has described the challenging higher education environment in England thus highlighting the importance of income diversification. A summary of the literature suggests a gap in knowledge regarding a generalisable explanation as to why some universities appear more successful than others in achieving a diversified income portfolio. The following chapter considers the literature in more depth and to what extent it can answer the research questions outlined in this chapter, or what knowledge is still required in order to achieve the research aim.

Chapter 2: A Review of the Literature

2.1 Chapter introduction

Having provided background to the research problem and outlined the aim of this research, the purpose of this chapter is to contextualise and justify the need for this study. The chapter considers to what extent the available literature can address the research questions or what knowledge is still required in order to achieve the research aim. This chapter presents a critical analysis and synthesis of the available theoretical and empirical literature related to the concepts under study. This literature review is also used to harvest the antecedent factors that have been suggested by prior research to have an influence on levels of income diversification so they may be empirically tested by this study.

This second chapter is structured around a series of questions designed to introduce, summarise and critically analyse the concepts underpinning the research questions and the overall aim of this research. The review begins with a synthesis of the key narrative themes in the higher education literature regarding income diversification, before critically analysing the empirical findings to date. Firstly, the parameters of the review and literature search are briefly discussed.

2.2 Parameters of the review

When conducting a review of the literature, it is important to recognise limitations to scope in order to keep the review focused (Hart, 2018). There are two areas related to the narrative for income diversification in higher education that are worth highlighting as being out of scope for consideration in this review.

Firstly, in addressing the topic of higher education funding and income diversification there is often a focus on the question of charging tuition fees with all the controversy that entails (De Zilwa, 2005; Webb, 2015). This is variously termed as cost-recovery (Ziderman & Albrecht, 1995) or cost-sharing (Johnstone, 2002; Teixeira & Koryakina, 2016) the premise being those that benefit from higher education should at least share in the cost (Johnstone, 2002). Although referred to in the income diversification literature, the cost-sharing debate is considered outside the scope of this review.

Secondly, the income diversification literature is inexorably linked to that of the entrepreneurial university. This is in part due to Clark (1998) stating that a diversified funding base was a key requirement for transformation to an entrepreneurial university. The relationship can be seen by reference to Etzkowitz (2003) who suggests that financial challenges have caused higher education institutions to become more entrepreneurial and diversify their income. The entrepreneurial university combines a third economic mission with its missions of teaching and research. Over time the literature regarding this third mission has increasingly become about public good i.e. regional and national development and less about its role in income generation for the university (Clauß, Moussa, & Kesting, 2018). Thus, some of the entrepreneurial university literature is considered out of scope for this review.

Finally, at a few points in this review, it is necessary to draw upon the non-profit management literature to compensate for income diversification research being underdeveloped in the higher education management literature. In a similar position, Webb (2015) notes that empirical studies on income diversification in higher education are sparse and makes the case for the relevance of non-profit studies on two grounds. Firstly, both operate in trust markets characterised by asymmetric information, and secondly, both are typically motivated by more idealistic goals than commercial organisations. Any non-profit studies cited in this review are limited to those that included higher education institutions in their sample.

2.3 Parameters of the search

The search for literature was focused on income or revenue diversification in higher education and also more broadly in non-profit organisations. An initial review of the resulting abstracts created a shortlist of 52 papers from the higher education literature and 78 from the non-profit management literature. These papers reflected a mixture of theoretical and empirical studies and many made a contribution to this review in some way. However, the most pertinent empirical studies in higher education on which this review is based comprise 18 studies, selected on the basis of their relevance to the aim of the research, thus seeking relevance over volume (Hart, 2018).

To contextualise and justify the need for this research, it is first necessary to describe the concepts of publicly-funded universities in England in terms of understanding their structure and how they are funded.

2.4 What are publicly-funded universities in England?

The purpose of this section is to review the current understanding of the concept of publicly-funded universities in the context of England before considering what is known in regard to the broader concept of income diversification. This section briefly describes the structure and funding mechanisms for universities in England.

In common with a number of countries in Europe such as France, Sweden, and Spain; the UK operates a unitary system for higher education provision. Unitary systems are seen as being constituted of similar institutions (Marginson, 2018). This is in contrast to binary systems such as operate in Portugal, Germany, and Greece where the higher education sector is comprised of universities and vocational institutions, including polytechnics (Santoalha, Biscaia, & Teixeira, 2018).

The UK is considered one of the least differentiated systems in Europe; all universities engage in teaching and research and offer courses at all levels, albeit some to different proportions (Scott & Callender, 2017). It has not always been thus, a white paper published in 1966 set out the government's plans for the establishment of 30 vocationally-oriented polytechnics as the leading institutions in the non-university higher education sector. These new institutions were formed from over 50 existing technical and other colleges (Pratt, 1997). However, this binary distinction was discarded in 1992 when these polytechnics and existing teaching colleges were brought together with traditional universities in a single, unitary system, both conceptually and in terms of policy (Shattock, 2012). The Further and Higher Education Act 1992 granted the now, 35 polytechnics, university status so increasing the number of universities in the UK by 50% and doubling the number of students receiving a university education (Boliver, 2015).

Universities in England are often referred to as pre-1992 or post-1992 universities as a way of distinguishing the 'traditional' universities from the former polytechnics (Scott & Callender, 2017) and also the increasing number of new universities that have emerged as a result of a succession of regulatory changes to designation (Boliver, 2015).

Although the majority of universities are publicly-funded institutions, there are also a number of private for-profit higher education providers or 'alternative providers' as they are commonly known. These include the small number of private universities in the UK (The University of Buckingham being the most established example); as well as a variety of other types of organisation formally recognised by the regulators as offering higher education

qualifications. These for-profit alternative providers, do not receive any annual public funding directly, their students are however eligible to apply for the government-backed student loan scheme to pay their tuition fees (Brown & Carasso, 2013).

There are also a number of specialist institutions with degree awarding powers that are not classified as universities, for example, the Royal Academy of Music. Moreover, a number of further education colleges also provide degree level study in partnership with an awarding university (Marginson, 2018).

Until 2015/16 the numbers of students any university could enrol was controlled and capped by the government, there are currently no such restrictions (House of Commons, 2018a).

The government only became seriously involved in the funding of higher education after the First World War, and was not the dominant source of income until after the Second World War. Strongly in favour of decentralised control of higher education, the University Grants Committee (UGC) system was established in 1918 to enable universities to be funded by public monies, but free from political interference in how it was distributed. Government grants were paid to the committee who in turn allocated it to individual universities. Universities were then free to spend these 'block grants' how they wished (Williams, 2006). Under the Education Reform Act 1988 the powers of the UGC were transferred to the new Universities Funding Council (UFC) which was directly responsible to Parliament (Shattock, 1994).

As well as bringing together universities and polytechnics under one system, the Further and Higher Education Act 1992 also established the Higher Education Funding Council for England (HEFCE) to fund this new unitary system (with separate councils for Scotland and Wales). Previously, polytechnics had been locally controlled and financed (Brown & Carasso, 2013). All institutions whether The University of Oxford or a former polytechnic were funded for undergraduate and postgraduate teaching from the same standardised formula. Funding for research was more selectively distributed, based on the quality of research (and largely driven by performance in the periodic Research Assessment Exercises (RAE)), nonetheless, all institutions were eligible to receive funding (Bence & Oppenheim, 2005).

The approach to the public funding of research has remained largely along similar performance-based lines, albeit that the RAE was renamed the Research Excellence Framework (REF) for the 2014 run (Marginson, 2018), and remained at reasonably

consistent levels (House of Commons, 2018a). From 2009/10 performance in these frameworks is what drives the level of Quality Related (QR) research funding a university receives (Brown & Carasso, 2013). However, the same cannot be said for funding for teaching. As fees for postgraduate programmes are not regulated, the following discussion will focus on tuition fees for undergraduate programmes.

Since 1998, substantial reforms to funding for tuition have taken place, particularly in England. It is out of scope to explore the ensuing political and ideological debates associated with the reforms, but a brief summary of the timeline is presented.

In 1998 a £1,000 annual tuition fee for programmes replaced the free university education in England that had been in place since after World War II (although not formalised until the Education Act 1962 granted exemption for domestic full-time students from university tuition fees (Anderson, 2006)). The £1,000 fee was implemented on a means-tested basis (Marginson, 2018). In 2004, the fee was increased to £3,000 and funded using income-contingent student loans (Brown & Carasso, 2013). Under a unitary system, these fees were charged by all universities regardless of historical roots and still ‘topped up’ by public funds (McGettigan, 2013). Faced with rising demand and escalating costs at a time of global economic crisis, a sustainable model for higher education financing was sought (McGettigan, 2013). The 2010 recommendations of the Independent Committee on Student Fees and Funding, chaired by Lord Browne, saw the introduction of a basic threshold fee of £6,000 and a maximum fee of £9,000 able to be charged for domestic student tuition from September 2012/13. By setting it as a cap, the aim was to create a market of choice and competition thus driving up quality (Jabbar et al., 2017). However, most universities set their fees at the maximum £9,000 level as to do otherwise was perceived as a potential risk to reputation (Marginson, 2018). As McGettigan (2013) notes, when introduced, the £9,000 fee presented a large increase on the 2011/12 fees which by this time were at £3,375. In 2017 the tuition fee cap was given an inflationary raise to £9,250, where it remains at time of writing.

The point of note in the context of this study, is that as a result of these reforms, with the exception of some public funding toward high-cost science, engineering and medicine subjects, tuition is paid for [eventually] by the student rather than government grants (Jenkins & Wolf, 2016; Scott & Callender, 2017). McGettigan refers to this as “internal privatisation - the changes to revenue streams within institutions so that for example, direct public funding is replaced by *private* tuition fee income” (2013, p. 9).

All full-time undergraduate students can apply for government-backed, income-contingent loans from the government-owned Student Loan Company (Marginson, 2018). These loans are repayable when post-graduation income from employment reaches a certain level and repayments are deducted as part of the income tax process (Brown & Carasso, 2013). Tangential to this discussion, is the fact that the way the government-backed student loans are accounted for in government spending changed in 2018 and now form part of the government deficit (Office for National Statistics, 2018).

There is variation in the rest of the UK; Welsh students in Wales have the same fees as England, Northern Ireland has fees but set at nearly a third of those in England and Wales; and for young undergraduate Scottish students (as opposed to students from other jurisdictions studying in Scotland), their tuition is wholly paid by public funds (Marginson, 2018).

Fees to international students depend on where the student is domicile; fees to EU students currently [pending the UK's withdrawal from the European Union] are regulated to be the same as to their UK domicile counterparts, whereas fees to non-EU students are not regulated and a primary source of discretionary income. This lack of regulation means fees tend to be grounded at the UK level and then freely varied upward depending on the prestige of the university (Marginson, 2018). As Jenkins and Wolf (2016) point out, universities have an incentive to seek out students for whom fees are not regulated by the government. Marginson (2018) notes therefore, universities have developed a high financial dependence on fees from non-EU international students.

Fees for postgraduate programmes are similarly set by the institution and can vary according to prestige. From August 2016 students could apply for the government-backed student loan scheme for master's degrees, and from August 2018 for doctoral degrees (Bolton, 2019).

In February 2018, the UK government announced another major review of higher education to be chaired by Sir Philip Augar, funding is within its scope (GOV.UK, 2018). The implications of the recommendations announced in May 2019 are still being debated at time of writing.

Note: as a result of the Higher Education and Research Act 2017, HEFCE was replaced by the Office for Students (OfS) from January 2018 and UK Research and Innovation (UKRI) from April 2018. Responsibility for funding teaching and research is divided between the two bodies.

In seeking additional income, higher education institutions around the world often pursue third-mission activities (teaching and research being the first and second missions), which tend to focus on commercial engagement with business (Pinheiro, Langa, & Pausits, 2015). As there can be regional and national economic benefits associated with this ‘knowledge exchange’ activity, the UK government developed additional funding mechanisms to encourage and reward it (Rossi, 2018). The Higher Education Innovation Fund (HEIF), launched in England in 2001, distributes funds based on an assessment of an institution’s knowledge exchange performance (Fuller & Pickernell, 2018). Similar funds have been launched in the other UK jurisdictions: the Innovation and Engagement Fund in Wales, the Knowledge Transfer grant in Scotland and Northern Ireland similarly has a Higher Education Innovation Fund (Rossi & Rosli, 2015). How performance in knowledge exchange is assessed is currently under review, the consultation period for a proposed Knowledge Exchange Framework (KEF) drew to a close at time of writing (UKRI, 2019).

The following sections synthesise the broader literature to explain the concept of income diversification and the theories that underpin it.

2.5 What is income diversification?

Income is defined by the Oxford English Dictionary as “money received on a regular basis, for work or through investments” (Income, n.d.). Diversification is defined as “the action of making or becoming more diverse or varied” (Diversification, n.d.). Thus, the concept of income diversification relates to having diverse and varied sources of regular income.

In the fishing industry, income diversification helps reduce the financial risk associated with high year-to-year variation in income caused by variations in their catch due to external regulations, market forces and the weather (Kasperski & Holland, 2013). Similarly, in the literature relating to agriculture and farming, income diversification is seen as a risk management strategy to reduce the adverse effects of fluctuations in yields caused by weather or the price of commodities influenced by external market conditions (Mishra, El-Osta, & Sandretto, 2004; Wan, Li, Wang, Liu, & Chen, 2016). In the banking sector, income diversification is seen as a strategy to mitigate some of the financial risks associated with external regulation and market competition (Meslier, Tacneng, & Tarazi, 2014; Brahmana, Kontesa, & Gilbert, 2018; Jiang & Han, 2018). For non-profit organisations, the literature points to income diversification as a strategy to reduce the resource uncertainty and volatility caused by business-cycle fluctuations, reductions in public spending, economic impacts on

donations and the intense competition caused by the scaling-up of the non-profit sector (Mayer, Wang, Egginton, & Flint, 2014; De Los Mozos, Duarte, & Ruiz, 2016; Zhu, Ye, & Liu, 2018). Finally, the higher education literature highlights the role of income diversification to improve financial stability (Besana & Esposito, 2015; Webb, 2015; Stachowiak-Kudła & Kudła, 2017) and reduce vulnerability (Namalefe, 2014), caused by diminishing public funding (Estermann & Pruvot, 2014; Teixeira et al., 2014), policies of massification (Teixeira & Koryakina, 2013; Jacob & Gokbel, 2018) and increased competition (Taylor, 2013; Besana & Esposito, 2015; Koryakina, 2018).

From whichever disciplinary perspective it is viewed, the apparent rationale for income diversification is to reduce exposure to financial risk caused by changes in the external environment. This multi-disciplinary view reinforces the notion that external environments are largely beyond the control of the focal party, yet they have the power to adversely affect income. The degree to which the party is dependent on that income will influence how it responds to these challenges (Pfeffer & Salancik, 2003). The theories underpinning income diversification are discussed in the following section.

2.6 What are the theories underpinning income diversification?

There are two theories commonly associated with research into income diversification; resource dependence theory and modern portfolio theory (Zhu et al., 2018).

Resource dependence theory put forward by Pfeffer and Salancik in 1978 in their seminal work *The External Control of Organizations* subsequently reissued in 2003, suggests the survival of an organisation depends on its ability to acquire and maintain resources. Hence, its dependency relationships with external organisations bring in the concepts of control and autonomy; when resources are abundant and certain, external dependency is not problematic. However, when resource flows become unstable, the organisation's survival is threatened. A key tenet of resource dependence theory is that organisations are not passive, changes in the external environment will drive organisational behaviour; they will respond to these resource flow challenges in a variety of ways. The extent of the threat and the degree of response will depend on the extent to which a) the resource is important to the organisation's functioning and b) the extent to which it is not available through other sources. Thus the most precarious situation for an organisation is a dependence on a single source for vital resources (Pfeffer & Salancik, 2003).

Publicly funded higher education institutions are described as having high dependence due to their concentration of funding sources (Slaughter & Leslie, 1997). As Webb (2015) acknowledges, resource dependence theory provides the rationale for universities to seek multiple and diverse sources of income to reduce dependence on any one source. A strategy of income diversification (seeking additional sources of funding), is an obvious institutional response to changes in higher education policy and resource dependence (Slaughter & Leslie, 1997).

Modern portfolio theory most commonly acknowledged to Markowitz (1952) suggests that a diversified portfolio of assets can reduce investment risk (although potentially delivering reduced reward). The rationale is to balance riskier high-return investments, with stable lower-return investments so minimising the variance between expected and received returns and reduce overall portfolio volatility. Markowitz places emphasis on the need to consider the nature of the investments in the portfolio and avoid investments that have a high covariance among themselves. A useful illustration is provided:

The adequacy of diversification is not thought by investors to depend solely on the number of different securities held. A portfolio with sixty different railway securities, for example, would not be as well diversified as the same size portfolio with some railroad, some public utility, mining, various sort of manufacturing, etc. The reason is that it is generally more likely for firms within the same industry to do poorly at the same time than for firms in dissimilar industries. (1952, p. 89)

Drawing on modern portfolio theory Webb (2015, p. 75) acknowledges in higher education “all revenue dollars may not be created equal”, as dependable government income is contrasted with the competitive tuition fees market. Similarly, Stachowiak-Kudła and Kudła (2017) referencing modern portfolio theory contend a higher share of income from the private sector creates higher risk as contrary to the public sector, the private sector is not obliged to fund higher education.

The focus of this study is not, however, on *why* universities diversify their income or what they hope to achieve by such a strategy. Instead, it inquires why some universities appear to be more successful in achieving a diversified income portfolio. To address this, the study is underpinned by the theory of the resource-based view and is discussed in the next chapter that presents the theoretical framework for the study.

The following sections critically analyse the key narrative themes in the higher education literature regarding income diversification, before examining the related empirical findings.

2.7 What are the key narrative themes regarding income diversification?

Empirical research on income diversification in higher education is sparse, so this review firstly considers and synthesises the key narrative debates in the theoretical and empirical literature and before examining the various empirical findings.

In reviewing the selected theoretical and empirical papers on income diversification, some broad debates emerge. The overarching theme in the discourse is that these are financially challenging times for higher education (Kwiek, 2017). Considering the literature spans some 30 years, it appears it has been ever thus for the sector and will likely continue. From the earliest reference in a higher education context by Chabotar (1989) to the most recent in Koryakina (2018); income diversification is seen as a necessary response to help mitigate the risks associated with dependence on any one source of income in challenging financial environments. The available literature on income diversification in higher education positions the following concepts.

2.7.1 Universities are actively diversifying their income

The realisation that the sector is keenly sensitive to external factors has led universities to realise the value of a diversified income portfolio (Webb, 2015). The dual pressures of rising demand and financial stringency mean that sources of funding for higher education are increasingly diversified (Zhao, 2001). As Taylor (2013) contends, in this harsh environment, good financial management includes the need to develop a diversified income base. Various studies confirm that higher education institutions around the world are pursuing a strategy of income diversification (Zhao, 2001; Stewart, 2008; Shattock, 2009; De Dominicis et al., 2011; Estermann & Pruvot, 2011; Webb, 2015).

2.7.2 The sources of income for publicly-funded higher education institutions

Writing in 2009, Shattock suggested in broad terms, most publicly funded institutions in Europe receive their income via three main sources; regular core income from government for teaching and basic research; additional research funds from public sources that are often earned on a competitive basis and finally, third-stream income that represents income earned on a quasi-commercial basis for example; contract research, professional development programmes and use of university facilities. However, over time this categorisation is clearly lacking recognition of the increasing importance of student contributions. Accordingly, in

their large scale European study, Estermann and Pruvot (2011) highlight the following broad categories of income; a) public funding (both block grants for teaching and research and competitively earned funding for research), b) private funding through student financial contributions (tuition fees and administrative expenses), and finally, c) other private funding (for research and education-related contracts, philanthropic donations, consultancy, hiring of facilities etc.). This appears a reasonable approximation to current funding arrangements and is confirmed by Jongbloed and Vossensteyn (2016) in their comparison of funding across OECD countries. Figure 2.1 adapts their schematic to encompass the UK position.

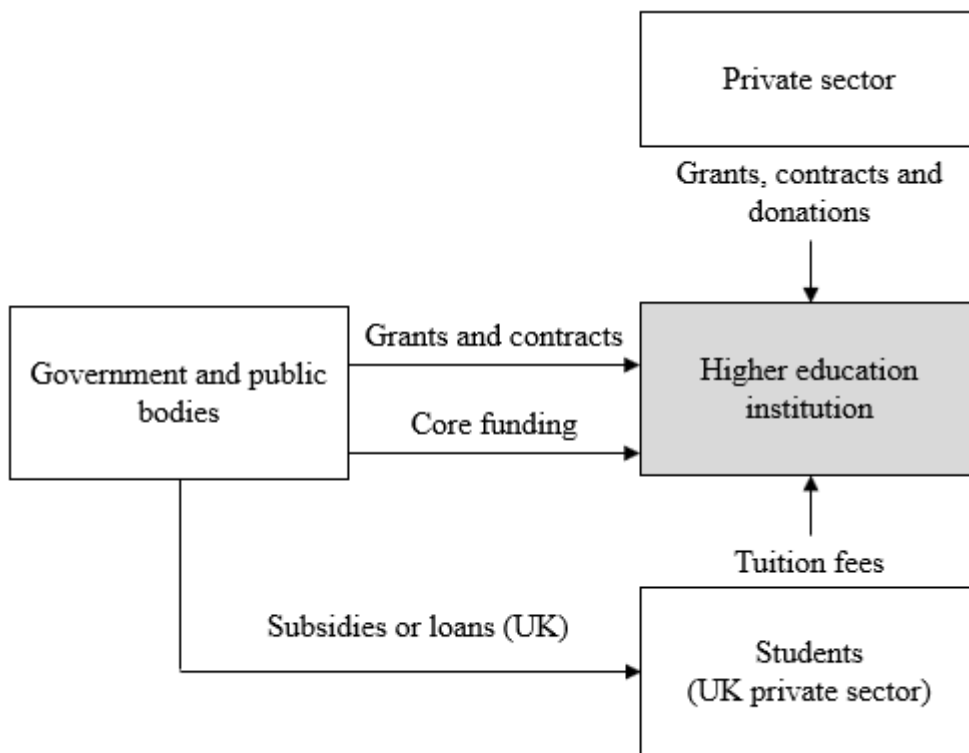


Figure 2.1: Funding channels for a higher education institution. Adapted from Jongbloed and Vossensteyn (2016).

In terms of the activities engaged in to generate additional income or third-stream income, most oft-cited in this regard are Hearn’s (2003) eight domains of revenue-seeking efforts as summarised in table 2.1.

Table 2.1: *Hearn's Eight Domains of Revenue-seeking Efforts*

Domain	Example
Instruction:	including online programming and niche-oriented non-degree programming.
Research and analysis:	including technology-transfer initiatives, business incubators, and e-commerce initiatives.
Pricing:	including differentiated pricing and user fees.
Financial decision making and management:	including venture capital investment, as well as participation in arbitrage and options markets.
Human resources:	including compensation incentives for entrepreneurship and retirement/rehiring incentives for faculty.
Franchising, licensing, sponsorship, and partnering arrangements with third parties:	including logo-bearing clothing, tours and camps, and event sponsorships.
Auxiliary enterprises, facilities, and real estate:	including on-campus debit cards, facility rentals, and alumni services.
Development:	including appeals to donors abroad and other efforts.

Source: Hearn (2003, p.iii)

It is helpful to note, the term third-stream income is often used to encompass all income generating activity that is peripheral to the core activities of teaching and research in academic environments and contexts (Molas-Gallart & Castro-Martínez, 2007; Shattock, 2010; Koryakina, Sarrico, & Teixeira, 2015).

2.7.3 The perceived drivers for income diversification

The recurrent themes suggesting a stimulus for pursuing a strategy of income diversification include; reducing public funding, rising costs, greater competition and the perceived risk of dependence.

Johnstone's (2002) contention that demand is rising faster than government's ability to pay for it is often cited in the income diversification literature (Stewart, 2008; Shattock, 2009; Namalefe, 2014; Feleke, 2015). Exacerbated by current global economic challenges and increasing demands on the state (Liu, 2007; Teixeira et al., 2014), public funding as a proportion of income for higher education institutions is declining and this is cause for

concern (De Zilwa, 2005; Pilbeam, 2006; Liu, 2007; Rozmus & Cyran, 2012; Webb, 2015).

As McCaffery opines:

The traditional and staple source of funding for HEIs i.e. government is no longer either reliable or munificent. On the contrary, mainline institutional support from the government, as a share of the total budget, has declined virtually everywhere. Not only that, the emergence of 'contractual' government has robbed universities of the ability to plan for the long term with any degree of confidence. (2010)

Compounding the issue, costs are rising as the established sources of income are diminishing, consequently costs outpace the available revenue (De Zilwa, 2005; Alstete, 2014; Feleke, 2015). Rising per-student costs are magnified by pressure to expand enrolment (Johnstone, 2002). As Estermann and Pruvot contend "costs are rising due to massification, growing demand, additional and tougher accountability requirements, new societal demands on institutions and the rising costs of human resources (pensions, etc)" (2011, p. 16).

An emerging theme in the discourse is that students have higher expectations, so it costs more to compete for them. Increasing competition and benchmarking has caused many European institutions to pour money into expanding research capability and the qualifications of their staff, this has driven up costs (Alstete, 2014; Teixeira et al., 2014).

The competition for students and their tuition fees is growing internationally as many universities now compete in global markets (Pilbeam, 2006; Besana & Esposito, 2015; Koryakina et al., 2015). In addition, some of the government funding is now on a competitive basis, putting universities in competition with each other (De Dominicis et al., 2011; Estermann & Pruvot, 2011; Stachowiak-Kudła & Kudła, 2017). Overall, increased competition between universities cause them to look for as many funding sources as possible (Prince, 2007; Rozmus & Cyran, 2012). Besana and Esposito (2015) note, these competitive pressures even extend to fundraising.

The need to reduce dependence on diminishing public funding is the primary driver for income diversification in the available literature (Johnstone, 2002; Liu, 2007; Rozmus & Cyran, 2012; Teixeira et al., 2014). Prophetically writing in 1992, Albrecht and Ziderman comment "Resources at institutions should be more diverse. Minimizing dependence on any one source reduces potential shocks of eventual changes in available public resources" (1992, p. 54).

Thus, the dominant narrative reflects that institutions are diversifying away from public funding to improve financial viability by generating revenues from non-governmental

sources (Feleke, 2015; Chirica & Puscas, 2018). As Shattock confirms “Financial stability is an important component in achieving academic success, but this can only be attained in the modern period from a diversified funding base in which the state does not provide the major proportion of the income” (2010, p.195).

Universities turn to income diversification to make up shortfalls in their funding caused by declining public monies (McCaffery, 2010; Shattock, 2010; Teixeira & Koryakina, 2013; Koryakina, 2018). In the US, declining public funding is countered by universities raising their tuition fees, although there is a limit to what the market will bear and so institutions seek additional revenues to supplement these reductions (Hearn, 2003; Alstete, 2014; Webb, 2015).

Finally, institutions diversify their income to be more adaptable; being less dependent on declining public funds can lead an institution to be more able to adapt to changes in its external environment (De Dominicis et al., 2011; Abankina, Vynaryk, & Filatova, 2017). The rise of performance-based funding has also prompted universities to seek alternatives with fewer strings attached (Shattock, 2010).

This slightly myopic view in the literature that income diversification is all about reducing dependence on public funding presents a developing gap in the discourse as it lacks contemporary relevance in some jurisdictions. Only Webb (2015) considers the risk of being overly dependent on tuition fees, but his study is on private, non-publicly funded institutions so public-funding declining or otherwise is not central to the argument.

There does, however, appear to be consensus of the importance of a more balanced income portfolio and to not be too dependent on any one source of income, whatever it may be (De Zilwa, 2005; De Dominicis et al., 2011; Webb, 2015).

2.7.4 The outcomes that are sought from a strategy of income diversification

In reviewing the narrative, the anticipated outcomes sought are to reduce exposure to financial risk, to improve autonomy, and to remain competitive.

In their comprehensive study of 100 higher education institutions across 27 countries, Estermann and Pruvot find that:

Risk management constitutes a major driver for income diversification for universities in Europe. The perception that it is necessary to spread financial risks is commonly shared among universities, especially in the light of the consequences of the economic

crisis and on the basis of pessimistic expectations regarding future trends in funding coming from ‘traditional’ sources. (2011, p. 11)

The risks to mitigate are perceived as the need to reduce financial vulnerability caused by dependence on any one source of income (Estermann & Pruvot, 2011; Feleke, 2015; Webb, 2015) or exposure to market forces and fluctuations in student recruitment (Chabotar, 1989; De Zilwa, 2005). Income diversification is also seen as a way of improving stability in the finances of an institution (Besana & Esposito, 2015; Webb, 2015; Stachowiak-Kudła & Kudła, 2017; Chirica & Puscas, 2018) and mitigating fluctuations generally (Eastman, 2006; Namalefe, 2014). More generally, income diversification is seen as a strategy to enhance financial health and sustainability (Cheslock, 2006; Stewart, 2008; Estermann & Pruvot, 2011; Feleke, 2015; Irvine & Ryan, 2019).

In *The Higher Education Handbook*, McCaffery (2010) cites Babbidge and Rozenweig (1962) to reinforce that “a workable twentieth-century definition of institutional autonomy [is] the absence of dependence upon a single or narrow base of support” (p.65). Thus, universities are also driven to diversify their income as a way to enhance or preserve their autonomy (Pilbeam, 2006; Estermann & Pruvot, 2011; Chirica & Puscas, 2018), and to generate discretionary revenues that have less strings attached as noted earlier. Estermann and Pruvot (2011) also find another motivation is to avoid the administrative burden often associated with securing public funding. Commercial activities or fundraising are perceived as being easier to manage and the resulting funds allocated without restrictions.

In his seminal work *Entrepreneurial Universities: Organizational Pathways to Transformation*, Clark (1998) positions a diversified funding base as one of the requirements for transformation and closely links it to the benefits of institutional autonomy, “the entrepreneurial response offers a formula for institutional development that puts autonomy on a self-defined basis: diversify income to increase financial resources, provide discretionary money *and* reduce government dependency” (p.146).

Note however these narratives are still closely linked to the declining public funding debate.

Finally, the shifting competitive landscape is seen as forcing institutions to pursue additional income streams to be able to remain competitive (Hearn, 2003; De Zilwa, 2005; Teixeira & Koryakina, 2013). According to Estermann and Pruvot “Income diversification may be strategically used to develop activities and respond to new missions, as it may reinforce the

position of an institution on the local, national or international stage by supporting its competitiveness” (2011, p. 10).

2.7.5 The criticisms or limitations of income diversification

The concerns around pursuing a strategy of income diversification in the literature are varied, the predominant debate is the potential negative distraction from core mission and damage to academic integrity and teaching quality (Zhao, 2001; Johnstone, 2002; Liu, 2007; Namalefe, 2014; Koryakina, 2018). The potentially negative effects of pursuing additional income streams are most prominently discussed in two influential books Slaughter & Leslie (1997) *Academic Capitalism* and Bok (2003) *Universities in the Marketplace*, both these seminal works are heavily cited in the studies noted previously.

A strategy of income diversification can also lead to internal tensions within the academy; those faculties with more obvious links to commercial opportunities for income may secure more discretionary funds than those who do not (Johnstone, 2002; Liu, 2007). Drawing on resource dependence theory, Namalefe (2014) observed this may even lead to a perceived power imbalance.

In financial contexts, the debate centres around the likely effectiveness of such a strategy and its limitations (Ziderman & Albrecht, 1995). Whilst recognising that income diversification is an important part of good financial management, Taylor (2013) observes its ability to have a meaningful effect may be limited given the scale of teaching income as a proportion of total income.

Income diversification is recognised as not being a short-term answer (Prince, 2007). As Stewart (2008 p.vi) notes, “There is no easy panacea to the income/cost divergence that the HE sector faces”. Moreover, a strategy of income diversification can generate additional costs (Ziderman & Albrecht, 1995; Liu, 2007); thus, institutions need to be mindful of the need to generate net returns, not just income (Hearn, 2003; Shattock, 2010; Taylor, 2013). As universities fees are often regulated and set by government, generating increased external profitable income streams will require new skills and consideration around optimal pricing of activities, this more commercial orientation may be lacking (Morgan & Prowle, 2005).

A common focus for income diversification is on building up research capabilities, this brings with it the need for substantial investment (Pilbeam, 2006; Teixeira et al., 2014).

Although, whilst research tends to require cross-subsidy in the short-term, it can pay reputational dividends in the long-term (Jenkins & Wolf, 2016).

With the caveat of these concerns and limitations, income diversification remains an important and necessary strategy (Johnstone, 2002; Shattock, 2010; Estermann & Pruvot, 2011; Taylor, 2013; Koryakina, 2018). And yet, as the literature notes that some universities appear more able to succeed in diversifying their income streams than others (Estermann & Pruvot, 2014).

2.7.6 Not all universities are equally able to succeed in diversifying their income

As noted previously, in the face of reducing public funding, rising costs, and a more competitive landscape, universities are actively pursuing a strategy of income diversification with the aim of reducing risk, improving autonomy and remaining competitive. However, one of the dominant themes in the available literature is that, whether due to institutional or national limitations, not all universities are equally able to succeed in diversifying their funding base (Johnstone, 2002; De Zilwa, 2005; Pilbeam, 2006; Prince, 2007; Shattock, 2009; Ali, Bhattacharyya, & Olejniczak, 2010; Estermann & Pruvot, 2011; Teixeira & Koryakina, 2013; Teixeira et al., 2014). As the following sections highlight, this has the potential to create inequalities in exposure to financial risk, thus empirically testing the antecedent factors that explain the variation is of theoretical and practical importance.

The following sections critically analyse and synthesise the available literature to present what is empirically known about the outcomes of a strategy of income diversification and also how is it known.

2.8 What are the empirical findings for income diversification in higher education?

The previous section has focused on the broad debates in the literature. In this section, the findings of the empirical studies are critically reviewed.

The results of the search for relevant literature produced 18 empirical studies relating to income diversification in the higher education sector. These studies present a variety of focal questions and therefore findings, but only four present an outcome related to financial health. For deeper consideration of the financial outcomes of a strategy of income diversification,

this review of the literature also extends into the non-profit management literature, selecting studies where educational institutions were represented in the sample.

2.8.1 Financial outcomes

Despite the strength of the narrative for the need to diversify income and reduce dependence, studies on the financial outcomes of income diversification are meagre. Only four were focused on establishing the financial outcome; firstly Stewart (2008) finds that state-funded US institutions are more financially diversified than their UK counterparts and is hence suggested by logic to have a more balanced income portfolio and a reduced dependence on public funding. Secondly, according to Besana and Esposito (2015), US not-for-profit higher education institutions that are identified as being more financially diversified, achieve greater income gains and better financial solvency. In private US institutions, Webb (2015) finds an interesting relationship that as university or college revenues becomes more diversified, the total revenue per full-time-equivalent student increases and so does the financial health of the institution. More recently, in their study assessing the financial health of Australian universities, Irvine and Ryan (2019) find income diversification to be a strong predictor of financial viability.

However, to assess in more depth the degree to which income diversification lessens financial vulnerability and improves stability, it is necessary to turn to the non-profit management literature which is more developed in this regard. As Chikoto, Ling and Neely contend “the topic of revenue diversification or its inverse, revenue concentration, has been and continues to be of keen interest to the study of nonprofit organizations’ financial environments” (2016, p. 1428). As stated previously, the two sectors operate in trust markets and are motivated by more idealistic goals than the traditional business sector (Webb, 2015). Moreover, the relevance to higher education can be exemplified by the similarities in the challenges facing the two sectors. Common themes include issues of vulnerability and reduced autonomy caused by overdependence on reducing government funding thus the need to seek multiple sources of income, balanced against concerns of distraction from core mission (Mitchell, 2014).

In the non-profit literature income diversification is positioned as a risk reduction strategy (Chikoto et al., 2016). The key debate in the literature centres around a) how financially diversified non-profit organisations are, and b) does revenue diversification or revenue concentration better help their financial position? Taking a chronological approach, this

section reviews some of the more prominent studies that include educational institutions in their sample (this does though, encompass all institutions from pre-school to higher education).

In their seminal 1991 paper, Tuckman and Chang develop a methodology for measuring the financial vulnerability of non-profit organisations (1,080 educational institutions representing 23% of the sample). The degree to which their income is diversified (or concentrated) comprises one of the four criteria for vulnerability in the methodology. The theory being that a non-profit is more vulnerable if their sources of income are limited than if they are multiple. As Tuckman and Chang state:

This is because a shock is more likely to affect one revenue source than it is to affect all sources at once. The larger the number of revenue sources a nonprofit has and the more equally divided its share of revenues from each source is, the less vulnerable it tends to be. (1991, p. 452)

The authors further argue that a decline in one source may be offset by an increase in another and the more sources of income in the portfolio, the more opportunity for this balancing effect to occur. Tuckman and Chang measure income diversification/concentration using a measure based on the Herfindahl Index used in economics to measure market concentration. For each non-profit organisation, the square of the percentage share that each income source represents to total income is summed to produce an index score. This creates a measure that captures both the number of income sources and the degree of income dispersion. This Herfindahl-based approach has been adopted by all subsequent studies looking at income diversification in non-profit organisations and remains the most common measure of income diversification (Searing, 2018). The Tuckman and Chang study uses US tax return data on the following income sources; income from contracts, gifts and grants; programme service income; membership dues; sales of unrelated goods; and investment income (five income sources). A non-profit with income from only a single source would have an index score of 1, while a non-profit with more equal amounts in each source would have an index score nearer to 0, reflecting a more balanced portfolio. Tuckman and Chang label non-profits in the bottom quintile i.e. those with an index score closer to one, as vulnerable and at risk.

In a follow-up to their 1991 study, Chang and Tuckman (1994) further investigate the financial outcomes of income diversification in non-profit organisations. Again, the level of income diversification (or concentration) is measured using US tax data, although this time the measure is presented as the 'Herfindahl-Hirschman Index' and referenced to Hirschman (1964) and Scherer (1980). The 15,073 educational institutions make up 13% of the sample,

no other category of organisation has a more dominant representation. The paper goes on to use ordinary least squares (OLS) regression estimates to test the proposition that non-profits with income from multiple sources are in a stronger financial position because income diversification can be used to reduce exposure to the risks of instability in any one income source. Using three proxy variables to measure financial strength (assets at the beginning of the year, operating margin, and dollar value of the change in total equity in a year), once again, they find that non-profits with multiple and more balanced sources of income are more likely to be in a stronger financial position as a result of being less dependent on any one source.

In a later study, Keating, Fischer, Gordon, and Greenlee (2005) expand on the Tuckman and Chang (1991) model of assessing financial vulnerability in non-profits and find that income concentration leads to a greater risk of insolvency. Therefore, again suggesting that income diversification can improve a non-profit organisations' financial position.

Building on the vulnerability findings just noted, Carroll and Stater (2009) use regression analysis to investigate whether income diversification can reduce income volatility thus leading to greater stability in the finances of non-profit organisations. The approach to measuring remains the same but is now positioned as the Hirschman-Herfindahl Index (HHI)*. Investigating financial stability necessitates adopting a more time-series approach, hence gathering US tax data for a 13-year period. The data set contains 45,187 educational institutions representing 15% of the sample. Their findings show that organisations with more diversified income portfolios, that seek to equalise their dependence on each source, have lower levels of income volatility over time and so enjoy greater financial stability.

*As an aside, the observant reader may have noted that the Herfindahl-Hirschman Index is sometimes stated as Hirschman-Herfindahl. The order in which the names are presented reflect the view of the author in question as to who proposed the measure first. See Hirschman (1964) *The paternity of an index* for insight into the debate.

Mayer et al. (2014) build on the Carroll and Stater (2009) study using a new measure of volatility that accounts for the income type. Drawing heavily on modern portfolio theory, their findings reveal that income diversification can reduce volatility if the balance of the *type* of income in the portfolio is right (favouring earned income and donations over investment income).

In a more contemporary piece, Chang, Tuckman, and Chikoto-Schultz (2018) review the progress on studies related to income diversification in non-profit organisations. They consider the income diversification vs. concentration debate. They conclude that having a diversified income portfolio offers many benefits, but organisations should be aware that there are potential risks to such a strategy. Drawing particular attention to the Mayer et al. (2014) study, non-profits need to consider the behaviour of the individual funding streams that make up their income portfolio i.e. it is not enough to just have multiple income streams, the reliability of each of those streams is important. The authors also reflect on Frumkin and Keating (2002) that found a strategy of more concentrated income can bring greater administrative efficiency and faster growth. Although their subsequent 2011 study of 12 years of data for 8,828 non-profit organisations (including education), confirmed that the cost-saving benefits came at the expense of increased exposure to fluctuations in their financial position. Chang et al. (2018) bring the debate up to date by referring to Chikoto and Neeley (2014) whose study confirmed the earlier works of Frumkin and Keating (2002, 2011) and conclude income concentration is only effective when adopted as a one-time financial capacity strategy. Zhao and Lu (2019) posit an interesting compromise between income diversification and concentration, and that is the concept of *within-source* diversification. If a non-profit is reliant on government income, it should seek different types of government income so diversifying whilst benefiting from the efficiencies associated with concentration. The authors however point out that little scholarly attention has been given to empirically examining this approach.

In closing, Chang et al. (2018) also note that the majority of these studies have been conducted on the sector as a whole and caution overgeneralisation considering the diversity within the sector. Although in their concluding remarks they comment “While the missions of nonprofit entities differ widely, they share certain needs. These include stable and predictable sources of revenue that provide income sufficient to enable them to carry out their missions” (p.31).

Finally, there has been a recent meta-analysis which by its nature include studies that have educational organisations in the sample. Hung and Hager (2019) conducted a meta-analysis analysis of 40 original studies into the relationship between income diversification and financial health. Reporting some 296 statistical effects, they include potential moderators for variances in the reviewed studies to help with generalisability. They moderate for the dominance of studies based on US data and also for subsectors such as arts, education etc.

The results of their analysis conclude there is a positive, statistically significant association between income diversification and financial health in non-profit organisations. Interestingly more positive effects are found in studies outside the US, and at a subsector level, the effect is similar across all sectors except foreign affairs non-profits where it is smaller. As per modern portfolio theory, they reiterate the need to consider the nature of the income in the portfolio.

There have been other more contemporary studies on the financial outcomes of income diversification in non-profit organisations, but as the samples did not include higher education organisations they are not considered here.

2.8.1.1 Additional comment in regard to comparing the literatures

Income diversification is a prominent topic in the non-profit management literature (Chikoto et al., 2016). To synthesise the previous discussion; cultivating multiple income streams and seeking an equal balance across them (thus reducing dependence on any one source) can reduce vulnerability, improve stability and the general financial position of non-profit organisations. With the caveat that the nature of the income in the portfolio also needs to be considered. It is therefore important to understand why some universities appear to be more successful than others in achieving a diversified income portfolio so they too may realise these financial benefits.

The narrative surrounding these non-profit studies is a mirror of the debates in the higher education literature. This extract from the non-profit income diversification literature highlights the parallels:

Competition in the nonprofit sector has dramatically intensified in the past 20 years because of (a) the increased number of NPOs, (b) the decline and diffusion of governmental support, and (c) the entry of for-profit companies into markets that traditionally have been the domain of NPOs. (Gunnerson, 2019, p. 32)

But there the similarities end. It is striking that the majority of higher education institutions under focus in the literature are themselves non-profit organisations, many being the same organisations that feature in the non-profit studies. Yet there appears to be zero overlap between the two literatures. Ubiquitous names like Tuckman and Chang are only referenced in one study (Webb, 2015). Whilst it could be argued there are limitations to the generalisability of the findings of these non-profit studies to the higher education sector in England, the theoretical bases of resource dependence theory and modern portfolio theory

that underpin these studies suggest it is a reasonable assumption that income diversification can bring positive benefits at the very least to reducing financial vulnerability in the current competitive climate.

It is tempting to speculate that perhaps income diversification is a new concept to the higher education domain. However, writing 30 years ago in *The Journal of Higher Education* in 1989, Chabotar notes the financial challenges facing higher education institutions due to declines in public spending, unfavourable economic conditions and intense competition. He remarks that revenues should be diversified to “not become overly dependent on government appropriations, private gifts and grants, user fees or any single source” (1989, p. 196). So, the significance has been understood for some time. Furthermore, as the following section highlights, the measurement of income diversification in higher education similarly does not currently reflect the established approaches outlined in the non-profit literature.

2.8.1.2 Measurement of income diversification in the higher education literature

In the higher education literature, it is noticeable that income diversification is seldom formally measured, nor a diversification index created such as those proposed in the non-profit literature. Webb (2015) uses the Hirschman-Herfindahl Index to measure levels of income diversification in a study of 814 private universities and colleges in the US. De Dominicis et al. (2011) measures the level of income diversification in 200 research active universities across Europe utilising the Simpson index of diversity which is actually a derivative of the Herfindahl-Hirschman Index, more commonly used in ecology studies (Kasperski & Holland, 2013). Both however, measure the same thing, namely the number of sources and proportion of total income in each, so technically *two* higher education studies have utilised an established measure on income diversification. Webb (2015) uses the diversification index score as an independent variable to test an association between level of income diversification and value of income per full-time-equivalent student. Whereas De Dominicis et al. (2011) use the diversification index to test relationship between university autonomy and level of income diversification i.e. were autonomous institutions able to be more financially diversified.

In his US study of private institutions, Webb (2015) uses five income categories for the Herfindahl-Hirschman Index measure; tuition (from students after any government grants), governmental (all government funds regardless of whether grant or contract), private (any other private income), endowment income and finally, auxiliary (revenue indirectly

associated with institutional mission such as student accommodation, catering, university presses). These categories do not appear to delineate research income, although the focus of the study was on student fee income, so proportions of research income were apparently not a concern. In their study of European publicly-funded institutions, De Dominicis (2011) uses six income categories for the Simpson index measure. Governmental core funding, governmental competitive funding, industry funding, non-profit sector funding, funding from abroad (EU) and other income. Even though a European study that included England, it does not appear to delineate student fee income. However, the focus of the study was on the proportion of governmental income that was on a competitive basis, so whether some countries had private student fee income was not a concern. Thus, although these studies are using established measures, the income portfolios are not representative nor disaggregated to reflect those of a generalist, publicly-funded institution such as is the focus of this study.

There have been other approaches adopted to assess the level of income diversification in higher education. Pre-dating Tuckman and Chang's (1991) use of the Herfindahl measure of diversification/concentration, Chabotar (1989) published a paper on the use of financial ratios to understand the financial condition of higher education institutions. The methodology included a ratio to measure the diversity of income sources by comparing the relationship between the main sources of revenue and the related expenditures (source of revenue / total expenditures). The focus on expenditures provides a useful angle as it accounts for the fact that some sources of income are restricted in how they can be spent, it does rely on being able to obtain information on which expenditures used funds from which sources and does not appear to have been widely utilised. More recently, Irvine and Ryan (2019) used ratios of particular income categories to total income as one of the ratio indicators to assess the financial health of publicly-funded universities in Australia.

There is other evidence of attempts to quantify income diversification in the higher education literature. Through the use of pie-charts, both Stewart (2008) and Estermann and Pruvot (2011) present a visual description of proportions of total university income residing in each source (see example figure 2.2). It is worth noting these are the only two studies for which the objective was to present the current status of income diversification. Stewart comparing U.S. and UK universities in 2007/2008 and Estermann and Pruvot presenting the status of Europe as a whole in 2009 (see figure 2.2).

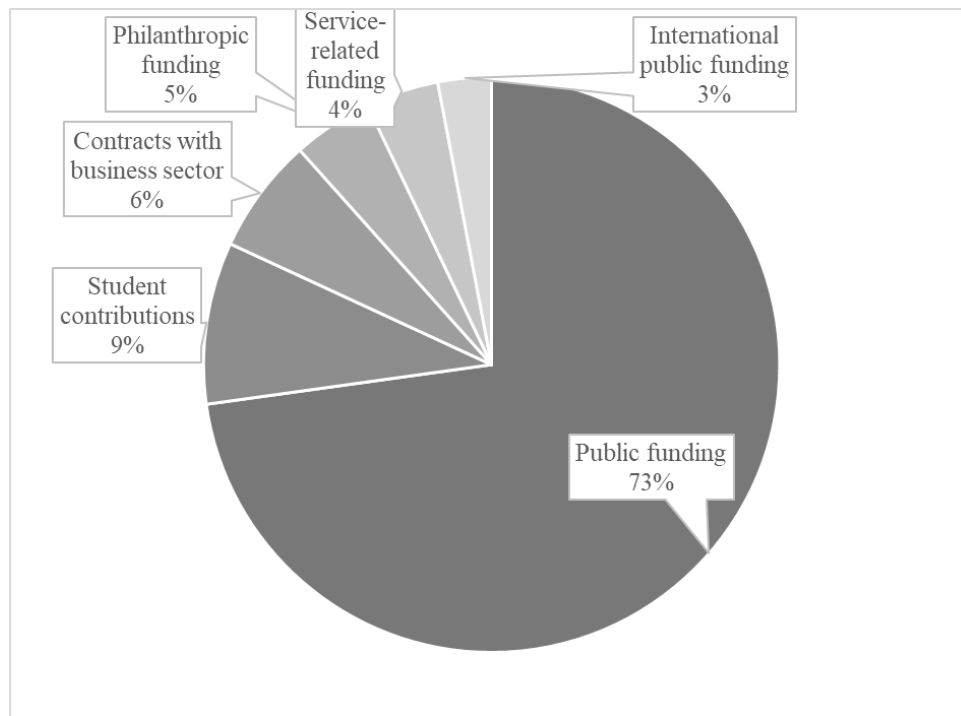


Figure 2.2: Average income distribution within 100 European universities in 2009. Source: Estermann and Pruvot (2011, p.27), reproduced with permission © European University Association).

It is notable and of relevance to this discussion that on average, the most recent available data shows European universities receive 73% of their income from direct public funding and only 9% from student contributions.

The only other studies quantifying some aspect of income diversification as a variable can be summarised thus. Teixeira et al. (2014) measures the proportion of income in Portuguese institutions that is derived from non-public funds to create a dependent variable. Besana and Esposito (2015) analysing a sample of US universities use a calculation of revenue totals from four income categories in divided by total expenditures prior to performing a cluster analysis (this is reminiscent of the Chabotar approach, but no reference is made). In Hermansson, Lisenkova, McGregor, and Swales (2015) for their study of London university expenditure patterns, the authors simply look at the proportion of income the universities receive from public funding as a measure of how diverse their income sources are. Finally in considering the influence of external regulation on income diversification, Stachowiak-Kudła and Kudła (2017) measure the share of stable public, unstable public and unstable private financing in the income portfolios of selected European universities.

In conclusion, although in the non-profit literature the starting point for analysing the impacts of income diversification is to obtain an accurate measure of it, this does not appear to be the case in higher education. To the best of this researcher's knowledge, this is the first

study to use an established measure of income diversification to develop an index for publicly-funded universities on a national scale, so enabling influencing factors to be statistically tested whilst at the same time providing insight for university leaders and policymakers. The accuracy of the measurement is enhanced by the disaggregation of non-core, third-stream income from traditional sources of funding.

A brief discussion of other less financially-oriented outcomes of a strategy of income diversification in higher education follows.

2.8.2 Other outcomes of a strategy of income diversification

There are higher education studies that suggest efforts to reduce dependence on public funding and secure additional funding sources through diversification may have a negative effect on academic integrity and quality (Zhao, 2001; Abankina et al., 2017). This mirrors the themes noted previously concerning dilution of mission etc. Another potential impact of an income diversification strategy is a change to how a university is structured. Eastman (2006) finds how an institution is organised is a reflection of the way it is financed; a sustained change in financing will eventually lead to a change in structure. Finally, Hermansson et al. (2015) find that the level of income into London higher education institutions and the composition of that income determines their expenditure impact on the English economy.

Despite a desire to improve institutional autonomy and competitiveness being noted as a driver for a strategy of income diversification, there do not appear to be any studies testing whether these outcomes are realised. This has however been a focus for studies in the non-profit literature. Underpinned by resource dependence theory, both Froelich (1999) and Mitchell (2014) find that income diversification can combat resource dependence and consequently improve autonomy and reduce external control.

As considered in the following section, the extant empirical research does demonstrate a keen interest in the antecedent factors that may positively influence a university's success in generating additional streams and diversifying its income base.

2.8.3 Antecedents to success in diversifying the income portfolio in higher education

A substantial proportion of the empirical studies are focused on investigating the antecedent factors that suggest an advantage in generating additional income and thus diversifying the portfolio. This indicates its importance in the field and mirrors the prominence in the general narrative that not all universities are equally successful in diversifying their income streams, whether due to institutional or national limitations. The antecedent factors in the available research can be classified as external factors and internal factors, both are discussed in the following sections.

2.8.3.1 External factors

Several of the empirical studies are focused on international comparisons, so the external influences on success in diversifying income relate to national differences in institutional autonomy. These are largely derived from the national frameworks in which the university is situated. In their study of 100 higher education institutions across 27 countries, Estermann and Pruvot find institutional autonomy to be a pre-requisite to income diversification, “the capacity of universities to generate additional income relates to the degree of autonomy granted by the regulatory framework in which they operate” (2011, p. 85). This autonomy is variously positioned as staffing autonomy (Shattock, 2009; Estermann & Pruvot, 2011) and financial autonomy (De Dominicis et al., 2011; Estermann & Pruvot, 2011). Estermann and Pruvot (2011) find that it is financial autonomy that is most associated with the capacity to attract additional income (including investment income) and hence be more financially diversified. This is confirmed by De Dominicis et al. (2011) in their study of 200 research intensive universities from 33 European Research Area countries. Their research suggests the most financially autonomous universities have the highest level of income diversification. Interestingly they note that the most autonomous and highly financially diversified institutions are located in the UK (their study is based on data collected 2009/10).

Variations in ability to successfully diversify university income can also be influenced by the effects of external financial regulation, either in an international comparative context (Stachowiak-Kudła & Kudła, 2017) or within country changes to financial regulation (Teixeira & Koryakina, 2013). Government funding incentives such as matched funding schemes are also found to have a positive effect (Shattock, 2009; Estermann & Pruvot, 2011).

Whilst these external factors explain variation in international comparative studies, in terms of the aim of this research they have less relevance, as within England, all publicly-funded universities operate within the same financial and regulatory framework. That said, more broadly it may be considered that funding formulas and performance or output criteria for public funds inevitably influence the institution's internal strategic and academic decisions and hence the income it pursues (Estermann & Pruvot, 2014), however this external influence is outside the scope of this study's internal focus.

2.8.3.2 Internal factors

The internal factors identified by the extant empirical literature are of specific relevance to this study. These represent the resources and capabilities of an institution that positively influence income diversification and income generation and will be harvested from this chapter for subsequent empirical testing. In this context, there are three studies that deserve a special mention as they are driven by similar aims to this research.

Firstly, although focused on entrepreneurial income generation in European universities, Michael Shattock's (2009) comparative case study of 27 higher education institutions across seven European countries, has a keen focus on identifying factors that stimulate or inhibit entrepreneurialism and recognises the importance of a diversified funding base.

Secondly, published by the European Universities Association in 2011, *Financially Sustainable Universities II: European universities diversifying income streams* report by Estermann and Pruvot is the most pertinent to the aim of this study. A comprehensive approach utilising questionnaires, site visits, interviews and case studies, this report evaluates the status of income diversification in 100 European universities from 27 countries (including the UK). It then identifies the external and internal factors that influence the development of successful income diversification. It is one of the few studies that comes close to considering university income as a 'portfolio' and explores all sources of additional income including fundraising (which is notable by its absence in other studies).

Finally, Teixeira et al. (2014) in their study of 30 higher education institutions in Portugal the focus is specifically on understanding what institutional characteristics influence income diversification and employs regression analysis to identify them. However, unfortunately the measure of income diversification is simply the proportion of income that is from non-public sources thus does not consider the balance in the remainder of the portfolio.

Table 2.2 presents a summary of the findings of all the empirical studies that had some focus on identifying why some universities may be more successful in generating additional income and diversifying their income base (note all 'Europe' studies included the UK). Only the internal factors are noted in the table, the external factors having been discussed in previous section.

Table 2.2: Summary Empirical Findings Identifying Internal Factors Suggested to Have an Influence on Income Diversification

Factor	Study	Country	Sample	Methodology
Reputation influences ability to generate third-stream income.	Pilbeam (2006)	UK	16 institutions in four disciplines	ANOVA on secondary data
Reputation influences ability to explore alternative sources of income.	Teixeira and Koryakina (2013)	Portugal	National picture	Secondary data analysis
Prestige and reputation influences ability to generate third stream income .	Prince (2007)	UK	Six university business schools	Case studies with interviews
Prestige influences ability to secure independent income.	De Zilwa (2005)	Australia	National picture	Secondary data analysis
Level of academic qualifications of staff influences ability to generate non-public revenues.	Teixeira, Rocha, Biscaia and Cardoso (2014)	Portugal	15 polytechnics 15 universities	Regression on secondary data
Staff incentives influence ability to diversify income.	Estermann and Pruvot (2011)	Europe	100 HEIs from 27 countries	Questionnaire and interviews
Incentivising staff influences entrepreneurial income generation.	Shattock (2009)	Europe	27 HEIs from 7 countries	Case studies with interviews
Academic reward systems influence ability to diversify income .	Teixeira and Koryakina (2013)	Portugal	National picture	Secondary data analysis
Flexible management of human resources influences entrepreneurial income generation.	Shattock (2009)	Europe	27 HEIs from 7 countries	Case studies with interviews

Table 2.2: Summary Empirical Findings Identifying Internal Factors Suggested to Have an Influence on Income Diversification

Factor	Study	Country	Sample	Methodology
Academic discipline physics and engineering influences ability to generate third-stream income.	Pilbeam (2006)	UK	16 institutions in four disciplines	ANOVA on secondary data
Academic discipline toward the sciences influences ability to explore alternative sources of income.	Teixeira and Koryakina (2013)	Portugal	National picture	Secondary data analysis
Academic discipline hard sciences and maths positively influences value research grants.	Ali, Bhattacharyya and Olejniczak (2010)	U.S.	354 universities 107 disciplines	Regression on secondary data
Leadership influences ability to diversify income.	Estermann and Pruvot (2011)	Europe	100 HEIs 27 countries	Questionnaire and interviews
Senior management influences ability to generate third stream income.	Prince (2007)	UK	Six university business schools	Case studies with interviews
Management processes influence ability to diversify income.	De Zilwa (2005)	Australia	National picture	Secondary data analysis
Income diversification embedded into institutional strategy influences ability to diversify income.	Estermann and Pruvot (2014)	Europe	100 HEIs 27 countries	Questionnaire and interviews
Culture influence s ability to diversify income.	De Zilwa (2005)	Australia	National picture	Secondary data analysis
Entrepreneurial culture influences ability to generate third stream income.	Prince (2007)	UK	Six uuniversity business schools	Case studies with interviews

Table 2.2: Summary Empirical Findings Identifying Internal Factors Suggested to Have an Influence on Income Diversification

Factor	Study	Country	Sample	Methodology
Key structures influence ability to diversify income.	De Zilwa (2005)	Australia	National picture	Secondary data analysis
Organisational structures influence ability to generate third-stream income.	Prince (2007)	UK	Six university business schools	Case studies with interviews
Staff capacity (dedicated staff) influences ability to diversify income.	Estermann and Pruvot (2014)	Europe	100 HEIs 27 countries	Questionnaire and interviews
Staff competency and experience influences ability to diversify income.	Estermann and Pruvot (2014)	Europe	100 HEIs 27 countries	Questionnaire and interviews
A focus on research leads to a higher share of income from additional funders.	Estermann and Pruvot (2014)	Europe	100 HEIs 27 countries	Questionnaire and interviews
Research intensity influences ability to generate non-public revenues.	Teixeira, Rocha, Biscaia and Cardoso (2014)	Portugal	15 polytechnics 15 universities	Regression on secondary data
Regional opportunities influence ability to generate third stream income.	Prince (2007)	UK	Six university business schools	Case studies with interviews

In the following sections, the findings of the studies in table 2.2 are synthesised and considered in the context of this study. The discussion also draws from the broader narrative in these papers plus related available literature in the higher education domain. This synthesis will form the basis of hypothesis generation in the following chapter that outlines the theoretical framework for this study. The factors are discussed in order of prominence in the literature.

2.8.3.2.1 Brand, reputation and prestige

A university's brand, reputation and prestige feature prominently in the literature as a factor influencing the generation of all types of income and thus the level of diversification and balance in the portfolio. According to Esterman and Pruvot "A university's brand and reputation is a precondition for attracting additional income" (2011, p. 71). The more prestigious universities appear to be the ones able to secure more independent third-stream income from consultancy, contract research and investments (Pilbeam, 2006; Prince, 2007; Teixeira & Koryakina, 2013). In the broader higher education literature, Breeze, Gouwenberg, Schuyt, and Wilkinson (2011) find that the accumulative advantage gained as a result of a university's reputation, wealth and networks, also have an influence on ability to raise funds for research from philanthropic sources [and therefore help diversify the income portfolio].

When Teixeira et al. (2014) find that the proportion of staff with a PhD has a statistically significant relationship with levels of non-public income, they attribute the association to the enhanced reputation and research credentials the qualified staff promote. In this context, the authors reference the 'Matthew effect' (Merton 1968). Similarly, Pilbeam (2006) references the 'halo effect' of reputation in generating additional income. Shattock (2010, p. 15) also notes the Matthew effect and summarises it thus:

Merton similarly argues that those institutions that attract more of certain resources at one point develop a lead over their peers when competing for resources in the future so that over the years they accumulate a magnetic power in attracting outstanding talent and hosting the most significant research. (Merton 1988)

As Shattock goes on to argue, universities with stronger reputations are likely to win more research contracts, attract more international students and be able to charge higher fees and have more success with fundraising, therefore generating more non-public income than those without such a strong reputation. Furthermore, Jenkins and Wolf (2016) in their empirical analysis of brand in English universities, find that reputation has a large impact on fee and

teaching income, particularly in respect of the higher fees that can be charged to international students.

Whilst the available literature points to a compelling case that a university's reputation leads to greater income diversification, none of the empirical studies statistically tested the relationship between reputation and level of income diversification. Thus, a university's reputation forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.2 Academic discipline

A number of studies show the subject mix of an institution has a role to play in generating additional income and diversifying the portfolio. As Teixeira and Koryakina (2013) find, an orientation toward the sciences influences a university's ability to explore alternative sources of income. More specifically; a university's subject mix can influence ability to generate third-stream income, it is the sciences that are suggested to generate higher amounts (Pilbeam, 2006; Rossi & Rosli, 2015). According to Stewart (2008), universities with an orientation toward the STEM subjects have the greatest opportunity to earn significant amounts of business income. However, in their wide-ranging study, Estermann and Pruvot (2011) note that whilst it is a common perception that technology-oriented faculties are more able to earn private income than the social science faculties, they found that 'comprehensive' universities are just as able as their technology-focused counterparts to secure private income.

Whether or not the institution has a medical school also features as a factor in ability to generate third-stream income (Powers, 2003) and also influences the level of private giving from a donative perspective (Liu, 2006). Consequently, for this study, STEM orientation is extended to STEMM to encompass the presence of medical disciplines.

Finally, in England STEMM subjects still attract an element of public funding for teaching (Jenkins & Wolf, 2016). So, STEMM oriented institutions may have higher proportions of core funding in their income portfolio, contributing a balancing effect.

Although the available literature makes a case for STEMM orientation leading to greater income diversification, none of the empirical studies statistically tested the relationship between the degree of a university's STEMM orientation and its level of income

diversification. Therefore, STEMM orientation forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.3 Leadership and management

The internal factors summarised in table 2.2 reflect a variety of concepts related to leadership and management and their importance in an institution's ability to diversify its income. Key to the strategy is leadership commitment, as it is the leaders that can drive the case and make any changes to structure and culture needed to encourage income diversification (Prince, 2007; Estermann & Pruvot, 2011, 2014; Webb, 2015).

Leadership commitment is a challenging concept to assess in an objective study such as this, however as Estermann and Pruvot (2011) note, successful income diversification depends on the degree to which the strategy is embedded. This study therefore considers to what degree the income diversification strategy is embedded, proposing it as an observable outcome of an unobservable construct (albeit still a subjective measure).

Whilst Estermann and Pruvot (2011) make a case that an embedded strategy leads to greater income diversification, they did not statistically test the relationship between an embedded strategy and the level of income diversification achieved. Thus, the degree to which the strategy is embedded in the institution forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.4 Culture and outlook

Several studies highlighted the importance of a university's culture as a factor influencing their success in diversifying their income. As De Zilwa (2005) concludes, to better diversify revenues, universities need to encourage the risk-taking cultures that are associated with entrepreneurialism. The success of new revenue generating initiatives will depend on an entrepreneurial culture that motivate staff to leverage their expertise (Prince, 2007; Shattock, 2009; Koryakina, 2018). But an organisation's culture is a challenging concept to assess in an objective study such as this. As a component of culture Koryakina et al. (2015), find an entrepreneurial 'outlook' is propitious to income diversification. The broader higher education literature suggests this may be a more measurable concept (Guerrero & Urbano, 2012).

Although the available literature makes the case for an entrepreneurial outlook leading to greater income diversification, none of the empirical studies statistically tested the relationship between having an entrepreneurial outlook and the level of income diversification achieved. Hence, entrepreneurial outlook forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.5 Organisational structure

How an organisation is structured and organised is shown to have an effect on its ability to generate independent income and thus be more financially diversified (De Zilwa, 2005; Prince, 2007). Citing Pfeffer and Salancik (1978) and resource dependence theory, Leslie, Slaughter, Taylor, and Zhang (2012) contend that dependence on external markets prompts university leaders to develop structures and processes designed to secure more robust or more diverse, resource streams. Universities need to adopt business-like perspectives in pursuing additional income (Feleke, 2015). This particularly concerns the need to have staff dedicated to non-core income generation and business engagement i.e. the creation of specific teams or dedicated structures (Estermann & Pruvot, 2011, 2014).

Technology transfer offices (TTO) as they are commonly termed in the literature, yet variously referred to as knowledge exchange (KE) or knowledge transfer (KT) offices, formalise the university's commitment to income generation as well as their broader third mission (Rothaermel, Agung, & Jiang, 2007; Shattock, 2009; Nelles & Vorley, 2010). A resourced and dedicated development and alumni relations office (DARO) has also been shown to improve fundraising capability (Liu, 2006; Stewart, 2008; Shattock, 2010; Estermann & Pruvot, 2011; Motion & Beney, 2011).

Whilst the available literature makes the case that dedicated resource leads to greater income diversification, none of the empirical studies statistically tested the relationship between dedicated resource and levels of income diversification. Therefore, the proportion of staff dedicated to technology transfer and the proportion of staff dedicated to development and alumni relations form explanatory variables in the theoretical framework discussed in the next chapter where hypotheses are proposed.

2.8.3.2.6 *Skilled and experienced staff*

Staff competency and experience is suggested to influence ability to diversify income as these initiatives need new expertise (Liu, 2007; Estermann & Pruvot, 2011, 2014). As Rossi (2018) finds, more experienced technology transfer staff leads to better commercial performance of knowledge transfer initiatives. Similarly, experience in fundraising supports the generation of additional revenue (Koryakina et al., 2015).

Whereas the available literature makes the case that having staff experienced in income generation leads to greater income diversification, none of the empirical studies statistically tested the relationship between staff experience and levels of income diversification. Thus, the level of experience in the technology transfer office (TTO) and level of experience in the development and alumni relations office (DARO) form explanatory variables in the theoretical framework discussed in the next chapter where hypotheses are proposed.

2.8.3.2.7 *Research intensity*

Estermann and Pruvot (2011) note that a focus on research leads to a higher share of income from additional funders [and so a more diversified income base]. In considering the factors that may differentiate an institution's capacity to respond to external challenges through income diversification, Teixeira et al. state "which according to our results, seem to be positively correlated with their research intensity" (2014, p. 410). Although research intensity was not a variable in their statistical analysis, the comment may have been prompted by the binary system under which the Portuguese institutions operate. They note (yet do not test) the weaker focus on research within Portuguese polytechnics their results are suggesting "certain institutional characteristics related to mission differentiation and the path of binary systems are important determinants of higher education institution's ability to earn income from tuition fees and other non-public sources" (2014, p. 398).

In the broader literature, Slaughter and Leslie (1997), in their seminal work *Academic Capitalism* note that research intense institutions are better positioned to raise additional income. Research capacity is also deemed by Marginson (2006) as a source of competitive advantage generally, perhaps mirroring the Matthew effect discussed earlier.

Whilst the available literature makes the case that research intensity leads to greater income diversification, none of the empirical studies statistically tested the relationship between research intensity and the level of income diversification achieved. Hence, research intensity

forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.8 Regional location

Regional opportunities are suggested to have an influence on an institution's ability to generate third-stream income. The level of commercial activity will be a reflection of the client organisations in the region, and so determine the type of third-stream activity within the university (Prince, 2007; Shattock, 2009). As Alstete (2014) contends, an institution's geographical location will have a role to play in what kind of additional income can be generated. Although Teixeira et al. (2014) find that location is not as significant a factor in generating non-public revenues as they first assumed.

While the available literature makes a tentative case that regional location leads to greater income diversification, none of the empirical studies statistically tested the relationship between regional location and the level of income diversification achieved. Therefore, regional location forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.8.3.2.9 Investment income

Finally, in considering a diversified income portfolio, it is posited by this study that a university's investment income should be part of the mix. This is not touched upon in the higher education income diversification literature, however this study draws from Lerner, Schoar, and Wang (2008), who find that the size of a university's endowment is a good predictor of its investment income [and consequently the strength of that income source in balancing the portfolio]. Therefore, the size of a university's endowment forms an explanatory variable in the theoretical framework discussed in the next chapter where a hypothesis is proposed.

2.9 The need for further research

As noted previously, the extant research lacks statistical testing against established measures of income diversification. Evaluating the studies presented in table 2.2 in terms of their relevance and generalisability, the following observations are offered to further justify the need for additional research.

In the following table 2.3 it can be noted no studies thus far have made an attempt to measure the levels of income diversification within their sample. Although Estermann and Pruvot (2011) at least considered the income portfolio as a whole, the ‘level’ of income diversification was not calculated. Similarly, whilst Ali et al. (2010) measured research grant income in the U.S., and Teixeira et al. (2014), the proportion of income from non-public sources in Portugal, neither adopted an established measure of income diversification. Moreover, there are concerns around currency and contemporary relevance. In the European studies the most recent data relates to 2009-2010. In the UK specific studies, the most recent data relates to 2006-2007. Much has changed in the intervening years; particularly how higher education is funded.

Table 2.3: Measures and Data of the Empirical Studies Identifying Internal Factors

Study	Measure of income diversification	Data year(s)
De Zilwa (2005)	Level of income diversification not measured.	2001 data
Pilbeam (2006)	Level of income diversification not measured.	Four-year analysis 1996-2000
Prince (2007)	Level of income diversification not measured.	2006-2007 data
Shattock (2009)	Level of income diversification not measured.	Comparison of data over the period 1994 to 2004
Ali, Bhattacharyya and Olejniczak (2010)	Level of income diversification not measured.	2004 data
Estermann and Pruvot (2011)	Pie chart of proportions of income in each category in the sample.	Study conducted May 2009 to September 2010
Teixeira and Koryakina (2013)	Level of income diversification not measured.	Various data ranging from 1989 to 2010
Teixeira, Rocha, Biscaia and Cardoso (2014)	Proportion of income derived from non-public funds.	Data for the period between 2003 and 2009

Furthermore, these studies as a collection, provide a disjointed view and are largely atheoretical in their positioning, this creates a deficiency in providing a grounded explanation. Together, these observations create a gap in the knowledge in explaining why some universities are more successful than others in achieving a diversified income portfolio and point to the absence of a nomothetic explanation.

Finally, Teixeira et al. (2014) cite the need for further research:

Because the trend toward greater revenue diversification will be reinforced in the coming years, it is important that we continue to explore the factors that may help us understand the effectiveness of some institutions in diversifying their funding sources... the analysis of the differences in the patterns of revenue diversification will be relevant given the growing stratification observed in many systems and the willingness of governments to promote greater institutional competition for funding and to concentrate resources in a few institutions. (p.410-11)

2.10 Chapter conclusion

This chapter has confirmed universities are diversifying their income in response to challenges in their external environments. Institutions are adopting a strategy of income diversification to reduce the risks associated with dependence on any one source of income. The available literature has advanced our understanding of income diversification in a number of contexts, and proposed factors that may be important antecedents to achieving a diversified income portfolio. However, the extant research has a number of limitations in providing a generalisable explanation as to variances in levels of income diversification among higher education institutions.

This predominantly deductive study addresses these limitations by firstly adopting an established measure of income diversification, then statistically testing the antecedent factors identified by the prior research harvested from this chapter. The outcomes contribute to the ongoing academic debate whilst providing practical guidance to university leaders and policymakers in financially challenging times. To achieve its research aim, this study is guided by the theoretical framework described in the following chapter where a number of hypotheses are advanced.

Chapter 3: Theoretical Framework and Hypotheses

3.1 Chapter introduction

Having reviewed the available literature on income diversification in higher education and identified its limitations, the purpose of this chapter is to present the theoretical framework that drives this inquiry and develops the hypotheses used to test the factors harvested from the available literature. The theory in which a study is grounded can be viewed as defining the output, thus it guides the study in its entirety; from the objectives to the methodology, the data collection to the interpretation (Maxwell, 2012). The theoretical base helps with understanding the constructs and the relationships between them. It can also provide a useful boundary to the research (Maxwell, 2012; Imenda, 2014; Beaudry & Miller, 2016).

This third chapter critically discusses the use of theory in the extant research and then introduces the resource-based view as the theoretical base for this study. Resource classifications are discussed, and finally the resource-based hypotheses are presented.

3.2 Theoretical bases in the extant research

Modern portfolio theory is used extensively in income diversification studies in the non-profit literature (Hung & Hager, 2019). The same can be said for resource dependence theory (Froelich, 1999; Hodge & Piccolo, 2005; Mitchell, 2014). In contrast only two studies in the higher education income diversification literature appear to have a theoretical underpinning. Stachowiak-Kudła and Kudła (2017) adopts modern portfolio theory to position the importance of financial regulations on income diversification in selected European countries. Webb (2015) draws from both modern portfolio theory and resource dependence theory to highlight the importance of income diversification and tuition dependence in U.S. private universities and colleges.

The extant research most relevant to this study i.e. considering the antecedent factors that may explain variance in levels of income diversification appears to be atheoretical. Whilst Teixeira et al. (2014) note resource dependence as a theoretical basis for the motivation to diversify income, their study examining the institutional characteristics that influence the levels achieved does not appear to be underpinned by any particular theory.

Lastly, in their systematic literature review of public sector accounting research in the higher education sector Schmidt and Günther (2016) comment:

Furthermore, we share the concern of other authors regarding the lack of theoretically-informed research (Broadbent and Guthrie 2008, 1992; Lapsley 1988) as the majority of papers in the HE sector do not explicitly refer to a theoretical foundation. Even though the missing theoretical foundation has been criticized in older reviews, we do not see an increase in use of theories for the most recent time period from 2010 to 2014. (p.259)

For a more grounded approach, this study adopts the resource-based view of the firm and uses it deductively to take general theoretical concepts and apply them to the specific context of income diversification in publicly-funded higher education institutions in England.

3.3 What is the resource-based view of the firm?

The resource-based view of the firm is a widely adopted theory in the strategic management literature that focuses on the internal resources and capabilities of an organisation. It has been explored in the academic literatures as a means of explaining why some organisations appear to have an advantage over others (Clulow, Gerstman, & Barry, 2003; Newbert, 2007).

3.4 How did it develop?

The theoretical roots of the resource-based view can be traced as far back as Ricardo (1817). The expression ‘Ricardian rents’ refers to the extra margins on revenues earned due to the leverage of resources that are superior, scarce and inelastic in supply. The works of economists in the 1930’s similarly consider the resources of an organisation such as reputation and know-how in creating an advantage (Chamberlin, 1933; Robinson, 1933). However, it is the book by Edith Penrose (1959) *The Theory of the Growth of the Firm* that is most commonly acknowledged as the more contemporary foundation for the resource-based view (Hoskisson, Wan, Yiu, & Hitt, 1999). Penrose viewed organisations as a collection of productive resources and argued it is the heterogeneity and interaction of these resources that provide an organisation with advantages in relation to their competitors.

This concept was built upon by Wernerfelt (1984) *A resource-based view of the firm* and Rumelt (1984) *Towards a strategic theory of the firm*, which firmly advanced the resource-based view in the strategic management literature (Newbert, 2007). Published in the same year, these papers considered similar concepts, interestingly neither referred to the other. It

was Rumelt that first used the term a 'unique bundle' of resources as giving an organisation its competitive advantage (Barney & Arikan, 2001).

Challenging some of the more external views of strategy at the time such as the Porterian approaches (Porter, 1979), Wernerfelt and Rumelt argue an organisation's competitive advantage lies in its own resource base. These concepts were further developed in Prahalad and Hamel (1990) which focused on the exploitation of core competencies. Although it is Barney (1991) that is widely acknowledged as the first formalisation of the fragmented literature into a theoretical framework that was therefore empirically testable (Newbert, 2007). In a special issue of the *Journal of Management*, Jay B. Barney (1991) presents a theoretical view of resources and sustained competitive advantage, emphasising the important of resource heterogeneity and immobility. He argues that a sustained competitive advantage stems from the resources and capabilities of an organisation that are valuable, rare, imperfectly imitable and not substitutable. Latterly, Barney (1995) suggests that having such resources is not sufficient, the organisation also needs to be organised to leverage them.

3.5 Classifying resources

At a high level, resources are generally viewed as either tangible resources such as financial assets, physical buildings and equipment; or intangible resources such as reputation and know-how (Itami & Roehl, 1987), however within those classifications, the view gets more complex.

Prahalad and Hamel (1990); Grant (1991) and Amit and Schoemaker (1993) focus on the differences between the *assets* the organisation has and its *capabilities* or *core competencies*. Building on this work, Hall (1992) and further in Hall (1993), confirm an organisation's capabilities as key to a sustained competitive advantage. He categorises the differentiating effect of an organisation's intangible resources into a) advantages stemming from competencies and b) advantages derived from assets. Hall (1992, 1993) further positions intangible resources as the bedrock of an organisation's capabilities. He suggests that intangible resources are assets such as culture and reputation; whereas organisational tacit knowledge and staff know-how he classes as intangible resources that are competency based. Helpfully Hall (1992, 1993) summarises; if an intangible resource is something that an organisation *has*, then it is an asset. If the intangible resource is something that the organisation *does*, then it is a capability.

All organisations will possess tangible and intangible resources to some extent, but not all will confer a competitive advantage (Barney, 1991; Amit & Schoemaker, 1993; Peteraf, 1993). Although as noted previously, Barney (1991) proposes that for a sustained competitive advantage, there needs to be an assumption of resource heterogeneity, that organisations in the same sector have different resources; and resource immobility, that the resource cannot easily be bought and sold. Barney (1991) further contends that for the assumptions of heterogeneity and immobility, resources need to be valuable, rare, imperfectly imitable and not substitutable. This is commonly referred to as the VRIN model (Bobe & Kober, 2015).

Barney (1991) suggests a resource is valuable when it contributes to the strategies to improve the performance of an organisation. Further, the possession of a rare resource enables an organisation to add more value than its competitors (Peteraf, 1993). The same rationale may apply to a collection of valuable resources i.e. a resource may not be rare in isolation, but when combined with other resources, can confer a competitive advantage (Bobe & Kober, 2015). Being valuable and being rare however, is not sufficient for sustained advantage (Brahma & Chakraborty, 2011). As Barney (1991) contends, the resource must also be imperfectly imitable i.e. it is hard for competitors to copy. There are several reasons why a resource may be potentially inimitable; an advantage due to an organisation's established history; causal ambiguity (it is not clear why an organisation has an advantage), and social complexity (social phenomena such as an organisation's culture). Finally, for a sustained competitive advantage, there must not be other resources (that a competitor may possess) that could achieve the same strategic advantage (Barney, 1991).

Whilst formalised by Barney (1991) these concepts are supported by a range of scholars of the resource-based view (Wernerfelt, 1984; Mahoney & Pandian, 1992; Peteraf, 1993; Galbreath, 2005; Nothnagel, 2008; Wernerfelt, 2016) and of course in Barney's later works (Barney, 2001; Barney & Arikan, 2001; Barney & Mackey, 2005; Barney, 2007; Barney & Clark, 2007; Barney & Hesterly, 2010).

3.6 Additional considerations

Building in part on the Mahoney and Pandian (1992) observation of the missing link between resource possession and resource exploitation, Barney (1995) as noted previously, evolves the VRIN model to VRIO making 'not substitutable' an assumption and replacing it with *organisation*. Barney contends that having resources is not enough, the organisation needs

to be organised to exploit them. This includes organisational components such as structures and compensation policies which may create incentives for employees to behave in certain ways (Barney & Mackey, 2005; Barney, 2007; Barney & Clark, 2007; Barney & Hesterly, 2010). Barney and Hesterly (2010) term these resources and capabilities as *complementary* because they have limited potential in isolation to create an advantage, but in combination with the other resources and capabilities, may help an organisation leverage its potential. The authors posit that it is being thus organised, that an organisation will have a sustained competitive advantage.

In a similar vein, Amit and Schoemaker (1993) contend that capabilities represent the ability of an organisation to effectively combine their resources for maximum effect. According to Fahy (2002), intangible resources that are *capabilities* are the most tacit and possess greater causal ambiguity. Galbreath (2005) finds that capabilities contribute more to organisational success than both tangible resources and intangible resources that are categorised as assets. A further stream of resource-based view theory development has centred on the impact of rapid and unpredictable external environments and the need for organisations to develop more *dynamic capabilities* in order to respond. The focus is not on static resources, but on building and configuring resources and competencies to deal with changes in the external environment (Teece, Pisano, & Shuen, 1997; Eisenhardt & Martin, 2000).

In summary, Wade and Hulland (2004) conclude that resources encompass all assets, capabilities, attributes and knowledge that an organisation may use to increase its performance in many contexts, and are valuable in reacting to opportunities and threats in a market. They also highlight that a resource may not appear to have a particular value directly, but in combination the interactions between assets and capabilities create the potential for the latter to transform the former.

3.7 The resource-based view in public sector and higher education contexts

Scholars have reviewed the applicability of the resource-based view to public sector contexts and confirmed its relevance (Carmeli & Tishler, 2004; Bryson, Ackermann, & Eden, 2007; Ferlie & Ongaro, 2015), particularly in light of an evolving competitive public higher education market (Hansen & Ferlie, 2016). In addition, relevance is established by studies in the non-profit literature (Arya & Lin, 2007; Kong & Prior, 2008). Interestingly, revisiting the rural agriculture example in the opening to this chapter, Schwarze and Zeller (2005) find that the ability to diversify income highly depends on assets such as physical, human and

social capital. Access to these resources explain why some farms are more successful in diversifying their income than others.

The resource-based view has been a theoretical base for a variety of studies in higher education contexts. Plewa, Ho, Conduit, and Karpen (2016) adopt the resource-based view to test the configuration of university resources to build reputation and so compete for domestic and international students. Reputation in higher education appears to have a body of work that uses the resource-based view as its theoretical basis; (Rindova, Williamson, & Petkova, 2010; Delgado-Márquez, Escudero-Torres, & Hurtado-Torres, 2013; Finch, McDonald, & Staple, 2013).

Of particular relevance to the aim of this study, O'Shea, Allen, Chevalier, and Roche (2005, p. 994) adopt the resource based view "to understand why some universities are more successful than others at generating technology-based spinoff companies". Similarly, Ho and Peng (2016, p. 280) use the resource-based view to explain "why do some higher education institutions consistently outperform others". Moreover, Lynch and Baines (2004) employ the resource-based view to explore potential coping strategies for universities in Britain faced with unprecedented competitive pressures. Lynch and Baines (2004) make a compelling argument that universities are increasingly competing and that their unique bundle of resources explain why some outperform others in a variety of contexts. Thus, it is reasonable to assume the resource-based view provides an appropriate theoretical base to help explain why some universities are more successful than others in achieving a diversified income portfolio. In doing so this study extends the resource-based view into an unchartered context.

3.8 Methodological concerns with research adopting the resource-based view

Grant (1991) notes the need to try and obtain objective measures of an organisation's capabilities. Grant contends that asking the organisation may not get an unbiased response. Moreover, capabilities should be assessed relative to competitors. Barney, Wright, and Ketchen Jr (2001), identify a number of methodological issues for studies taking a resource-based view. Robust large-scale quantitative studies of the resource-based view may only be feasible in homogenous environments such as heavily regulated markets (Lockett & Wright, 2005). Intangible resources can be difficult to measure and the use of single proxies such as in Miller and Shamsie (1996) is challenged. However Barney et al. (2001) acknowledge the legitimacy of the approach advanced by Godfrey and Hill (1995), to focus on observables

that collectively shed light on ‘unobservables’. In addition, Levitas and Chi (2002) encourage researchers to conduct empirical studies even though some constructs may be hard to operationalise. They contend that the benefits of testing the resource effects on organisational performance outweigh the concerns around construct validity. In addition, Barney et al. (2001) call for studies to measure resources and capabilities over a time period rather than single year studies. Finally, Galbreath (2005) notes that studies adopting a resource-based view tend to focus on the importance of intangible resources and capabilities, he argues for the inclusion of tangible resources in the model. In its design and variable operationalisation, this study has endeavoured to address these concerns.

3.9 Building the framework

Whilst resources are commonly classified as tangible and intangible resources, within those considerations there are various frameworks adopted for categorising resources. For example Barney (2007) contends four basic types of resources may confer a competitive advantage; *financial capital* which comprises all the money resources organisations have at their disposal to implement their strategies; *physical capital* such as an organisation’s equipment, geographical location; *human capital* such as the experience and relationships of individual managers; and finally, *organisational capital* such as its reputation, culture and its administrative framework. This study questions the inclusion of human capital in terms of individuals that are potentially mobile (recalling Barney’s (1991) criteria of ‘imperfectly mobile’). Instead, this study adopts the categorisations used by Galbreath (2005) that draw from Barney (1991) but also the broader works of Grant (1991); Hall (1992) and Roberts and Dowling (2002). The following description is based on a synthesis of these papers.

3.9.1 Tangible resources

These are defined as those factors that are more physical in nature, in other words, they can be observed and measured. Tangible resources can be further subdivided into financial assets; such as cash, raised capital, investments and endowments and physical assets: such as buildings, equipment and land (including its location).

3.9.2 Intangible resources

Intangible resources are by their nature a little more complex. Defined by Lev (2001, p. 5) as “a claim to future benefits that does not have a physical or financial embodiment”, thus are not so easily quantified. As mentioned previously, the intangible resources of an organisation should be divided into intangible resources that are assets (what it has) and intangible resources that are competency based (what it can do). Table 3.1 provides an overview with examples.

Table 3.1: *Types of Intangible Resource after Hall (1992, 1993).*

Type of intangible resource	Categories of resource	Examples
Intangible resources: Assets	Reputational assets	Brand reputation, prestige Organisational reputation Product/service reputation
	Organisational assets	Culture Structure Policies
Intangible resources: Skills	Capabilities	Employee know-how
		Managerial know-how
		Relational abilities

Reputational assets can be broadly conceived as all the perceptions than an organisation’s internal and external stakeholders hold about the organisation (Itami & Roehl, 1987; Hall, 1992, 1993).

Organisational assets encompass the organisation’s culture which can be viewed as an array of implicit shared beliefs, assumptions and values that can drive organisational behaviour (Hall, 1992, 1993; Hofstede, Hofstede, & Minkov, 2010). Organisational assets also include its structure, its units and its reporting design (Barney, 1991); as well as its policies around recruitment, promotion and compensation (Barney & Wright, 1998).

Capabilities broadly represent what the organisation can do (Hall, 1992, 1993). It encompasses collective know-how (Penrose, 1959; Itami & Roehl, 1987; Hall, 1992, 1993) and the maintenance of effective relationships across a broad range of stakeholders (Hall, 1993; Ireland, Hitt, & Vaidyanath, 2002).

Drawing on the internal factors harvested from the literature review as influencing a university's success in diversifying its income, these resource categories are populated to develop the theoretical framework for this study. The hypotheses to be tested in the quantitative phase are also indicated and then presented below.

3.9.3 Illustrating the framework

The theoretical framework, hypotheses, dependent, explanatory and control variables under study are illustrated in figure 3.1.

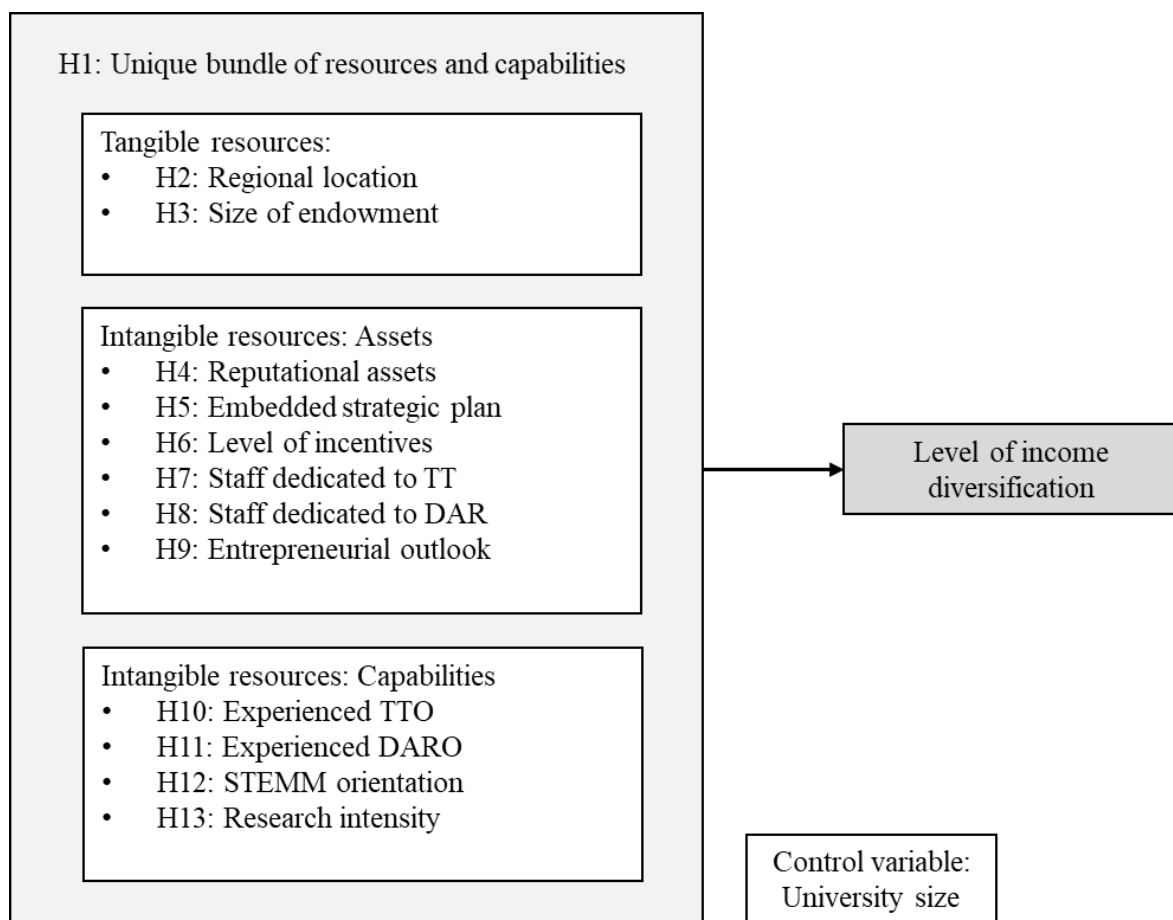


Figure 3.1: The theoretical framework for this study, highlighting the focal resource of each hypothesis.

The size of a university was not flagged in the extant research as a potential factor to influence the level of income diversification, however it is commonly used as a control variable in this type of study (Powers & McDougall, 2005; Liu, 2006) and so is included here as a potential alternative explanation.

3.10 Presenting the hypotheses

This section summarises the hypotheses that underpin the predominantly deductive nature of this study. Scholars of the resource-based view highlight the need for systematic hypothesis testing and the importance of empirical testing of the theoretical predictions (Barney, 2001; Priem & Butler, 2001; Levitas & Chi, 2002). Whilst the literature provided a rich source of potential resources that influence income diversification in higher education, none had been statistically tested against an established measure of income diversification. The literature review and the theoretical base driving this inquiry therefore develop the following hypotheses to address the second research question. These hypotheses not only test the extant income diversification in higher education research but also validate the resource-based view in this context.

Firstly, the hypotheses focus on establishing whether there is a relationship between a university's resource-set as a whole, and then which particular type of resource has the strongest relationship to a diversified income portfolio.

Hypothesis 1a: A university's unique bundle of resources have a statistically significant, positive effect on its level of income diversification.

Hypothesis 1b: Within a university's unique bundle of resources, it is the capabilities of the institution that has the greatest statistically significant effect on its level of income diversification.

The resources are then analysed individually, firstly to establish if there is an individual relationship between the resource and level of income diversification, and secondly to consider that relationship in combination with the other resources in the model. Hypotheses 2-13 are identical but for the resource under study.

Hypothesis 2a: There is a statistically significant, positive relationship between a university's [individual resource] and its level of income diversification.

Hypothesis 2b: The significant relationship persists when allowing for the combined effects of an institution's unique bundle of resources.

These resource hypotheses are illustrated in figure 3.1. Reference back to the literature review can provide additional context if needed.

In the more inductive phase of this mixed method study, the underlying mechanisms behind any relationships uncovered are explored to provide a richer explanation of any causal effect.

3.11 Chapter conclusion

This chapter has provided the rationale and justification for the use of the resource-based view as the theoretical base for this study to achieve the research aim. Moreover, the available research suggests its suitability in the context of higher education research. The theoretical framework provides appropriate categorisations for the antecedent factors harvested from the literature and provides structure to the hypotheses presented.

Building on this theoretical framework, the next chapter in this thesis considers the methodology that will be used meet the objectives of this research, address the research questions and achieve the research aim.

Chapter 4: Research Methodology and Methods

4.1 Chapter introduction

The previous chapters have justified the need for this research and discussed the theoretical framework that drives the inquiry. The purpose of this chapter is to present the research methodology and methods adopted to meet the research objectives, address the research questions and thus, achieve the aim of this empirical study. According to Crotty, the research methodology can be defined as “the strategy, plan of action, process or design lying behind the choice of particular methods and linking the choice and use of methods to the desired outcomes” (1998, p. 3).

This fourth chapter firstly considers the research paradigm and the overall design of the study, the methods of data collection and analysis within the design are then discussed. Ethical considerations and procedures are also noted.

4.2 Research paradigm

A research paradigm creates a framework to guide how the research should be carried out based on the researcher’s philosophical view of the world and their suppositions about knowledge creation (Collis & Hussey, 2014). As Creswell and Plano Clark (2011) suggest, these views relate to a researcher’s ontological assumptions (the nature of reality) and their epistemological assumptions (what constitutes valid knowledge).

Whilst acknowledging there are many points along the continuum, Collis and Hussey (2014) contend there are two main paradigms in business research; positivism and interpretivism. According to Merriam and Tisdell “a positivist orientation assumes that reality exists ‘out there’ and that it is observable, stable and measurable”, whereas interpretive research assumes that reality is constructed i.e. there is no single, observable reality (2016, p. 9). A researcher’s perspective on reality will influence perceptions on how valid knowledge is to be created by research; the positivists reinforcing reality is objective and therefore external to the researcher, and the interpretivists positing that reality is subjective and accordingly, the researcher is involved in the knowledge creation process (Grix, 2010; Collis & Hussey, 2014). These epistemological assumptions influence the type of data sought to achieve the aims of the research; the positivists favouring objective, quantitative data and the

interpretivists seeking more subjective, qualitative data (Robson, 2011). The types of data sought, in turn influence the research methods adopted for its collection (Creswell, 2014). Moreover, as Creswell and Plano Clark (2011) suggest, a researcher's paradigm underpins the methodological assumptions surrounding the entire process of the research. Positivists adopting a deductive approach to test established theory, versus the more inductive inquiry of interpretivists to "build up to patterns, theories and generalisations" (p.42). Finally, the paradigm in which the research is located drives the research approach and design objectives, before these are considered, the philosophical position of this study is discussed.

4.2.1 Where this study is located

The aim of this study is to offer a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio. This research strives to confirm "general laws and theories through which we can understand the social world" Robson (2011, pp. 22-23), to thus make a meaningful contribution to higher education management theory and practice. Research based on a realist ontology and epistemological objectivity is also deemed more relevant to policy decisions (Easterby-Smith et al 1991). In order to achieve the desired generalisability, an objective, deductive methodology is indicated (Collis & Hussey, 2014). The development of knowledge through objective, quantitative measurement reflects a realist ontological assumption, operationalising concepts so they can be measured (Easterby-Smith et al 2002). This suggests a positivistic research paradigm.

In contrast, if driven by an interpretivist approach, the outcome may be too idiographic for the looked-for contribution to theory and practice. As Grix states, "concern with 'subjectivity', with 'understandings, with 'agency' and the way people construct their social world, introduces complexities that invoke elements of uncertainty" (2010, p. 83). Grix goes on to say that these potential contradictions and inconsistencies do not sit well with those seeking "universal laws or certainty about how things work", and hence cannot support a nomothetic explanation in isolation.

However, as previously stated, paradigms should be regarded on a continuum and this research is located in the post-positivist tradition. Post-positivism is also described as a "less arrogant form of positivism" (Crotty, 1998, p. 29) as it posits that reality can only be imperfectly known (Guba & Lincoln, 1994; Phillips & Burbules, 2000; Robson, 2011). As Creswell explains "post-positivists reflect a deterministic philosophy about research in

which causes probably determine effects or outcomes. Therefore, the problems studied by post-positivists reflect issues that need to identify and assess the causes that influence the outcomes” (2014, p. 245). Post-positive researchers seek a deeper understanding of these effects and recognise quantitative methods alone may not be sufficient to achieve meaningful explanation (Jick, 1979; Guba & Lincoln, 1994).

Consequently, within post-positivism, there is room for the inclusion of elements from the interpretivist paradigm with its more relativist ontology and subjective epistemology (Miles & Huberman, 1994). In this study, qualitative data are used to inductively construct the reality to help explain the causal effects of the relationships deductively established. This sequential approach is in keeping with the post-positive paradigm (Creswell & Plano Clark, 2011). If the use of both quantitative and qualitative data were concurrent rather than sequential, this would reflect a pragmatic research paradigm where the nature of reality can be “singular and multiple” and the epistemology reflects practicality and “what works to address the research question” (Creswell & Plano Clark, 2011, p. 42).

The inclusion of quantitative and qualitative data and analysis in the same study is the subject of much philosophical debate (Tashakkori & Teddlie, 2003). The issue centres on the conflicting ontologies and epistemologies underlying the research philosophies that drive the two approaches. Tashakkori and Teddlie (2003) cite Smith and Heshusius (1986), as proponents of the incompatibility thesis, who state the use of both quantitative and qualitative data is impossible.

However, Creswell, Plano Clark, Gutmann, and Hanson (2003) contend, multiple paradigms can serve one study. Patton’s “paradigm of choices” also rejects methodological orthodoxy in favour of methodological appropriateness (1990). As a proponent of research utilising both quantitative and qualitative data in a single study for research into strategic management and the resource-based view Molina-Azorin suggests:

A paradigm of choices rejects the methodological orthodoxy in favour of methodological appropriateness as the primary criterion for judging methodological quality. Thus, the paradigm of choices recognizes that different methods are appropriate for different situations. The predominance of more quantitative-based methodological tools in the development of strategic management and the RBV [resource-based view] does not mean that these tools are applicable to all research questions. The research question and context should dictate the choice of appropriate research methods. (2007, p. 66)

The different methods are simply different tools for addressing the different questions necessary to achieve the research aim (Brinkmann & Kvale, 2015). As Piekkari, Welch, and Paavilainen (2009) contend, an explanation, needs not only objective data but also context.

This paradigmatic discussion has provided a backdrop to the rest of this chapter, the research approach, research design, data collection and analysis are covered in the following sections.

4.3 Research approach

According to Grix research approaches “are informed by the paradigmatic assumptions upon which they are based” (Grix, 2010, p. 162). Therefore, the philosophical position of the research drives whether the research is deductive or inductive in how it achieves the desired outcome. Collis and Hussey also term this the *logic of the research*, “whether the research logic moves from the general to the specific or vice versa” (2014, p. 4). As Bryman and Bell (2015) suggest, the desired outcome may be to test a theory, and so that theory drives the deductive research; or the desired outcome may be to inductively generate a theory, so the theory is the product of the research process.

Deductive research “is that which begins with clear assumptions or previous knowledge in order to understand a particular problem or find the answer to a problem” (Grix, 2010, p. 164). Additionally, a deductive logic is used to test pre-existing theoretical ideas (Robson, 2011). According to Collis and Hussey taking a deductive approach means “particular instances are deduced from general inferences” (2014, p. 333). In other words, moving from a general theory to testing the specific hypotheses derived from the theory (Robson, 2011). As Bryman and Bell (2015) confirm, a deductive approach is theory driven, the researcher deduces a contextualised hypothesis or hypotheses based on an established theory and gathers data to confirm or reject the hypotheses through statistical inference. The method of proposing hypotheses to test is known as the ‘hypothetico-deductive’ approach (Grix, 2010; Robson, 2011). As mentioned previously, deductive approaches are typically linked with quantitative research (Robson, 2011; Bryman & Bell, 2015) and the post-positive paradigm (Creswell, 2014).

In contrast, inductive research “draws conclusions from specific empirical data (the particular) and attempts to generalise from them (the general), leading to more abstract ideas, including theories” (Grix, 2010, p. 168). In other words, where general inferences are induced from particular instances (Collis & Hussey, 2014). As Robson describes “moving

from specific observations to develop a general theory” (2011, p. 57). The inductive approach with its focus on theory generation is typically associated with the interpretivist paradigm (Collis & Hussey, 2014). Unlike the hypothetico-deductive approach, the inductive approach proposes that “theories can be derived from observation” (Robson, 2011, p. 527), and is usually associated with qualitative research (Bryman & Bell, 2015). In qualitative research, researchers build from the bottom up, organising their data into “increasingly more abstract units of information” by inductively working back and forth between the themes and the data (Creswell, 2014, p. 186).

This study adopts a hypothetico-deductive research approach to test the hypotheses driven by the resource-based theoretical framework as described in chapter three, with the aim of developing a generalisable outcome. However, in order to provide a richer explanation of any causal effect, qualitative data are gathered and therefore an inductive approach is also used to support this study. It is not uncommon for there to be inductive elements within a predominantly deductive study (Bryman & Bell, 2015). Moreover, Creswell suggests “researchers may both test theories and generate them” (Creswell, 2014, p. 51).

The advantage of adopting both deductive quantitative, and inductive qualitative approaches to data collection and analysis is that it can accomplish a range of objectives e.g. it can demonstrate a relationship between variables and also offer an explanation as to how and why the predicted relationship occurs (Tashakkori & Teddlie, 2003).

As Morse (2016) contends, if the driving force of the research is to test a hypothesis to determine relationships, then the overall theoretical drive of the research is deductive, although it may include inductive elements in a supporting role. Such is the approach taken in this study.

4.4 Research design objectives

The research paradigm also drives the overall design objective, whether that be to explore, describe or explain. These classifications also reflect the purpose of the research (Collis & Hussey, 2014) and help in selecting the research design (Creswell, 2014).

Firstly, exploratory research simply explores phenomena (Robson, 2011; Collis & Hussey, 2014). This design objective reflects:

A study where the aim is to investigate phenomena where there is little or no information, with a view to finding patterns or developing propositions, rather than

testing them. The focus is on gaining insights prior to a more rigorous investigation. (Collis & Hussey, 2014, p. 334)

Secondly, descriptive research also describes phenomena (Robson, 2011; Collis & Hussey, 2014), but provides more detail than exploratory research, as according to Collis and Hussey “it is undertaken to ascertain and describe the characteristics of the pertinent issues” (2014, p. 5).

Finally, the purpose of explanatory research is to provide causal explanations of phenomena (Robson, 2011; Collis & Hussey, 2014). Robson goes on to state that explanatory research also “involves identifying the mechanism(s) operating” (2011, p. 525) which is very much at the core of the third research question of this study, to explain the underlying mechanisms behind the statistical relationships established. As Robson highlights, the post-positivist researcher “seeks to develop statements which can help explain situations or describe causal relationships” (2011, p. 22), this cannot be achieved through quantitative data alone (Jick, 1979; Guba & Lincoln, 1994).

Another consideration in the design objectives is the desired level of generalisation of the outcome. The researcher in the post-positivist tradition seeks a nomothetic outcome “in a search for universal laws which explain and govern the reality which is being observed” (Burrell & Morgan, 1979, p. 3). Whereas researchers grounded in an interpretivist paradigm seek an “understanding of what is unique and particular to the individual rather than of what is general and universal” (Burrell & Morgan, 1979, p. 3).

The post-positivist paradigm in which this study is located, has a deductive theoretical drive and is explanatory in its design objectives. This research seeks a nomothetic explanation to ensure the desired contribution to theory and practice.

4.5 Types of data

As touched upon earlier, the research paradigm in which the research is located also influences the types of data that are collected and analysed to meet the aim of the research (Creswell, 2014). As Collis and Hussey (2014) explain, these data may be quantitative (in numerical form) or qualitative (in non-numerical form, such as text or images). Which types of data are gathered and analysed will reflect the differing epistemological and ontological positions underpinning the research (Bryman & Bell, 2015). Post-positivism is most often

associated with quantitative data collection and analysis, whereas the more interpretive philosophies utilise qualitative data (Creswell, 2014).

Whilst thus far this narrative has adhered to the contention that *qualitative* and *quantitative* are descriptions of data types and not approaches to research (Collis & Hussey, 2014), the methodological texts commonly use the quantitative or qualitative labels to describe the broader research approach or strategy (Creswell, 2014; Bryman & Bell, 2015). For simplicity, this thesis will hereafter also use the terms quantitative and qualitative with their broader meaning.

As Bryman and Bell highlight “quantitative research is a strategy that emphasizes quantification in the collection and analysis of data and entails a deductive approach to the relationship between theory and research”; in contrast, qualitative research has an emphasis on words and the inductive generation of theory (2015, p. 37). It is in the examination of these two types of approaches, that the epistemological considerations of objectivity and subjectivity resurface, quantitative being associated with objective data and qualitative with subjective data (Grix, 2010).

Creswell also introduces the concept of mixed methods research that involves “the mixing or integrating of both approaches in a study” (2014, p. 244). Mixed methods research will be discussed in more detail in the following section that considers the research design for this study.

Both types of data have their strengths and weaknesses, as Collis and Hussey contend:

Qualitative data are normally transient, understood only within context and are associated with an interpretive methodology that usually results in findings with a high degree of validity. It contrasts with quantitative data, which are normally precise, can be captured at various points in time and in different contexts, and are associated with a positivist methodology that usually results in findings with a high degree of reliability. (2014, p. 143)

Quantitative research can uncover statistically generalisable results, but can fail to provide reasons for the results; conversely, qualitative research can lead to deep understanding, but is seldom generalisable because of the small size of the sample researched (Creswell, 2014). When brought together in one study, the respective weaknesses counterbalance and a richer understanding is achieved (Johnson & Onwuegbuzie, 2004).

This study utilises both qualitative and quantitative data to address the research questions, so realising the strengths and overcoming the weaknesses of both. According to Creswell,

quantitative data are indicated when deductively testing objective theories by examining relationships between variables (2014). However, as this research is located in the post-positive paradigm, it will also draw from qualitative data to support interpretation of the quantitative results. As Hakim suggests “qualitative research is valuable for identifying patterns of associations between factors on the ground, as compared with abstract correlations between variables in the analysis of large-scale surveys and aggregate data” (2000, p. 36). Hakim goes on to confirm that qualitative data can be useful to help explain any causal effect behind the relationships.

This discussion has highlighted how the research paradigm guides the research approach and the objectives the research design is to achieve. The following section considers the overall research design adopted in this study to address the research questions.

4.6 Research design

According to Bryman and Bell a research design is “a framework or structure within which the collection and analysis of data takes place” (2015, p. 727). A research design provides specific directions for the research procedure (Creswell, 2014). To reflect the need for quantitative and qualitative data to address the research questions of this study, a mixed method research design is adopted. Robson defines the mixed method design as “research which combines both qualitative and quantitative methods in a planned design” (2011, p. 528). Although, there needs to be clear purpose behind the use of mixed method designs, as Creswell and Tashakkori (2007) contend, the goal of mixed method research should be to produce more than the sum of its parts.

4.6.1 Mixed method research

The typologies for mixed method design within the mixed method approach are ever evolving (Tashakkori & Teddlie, 2003), however the typologies developed and updated in (Creswell et al., 2003; Creswell & Plano Clark, 2011; Creswell, 2014) represent the four most common designs. In a convergent parallel design, both quantitative and qualitative data are gathered, this design is most often used to directly compare findings for corroboration and validation purposes. In an explanatory sequential design, the study has two phases where firstly quantitative data is collected and analysed, the results of which inform the second phase of qualitative data collection, the purpose being for the qualitative phase to help

explain the quantitative results from the initial phase. In an exploratory sequential design, the phases are reversed, and the qualitative data is gathered to inform the data collection for the quantitative phase, the purpose being to generalise the findings from the qualitative phase to a larger sample in the quantitative phase (thus it is most commonly used when the researcher needs to develop and test an instrument). Finally, Creswell et al. (2003) describe the embedded design where a mixed method design is nested within a larger research design that may be quantitative or qualitative, the premise being that a single data set is not sufficient as there are secondary research questions that require different data to address them.

With sequential designs, consideration needs to be given to the priority of each strand i.e. to consider whether the quantitative and the qualitative strands will have equal weight, or whether one will dominate (Tashakkori & Teddlie, 2003). This can be illustrated using Morse's (1991) notational system; an explanatory sequential design may typically show as $QUAN > qual$, where the quantitative strand was implemented first and has a greater emphasis "in addressing the study's purpose" and the qualitative strand is in a supportive role to help explain the quantitative results. (Creswell, 2014, p. 110). Similarly, an exploratory sequential design may present as $QUAL > quan$ where the qualitative strand is implemented first and takes a priority with quantitative methods being adopted afterwards to "assess the extent to which the initial qualitative findings generalize to a population" (Creswell, 2014, p. 110). $QUAN > QUAL$ is an example of the notation where each phase is of equal weight.

This post-positivist study, driven by deductive logic and explanatory research design objectives, adopts an explanatory sequential mixed method research design where the quantitative phase is dominant ($QUAN > qual$). As Creswell notes this design is most useful when the research objectives are not only to identify trends and relationships in quantitative data, but also to explain the mechanism or reason behind the resultant trends (Creswell, 2014). Thus, the explanatory mixed method design can address all three research questions to achieve the research aim. According to Tashakkori and Teddlie "mixed methods research provides better (stronger) inferences" (2003, p. 14). Moreover, large sample, statistical testing of the resource-based view derived from secondary data is frequently cited (Barney et al., 2001), but some scholars argue that this approach does not provide a complete picture and suggest instead that more qualitative, primary data collection methods should be adopted (Johnson, Melin, & Whittington, 2003). Therefore, this study supports Molina-Azorín

(2007) who as noted previously, advocates the use of mixed methods in the study of the resource-based view, but that Molloy, Chadwick, Ployhart, and Golden (2011) contend is still lacking.

Bryman (2006) notes several rationales for the integration of quantitative and qualitative data in a mixed method study. Pertinent to the research aim of this study are i) explanation, where one is used to help explain the findings of the other; ii) complementarity, where one increases the interpretability of the other, iii) illustration, enhancing the dry quantitative data, iv) credibility, where adopting both approaches improves the integrity of the findings, and finally, v) utility, this is more relevant to research with an applied focus such as this study, where Bryman contends the combined results are more useful to practitioners.

As Morse (2016) points out, a final consideration in a mixed method design is the point of interface i.e. where the quantitative and qualitative data interact. In this study, firstly the results of the quantitative phase, inform the sample selection and the interview questions for the qualitative phase (Hanson, Creswell, Clark, Petska, & Creswell, 2005), then the qualitative findings are used to help interpret the quantitative results (Creswell & Plano Clark, 2011). Therefore, the design produces more than could be understood by what is learned from the separate phases (Molina-Azorín, 2011).

The slight limitation of this design is that the qualitative phase is therefore restricted in what can be outlined in advance. The sample to be interviewed and the questions to be asked are derived from the quantitative results phase and so cannot be defined *a priori*.

When interpreting connected results, the study is concerned with drawing inferences and meta-inferences; although inferences are drawn after each phase, the meta-inferences are not drawn until the end of the study and presented in the final discussion chapter. In this explanatory design, the meta-inferences are concerned with whether the qualitative data provide a better understanding of the research questions than simply the quantitative results alone. (Creswell & Plano Clark, 2011, p. 237).

Refer to figure 1.2 in chapter one for a visual overview of the research design and process for this study.

4.6.2 Time dimension

An additional consideration in the research design is the time dimension, the two most common types are cross-sectional and longitudinal (Collis & Hussey, 2014). As Bryman and Bell explain, a cross-sectional design “collects data on several cases at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables which are then examined to detect patterns of association” (2015, p. 723). Cross-sectional designs are often used to investigate economic characteristics of large numbers of organisations or people, they create a record of the phenomena at a point in time (Collis & Hussey, 2014).

In longitudinal designs, data are collected at more than one point in time and often reflect repeated data gathering as seen in experimental time-series designs (Robson, 2011). They examine the dynamics of a research problem by investigating the same sample group over a period of time, the aim of repeated observations is to reveal “the relative stability of the phenomena under study” (Collis & Hussey, 2014, p. 78)

This study is cross-sectional in its design, as Ramanujam and Varadarajan (1989) suggest, diversification can be too unpredictable to render longitudinal studies meaningful. Moreover, cross-sectional designs are predominant in studies underpinned by the resource-based view (Armstrong & Shimizu, 2007). Data collected in the quantitative phase represent the different contexts of all publicly-funded universities in England and the use of 5-year averages reflect the time period 2012/13 to 2016/17 (up to the most recently available data at the point of analysis).

Five-year averages are used as there is a likely time lag between the influence of an antecedent resource and the income diversification outcome. Averages over several years have been used in similar studies related to third-stream income generation for the same reason i.e. to reduce errors from time lags (Thursby & Kemp, 2002; Rossi, 2018). In addition, the period reflects one of considerable change in higher education funding and sector reform. The period 2012/13 to 2016/17 coincides with when the higher £9,000 tuition fee rate was introduced in England for courses starting September 2012 (so financial year ending 31 July 2013) and also the lifting of caps on student recruitment numbers. The impact to the income portfolio of a transition from predominantly direct government funding to predominantly tuition fee income is also smoothed by the use of average figures for the period.

4.6.3 Sampling strategies

A research design also needs to consider the sampling strategy to be adopted. Whilst there is no widely accepted typology for sampling within mixed method designs (Tashakkori & Teddlie, 2003), Creswell and Plano Clark (2011) contend it is natural to have both random (quantitative) and purposeful (qualitative) strategies within one study. Although the quantitative phase usually adopts a random strategy as noted, in this study data from the total focal population (bar one newer institution) are collected and analysed. The qualitative phase takes a purposive approach and the sample is based on the results of the quantitative analysis. The samples and the way they are selected is discussed more fully in each of the qualitative and quantitative phase chapters.

4.6.4 Validity and reliability

Concerns around the validity and reliability of the findings in a study, or indeed the concepts themselves, differ between quantitative and qualitative data collection and analysis (Johnson & Onwuegbuzie, 2004). Thus, Teddlie and Tashakkori (2009) recommend considering each separately. This study presents considerations of validity and reliability within each of the quantitative and qualitative phase chapters. However, in summary, the approach is based upon the model in figure 4.1, that have been developed from Lincoln and Guba (1985).

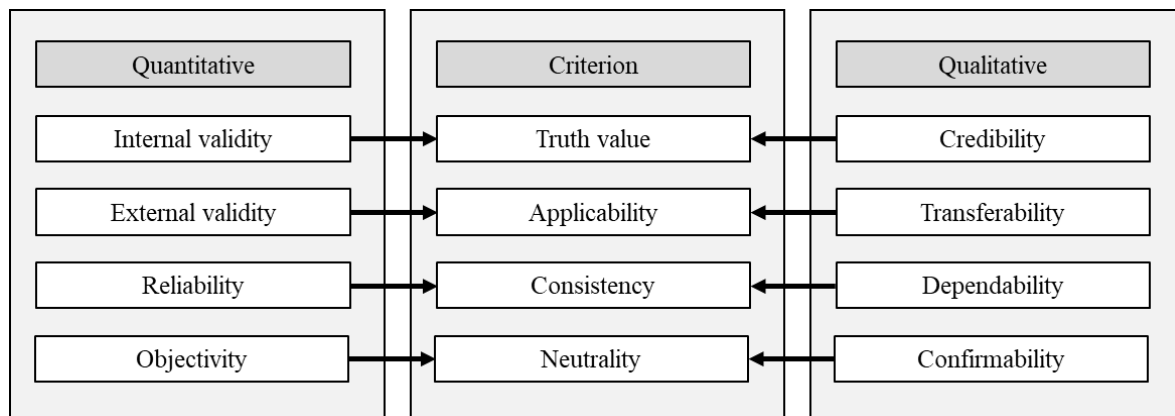


Figure 4.1: Evaluating qualitative and quantitative research. Developed from Lincoln and Guba (1985).

4.7 Data collection and analysis methods

According to Grix, “data collection is the process through which empirical data are produced and collected via a number of different data sources” (2010, p. 164). Data sources may be

classified as primary or secondary. Primary data are “new information that is collected directly by the researcher” (Easterby-Smith, Thorpe, & Jackson, 2008, p. 331), from an original source such as the researcher’s interviews or questionnaires (Collis & Hussey, 2014); Collis and Hussey go on to contrast that secondary data are “data that have been collected from an existing source” (2014, p. 340). Whilst primary data collection offers the greatest control and clarity of purpose, it is time consuming to do on a large scale, and it is scale that is often cited as the key advantage of using secondary data (Bryman & Bell, 2015). As noted previously, data collected may be quantitative in numerical form, or qualitative in non-numerical form; the appropriate choice will depend on the research questions and the overall research methodology driving the study (Crotty, 1998). Once collected, data then need to be analysed as “data in their raw form do not speak for themselves” (Robson, 2011, p. 408). The analytical strategy [or strategies] adopted in a study is dictated by the nature of the data i.e. quantitative or qualitative (Bryman & Bell, 2015).

As highlighted by Grix (2010), the data collection and analysis methods used in a study are driven by its research questions. The research questions for this study presented in chapter one, have differing goals that are best met by using different approaches to data collection and analysis. The explanatory sequential design then “connects the two sources of data so that their combined use provides a better understanding of the research problem than one source or the other” (Creswell & Plano Clark, 2011, p. 268). To illustrate, the analysis of the quantitative data will objectively determine any statistically significant relationship between a university’s resources and its level of income diversification; however, it will not explain the underlying mechanisms behind any relationship, how and why is the resource having the effect it is. By additionally collecting and analysing subjective qualitative data, a richer understanding of the causal effect emerges.

4.7.1 Quantitative data collection and analysis methods

Driven by deductive logic, the overall objective for the quantitative phase is to test a number of hypotheses and is thus achieved through quantitative data collection and analysis. This section presents the data collection method and rationale adopted in the quantitative phase; the analytical strategy is then outlined.

4.7.1.1 Methods of quantitative data collection

To demonstrate the contribution of resources to income diversification, it is necessary to first calculate how diversified the income portfolios of publicly-funded universities in England are. This forms the dependent variable. This analysis is performed on financial data for the period 2012/13 to 2016/17 (data for 2018/19 was published by HESA just as this thesis was being submitted). As these complete datasets are published annually by HESA, primary collection of such data is not necessary and as Bryman and Bell suggest, enables more time to be spent on its analysis (2015).

Once the level of income diversification is established, the level of the resources identified by prior studies as having an influence on income diversification also need to be quantified. These resources form the explanatory variables. The operationalisation and measurement of each explanatory variable is grounded in the extant research, and are discussed in detail in the quantitative phase chapter that follows. As the objective is measurement, quantitative data collection methods are appropriate (Creswell, 2014). The use of a questionnaire was considered to gather these data, however there were several concerns. Firstly, response rates from a target population in senior leadership roles may be low and create the potential for non-response bias which would affect the validity of the findings. Secondly, there is a concern it would be difficult to identify what sample could answer such a broad range of questions that would include objective facts that simply may not be known by the respondents. Finally, as Robson discusses, with questionnaires “respondents won’t necessarily report their beliefs, attitudes, etc. accurately (e.g. there is likely to be a social desirability response bias – people responding in a way that shows them in a good light)” (2011, p. 240). This may be an issue when trying to assess an institution’s resources such as reputation and research capability. These factors may explain why in Nothnagel’s (2008) meta-analysis research on resource-based studies, only 30% of studies used questionnaires as their data collection method (with 48% using secondary data analysis).

To minimise perceptual bias (Pehrsson, 2006) and in keeping with extant research, the income diversification and resource-based profile for each university is developed through the analysis of secondary and archival data. This low-cost, efficient approach (Hakim, 2000), also means it is possible to create a complete comparative dataset for each university. Thus the ‘sample’ is effectively the total population as all publicly-funded universities in England (bar one) are represented. This also supports increased statistical significance and generalisability of the outcome (Boyd, Gove, & Hitt, 2005).

As Grix (2010) contends, the nature of the population under study may also have an impact on the data collection methods adopted. Researching public institutions in a highly regulated sector brings with it access to large amounts of consistent, publicly available information. Data for the dependent and explanatory variables are collected from a number of secondary and archival sources which are presented in table 4.1.

Table 4.1: *Sources of Secondary Data and Access Arrangements*

Data type	Access arrangements
HESA open source financial, business interaction and student data.	Downloaded from the publications section of the HESA website.
HESA chargeable financial and business interaction data.	Via University of Gloucestershire's HEIDI Plus subscription.
HESA chargeable staff data.	Purchased from HESA Services Ltd.
UKCI competitive index data.	Downloaded from the Centre for International Competitiveness.
Results of Ross-CASE survey data.	Via an information request to the Council for Advancement and Support of Education (CASE)
The Sunday Times university league table data.	Via an information request to The Times & Sunday Times.
Year university status granted.	Calculated by reference to each university's website.

Regarding the integrity and authenticity of the data, the data for the dependent variable are all sourced from HESA. Higher Education institutions in the UK are under a statutory obligation to return accurate information to HESA each year. Their returns are liable to audit by HEFCE (as was, presumably from April 2018, the Office for Students). HESA data is widely used to support objective, quantitative research on higher education in the UK (Boliver, 2015; Jenkins & Wolf, 2016).

The data for the majority of the explanatory variables similarly originate from HESA. Moreover, the Sunday Times university league tables are themselves calculated from data supplied to them from HESA. Council for Advancement and Support of Education (CASE) is a respected non-profit association of educational institutions and their Ross-CASE survey of charitable giving in higher education has been running since 2002.

4.7.1.2 Methods of quantitative data analysis

This section covers the methods used to analyse the secondary data collected to address the first and second research questions.

4.7.1.2.1 Calculating the income diversification index

In this section the data analysis methods adopted to address the first research question are presented. This process also develops the dependent variable.

As discussed in chapter two, the Hirschman-Herfindahl Index (HHI) is widely recognised as a common measure of income diversification in the non-profit literature (Carrol & Stater 2009; Chikoto, Ling & Neely 2016; Searing 2018), and yet seemingly not applied in prior higher education research on the topic.

The index measures concentration and therefore its inverse diversification (Chikoto et al 2016). If all income is derived from just one source, then the index score =1. As the number of sources of income increases, the index score reduces towards 0. The index score also declines the more equally the income is distributed across the income sources (Chang & Tuckman, 1994).

In England, all publicly-funded universities have access to the same number of income sources as detailed in chapter two, so the index score is primarily affected by how equal the proportions of income derived from each source are (therefore reducing dependence on any one source). Thus, a higher HHI score reflects a less diverse income portfolio (Searing 2018). A university with an HHI score of 0.23 is more diversified in terms of their income than a university with a score of 0.76.

The Hirschman-Herfindahl Index is defined as the sum of squares of the percentage share of each income stream out of total income (Kim's 2014).

It is computed by the formula:

$$\text{Level of income diversification} = \frac{1}{N} \sum_{i=1}^n (r_i/R)^2, \quad \text{Equation (4.1)}$$

where N = the number of income sources, r = income from the i th source, and R = the total income (revenue) from all sources (Chang & Tuckman, 1994).

4.7.1.2.2 *Building the resource-based profile*

Data collected regarding university resources and capabilities 2012/13-2016/17 are averaged to create the explanatory variables (with the exception of the *reputational assets* variable which is described shortly).

4.7.1.2.3 *Statistical analysis*

In this section, the data analysis methods adopted to address the second research question are presented.

Firstly, a univariate approach is used to produce descriptive statistics such as the mean, standard deviation and range of scores for the dependent and explanatory variables. These descriptive statistics provide a general insight into the data (Creswell & Plano Clark, 2011).

Secondly, inferential statistical tests are applied to enable the results from the sample to be inferred to the population (Field, 2017). This study initially investigates the direction and strength of any bivariate association between a particular resource and level of income diversification. Where data has been found suitable for parametric analysis, this is typically performed using Pearson product-moment correlation analysis (Pallant, 2013).

Next, to identify the resource(s) making the most contribution to increasing the level of income diversification, a multivariate approach to analysis is adopted. There are a variety of multivariate methods for analysis of causal models for observed variables, however the selection is determined by the nature of the variables under analysis. Since this study has one dependent variable which is continuous and one or more continuous explanatory variables, multiple regression analysis is the most appropriate method for this analysis (Hair, Black, Babin, & Anderson, 2010; Creswell, 2014). Multiple regression is further justified because the aim is to not only measure the effect of the explanatory variables on the dependent variable (while controlling for the effects of all other variables), but also to “provide an estimate of the relative importance of the different independent variables in producing changes in the dependent variable” (Robson, 2011, p. 440). It is the simultaneous assessment that occurs in multiple regression that determines this relative importance (Hair et al., 2010; Tabachnick & Fidell, 2013). Finally, multiple regression analysis is cited as the most commonly used statistical method in the extant resource-based diversification research (Hauschild & Knyphausen-Aufseß, 2013), with regression analysis being evidenced as the most prevalent in wider resource-based studies (Nothnagel, 2008).

4.7.1.2.4 Estimation method

Having selected multiple regression as the approach, an estimation method is specified. The hypotheses to be tested are predicated on an institution's "unique bundle of idiosyncratic resources and capabilities" (Grant, 1996, p. 110). Therefore, Ordinary Least Squares (OLS) multiple regression analysis is chosen as the estimation method since it enables investigation of the individual and collective effects of the explanatory variables on the dependent variable by minimising the sum of the squared differences between actual Y and predicted Y (Warner, 2008, p. 338). In the context of this study, this means the separate and combined effects of the various resources on income diversification can be investigated.

According to Hair et al. (2010), a fundamental purpose of multiple regression analysis is to be able to predict the dependent variable from a number of independent variables. However, this research is explanatory in its design; it seeks to establish the importance of the explanatory variables (resources) in explaining differences in the dependent variable (level of income diversification), rather than predicting; hence the use of the term *explanatory variable* in this study. As Hair et al. (2010) confirms, multiple regression can also provide a way to objectively assess, individually and collectively, the magnitude and direction of the independent (explanatory) variables' relationship with the dependent variable.

The specific method of multiple regression is important because how the explanatory variables are entered into the model can influence the outcome in terms of effect on the dependent variable (Tabachnick & Fidell, 2013). To test the hypotheses presented in chapter three, it is necessary to analyse the influence of different *types* of resources in the context of income diversification, as well as understand the individual and combined resource contribution, therefore the method of hierarchical (or sequential) regression is adopted within the OLS estimation method. In hierarchical regression, each set of explanatory variables is entered in distinct blocks for analysis. The incremental changes in explanatory power can therefore be assessed at each stage (Warner, 2008). Fundamental to hierarchical regression is the order the variable 'blocks' are entered into the regression. This order is determined by the researcher and typically predicated on theoretical grounds (Warner, 2008; Tabachnick & Fidell, 2013). Following the resource-based view, blocks of resources in this study are entered in ascending order of their theorised contribution to competitive advantage i.e. building a hierarchy. This approach enables the analysis of the contribution of each resource type (tangible, intangible and capabilities) in explaining income diversification *after* accounting for the effects of the preceding type, thus testing the resource-based view.

For example, what contribution do intangible resource assets make, after accounting for the contribution made by tangible resources; subsequently, what contribution do capabilities make, after accounting for tangible and intangible resource assets. For clarity, the control variable *university size* is entered first in its own block.

To test whether university resources have a significant influence on ability to diversify income and which *type* of resource exerts the most influence, the following explanatory model is estimated:

$$\text{IncomeDiversification} = \beta_0 + \beta_1\text{Tangible}_i + \beta_2\text{Intangible}_i + \beta_3\text{Capabilities}_i + \beta_4\text{Size}_i + \varepsilon_i$$

Where tangible resources include physical and financial assets, intangible resources include reputational assets, organisational policies and structure. Size is the control variable. ε_i is the random error term.

To test which *specific* resources have a significant influence on ability to diversify income, the following explanatory model is estimated:

$$\text{IncomeDiversification} = \beta_0 + \beta_1\text{Physical}_i + \beta_2\text{Financial}_i + \beta_3\text{Reputational}_i + \beta_4\text{Policies}_i + \beta_5\text{Structure}_i + \beta_6\text{Entrepreneurial}_i + \beta_7\text{Capabilities}_i + \beta_8\text{Size}_i + \varepsilon_i$$

Where physical assets include regional location and endowment size; where organisational policies include embedded strategic plan and staff incentives; organisational structure includes resources dedicated to technology transfer and development and alumni relations; and capabilities includes the experience of technology transfer and development and alumni relations staff, orientation toward STEMM, and research intensity. Size is the control variable. ε_i is the random error term.

4.7.1.2.5 Variable development

The final statistical technique used in this study is factor analysis. Factor analysis is often used to “reduce a large number of related variables into a more manageable number, prior to using them in other analyses such as multiple regression” (Pallant, 2013, p. 182). Although in this study, it is used to develop a measure of a university’s reputational assets. An institution’s reputation is a complex concept, thus exploratory factor analysis is used to develop *reputational assets* as a composite variable reflecting a number of known measures of university reputation drawn from the literature.

Reputation has long been recognised as an unobservable, latent construct (Rindova et al., 2010). As Godfrey and Hill contend, with complex constructs there is a need to “theoretically identify what the observable consequences of unobservable resources are likely to be” (1995, p. 530). However, when relying on this approach it is important to adopt more than one measure to ensure construct validity (Boyd et al., 2005). This study therefore assesses a number of “observable variables that collectively reveal an unobservable resource” (Barney et al., 2001, p. 637).

The approach to establishing the reputational assets variable followed that taken in Hitt, Bierman, Uhlenbruck, and Shimizu (2006) and ratified as appropriate to this context (Hitt & Shimizu, personal communication, 17th April 2018). The ‘score’ created by the factor analysis has a mean of 0 and a standard deviation of 1. The measures and outcomes of this analysis are presented in the quantitative phase chapter that follows. Detail of the statistical procedure for the factor analysis used can be referenced in Stata Multivariate Statistics Reference Manual Release 15 (StataCorp, 2017).

Note: a similar approach had been planned for the *entrepreneurial outlook* variable, but the measures in the available literature appear somewhat limited so the single measure established by prior research was adopted for this study.

The regression diagnostics section in the dedicated quantitative phase chapter describes some additional statistical analysis procedures that are out of scope for this initial presentation of research methods.

4.7.1.3 Software

The statistical analysis is performed using StataCorp Stata 15 and IBM SPSS Statistics 24. The decision to use both software packages was to overcome some of the perceived limitations of each system.

4.7.2 Qualitative data collection and analysis

Driven by an inductive logic, the overall objective for the qualitative phase is to explore the underlying mechanisms behind the statistical relationships established in the previous phase. This section presents the data collection method and rationale adopted in the qualitative phase; the analytical strategy is then outlined.

4.7.2.1 Methods of qualitative data collection

As understanding the underlying mechanisms behind the statistical relationships established is the objective for the qualitative phase, thus the options for data collection necessarily become more qualitative (Creswell, 2014). As mentioned, in this sequential explanatory design, the qualitative data are being used in a supportive role, it is the quantitative data that has the “priority for addressing the study’s questions” (Creswell & Plano Clark, 2011, p. 71).

Interviews are selected as the qualitative data collection methods for this study as they create a sense of time, to probe in more depth and get behind the immediate response (Gibbs, 2018). Other qualitative methods such as observation were not considered relevant to this research context. Observational methods are “ways of collecting data that involve direct sampling of aspects of behaviour” (Easterby-Smith et al., 2008, p. 331). They tend to be used in more ethnographic research designs (Grix, 2010) where it is important to observe people’s behaviour (Collis & Hussey, 2014). In Nothnagel’s (2008) meta-analysis of empirical resource-based research only 1% of studies used observation as a data collection method.

The interview is one of the most widely used methods of data collection in qualitative research (Bryman, 2016). According to Collis and Hussey, “an interview is a method for collecting primary data in which a sample of interviewees are asked questions to find out what they think, do or feel” (2014, p. 336). An interview is a particular form of conversation that develops knowledge through the interaction of interviewer and interviewee (Brinkmann & Kvale, 2015).

Group interviews were initially considered as the group dynamic could have been useful in assessing the extent to which there is a consistent or shared view (Robson, 2011). However, the likelihood of obtaining simultaneous co-operation of senior leaders across multiple universities was considered remote. In addition, the nature of the explanatory sequential design means that very particular cases are often the focal point for the qualitative phase (Creswell, 2014, p. 224), this can restrict the ‘pool’ to draw the sample from and therefore even less likely specific individuals would be able to come together at the same time.

This study therefore adopts a strategy of individual interviews, specifically semi-structured interviews as they create the “possibility of modifying one’s line of enquiry, following up on interesting responses and investigating underlying motives” in a way that structured interviews cannot (Robson, 2011, p. 280). This more flexible method supports the

exploratory nature of this phase (Bryman & Bell, 2015), without compromising the structure inherent in the qualitative phase of a mixed method design that may occur if an unstructured interview format was used. As Creswell explains, in the explanatory sequential design, “the key idea is that the qualitative data collection builds directly on the qualitative results” and thus provides a degree of structure to the inquiry (2014, p. 224).

Recognising this study is grounded in the post-positivist tradition, it draws on the conception of neo-positivist interviews articulated by Roulston (2010) and cited in Merriam and Tisdell (2016) as those interviews where the interviewer minimises bias through their neutral stance so improving the validity of the findings.

Whilst more time consuming and expensive, face-to-face interviews are the preference. Firstly to be able to pick up on nonverbal body language (Brinkmann & Kvale, 2015), but also because of the practicalities of being able to take the participant through the relevant quantitative results around which the interview questions are built.

The following section consider how these data collected from the face-to-face, semi-structured interviews are analysed.

4.7.2.2 Methods of qualitative data analysis

This section covers the methods used to analyse the interview data collected to address the third research question.

As Bryman (2016) states, unlike in quantitative analysis, there are less clear-cut rules to guide the analysis of qualitative data. This section describes and justifies the approach taken in this study.

Prior to analysis, the collected interview data are usually transcribed into text documents, therefore the transcribed interviews form the raw data from which analysis and interpretation of the text can begin (Kvale, 1983). The considerable volume of raw data arising from transcribed interviews “requires reduction to certain patterns, categories, or themes, which are interpreted by using some schema” (Johnson & Christensen, 2012, p. 96). Whereas Silverman (2015) cites narrative analysis, content analysis and thematic analysis being the most common methods to analyse texts, it is thematic analysis that is most frequently employed for analysing interview data (King, 2012). Note as Braun and Clarke (2006) argue,

although Grounded Theory contains [largely thematic] procedures for analysing qualitative data, it is a *methodology* and therefore outside the scope of this discussion.

Braun and Clarke position thematic analysis as the “foundational method for qualitative analysis” (2006, p. 78). As mentioned, it has grown into one of the most common approaches to the analysis of qualitative data collected as a result of interviewing and is thus selected as the method of analysis for the qualitative data in this study. According to Saunders, Lewis, and Thornhill (2016), the purpose is to search for themes in a set of data by applying codes or labels to highlight patterns for further analysis. This coding process creates a “critical link between data collection and their explanation of meaning” (Saldaña, 2013, p. 3).

Thematic analysis, known for its flexibility derived from not being wedded to any particular philosophical position (Braun & Clarke, 2006; King, 2012), is particularly attractive in this mixed method study. Adaptable to realist or interpretive perspectives, the analytical approaches can be deductive, inductive or a blend of the two (Fereday & Muir-Cochrane, 2006). However, as the researcher’s worldview will naturally influence the interpretation, a reflexive account of data collection and analysis should be included (Saunders et al., 2016).

There are multiple approaches to undertaking thematic analysis (King, 2012). One of the most noticeable differences between them is in the use or not of *a priori* themes (Gibbs, 2018). Template analysis presents a particular style of thematic analysis and is widely adopted in organisational and management research (Brooks, McCluskey, Turley, & King, 2015). Grounded in the codebook template work of Crabtree and Miller (1992) and latterly advanced by Professor Nigel King, University of Huddersfield; template analysis provides a structured yet flexible “analytic strategy within the interpretive process” (Crabtree & Miller, 1999, p. 164). As King (2012) contends, it is a ‘style’ and not a rigid prescription. Core to the approach is the development of a coding template, initially from a subset of the data (Brooks et al., 2015). As Gibbs (2018) explains, template analysis involves identifying sections of text that exemplify codes in an initial template; it is looking for common threads across the data set. This initial template is then applied to subsequent interview transcripts and gradually modified until it evolves to “better reflect the terms used in the data by participants” (Saunders, 2015, p.589). As Crabtree & Miller position “much of the focus is on reducing the data through a coding process so that they can be displayed in an explicit form for analysis” (1999, p. 166).

The key difference between template analysis and the Braun and Clarke (2006) approach to thematic analysis is the use of *a priori* codes and also the development of the initial template (Crabtree & Miller, 1999; King, 2004). King goes on to suggest these *a priori* codes may stem from existing theory, the available literature or indeed “the interview topic guide – the set of question areas, probes and prompts used by the interviewer” (2004, p. 259). Thus *a priori* themes are supplemented by *in vivo* codes to build the template (King, 2012). In other words, thematic analysis with both data-driven inductive, and theory-driven deductive coding (Fereday & Muir-Cochrane, 2006).

As this study is explanatory sequential mixed method in design i.e. the qualitative phase is used to explore the quantitative findings; it will by its nature give rise to *a priori* themes for deeper exploration. Creswell and Plano Clark (2011) confirm, the initial quantitative results may be used to generate some predetermined topic codes to assist in the qualitative analysis in explanatory sequential designs. To paraphrase King (2012), a completely ‘bottom up’ approach to coding makes no sense when you already know what you are looking for.

In summary, as Braun and Clarke (2013) contend, codebook approaches [such as template analysis] are more commonly used in applied research as a practical response to a question that needs answering. Interestingly, Crabtree and Miller (1999, p. 177) note the template ‘organizing style’ is well suited to the more quantitatively trained researcher, “those feeling more positivist pressures being more comfortable using a structured approach” Crabtree and Miller (1999, p. 167). Thusly, template analysis was selected for a number of reasons; firstly, it allows for a combination of deductive approaches whereby initial themes are derived from existing theory, conceptual frameworks and the literature; and then built on inductively as the data is explored (Fereday & Muir-Cochrane, 2006). Secondly, the use of these *a priori* themes in the initial analysis supports the explanatory sequential mixed method design i.e. the statistical relationships that need explanation are known. Also, in relation to the design, the greater degree of structure provided by the template approach is particularly suited to applied business research (King & Brooks, 2016). Thirdly, as King (2012) suggests, there is flexibility in the hierarchical approach to coding, some themes may have many levels, some only a few. Brooks et al. contend this allows researchers to “explore the richest aspects of the data in real depth” without having to try and apply a consistent level of depth to all the data (2015, p. 218). Finally, the focus of template analysis is across-case and whilst some ‘holistic understanding’ of individual accounts may be lost (Brooks et al., 2015), the across-case view supports this study’s competitive advantage inquiry. Overall, template analysis

provides a structured yet flexible approach to analysing these data. King (2012) cautions it is important to balance applying the template to the data, with using the data to develop the template i.e. do not become fixated on the template. More detail on the template analysis procedure undertaken is provided in the analysis results section of the qualitative phase chapter.

4.7.2.3 Software

Although Collis and Hussey (2014) highlight, that Computer Assisted Qualitative Data Analysis Software (CAQDAS) or Qualitative Data Analysis (QDA) software packages are widely used in analysis to support data storage, coding, retrieval and display. The authors take care to emphasise is that it does not do the analysis and interpretation, it is just a tool to aid the researcher with the task. DiCicco-Bloom and Crabtree (2006) contend, despite the increasing sophistication of these packages, the quality of the analysis will only be as good as the capabilities of the researcher.

King and Brooks (2016) agree the organisational and display advantages of software for conducting thematic analysis, however, warn that there is a cost in terms of money and time to learn software. This study benefited from free access via the home institution's licence plus this researcher's inherent capacity for learning new software (achieving NVivo accredited status as a byproduct of this process). Thus, the qualitative phase of this study utilised QSR NVivo 11 Pro to support the qualitative analysis process.

4.8 Ethical considerations

Data collection and analysis brings with it a responsibility to act ethically (Neuman, 2014). All research procedures in this study follow the University of Gloucestershire's *Research Ethics: A Handbook of Principles and Procedures*, published June 2018. Data is also managed, stored and retained in line with the guidance in this handbook.

Whilst the quantitative phase only draws upon publicly available data, confirmation was sought from HESA that a university's individual results could be referenced by name during the interviews and also in final thesis (Chaplin, personal communication, 2nd October 2018).

Ethical considerations are particularly important in qualitative research (Maxwell, 2008). The use of interviews in this study requires "a delicate balance between the interviewer's

concern for pursuing interesting knowledge and ethical respect for the integrity of the interview subject” (Brinkmann & Kvale, 2015). In summarising the APA (2002) *Code of Ethics*, the four main areas for consideration are: informed consent, confidentiality, consequences, and the role of the researcher. The ethical considerations of the qualitative phase are discussed in more detail in the qualitative phase chapter (six).

4.9 Chapter conclusion

This chapter has presented the rationale and justification for adopting an explanatory sequential mixed method design to address the research questions and achieve the aim of this research. The methods of quantitative and qualitative data collection and analysis have also been positioned in the context of the research design.

The following two chapters present the outcomes of implementing the research methodology and methods. The chapters present the quantitative and qualitative phases in their entirety; from sample selection to data collection, from analysis procedure to results.

It is in the discussion chapter (seven) where these data are integrated, as per the explanatory sequential mixed method design.

Chapter 5: The Quantitative Research Phase

5.1 Chapter introduction

Having provided the rationale and justification for the research design, data collection and analysis methods, the purpose of this chapter is to present the quantitative phase in its entirety from sample selection to results. The qualitative phase follows in chapter six.

This fifth chapter provides an explanation and justification for the sample used, followed by operational definitions of the variables, their measures and data sources. Subsequent sections describe data collection, and finally, the quantitative analysis and results are presented with consideration of their validity and reliability. The chapter begins with a brief summary of the research objectives for the quantitative phase.

5.2 Research objectives for this phase

In this explanatory sequential mixed method design, the main objective of this quantitative phase is to identify the resources of a university that have a statistically significant influence on a university's level of income diversification (research objective three). In order to achieve this objective, it is firstly necessary to develop a model for obtaining a more accurate measure of income diversification that takes into account third-stream income (research objective one). This will enable the creation of a national income diversification index for publicly-funded universities in England (research objective two), which also produces the dependent variable with which to test the resource-based hypotheses.

Meeting these objectives addresses the first two research questions for this study, namely how diversified are the income portfolios of publicly funded, non-specialist universities in England and, which resources and capabilities of a university have the greatest influence on achieving a diversified income portfolio?

How and why the resources influence levels of income diversification will then be explored in the qualitative phase to better understand the underlying mechanisms in the statistical relationships identified in this quantitative phase, thus developing a richer explanation of any causal effect (research objective four).

The following section considers the sample on which the quantitative research phase is based.

5.3 Sample and justification

As explained in chapter one, the focal population for this study are the publicly-funded universities within England that are not highly specialised e.g. musical conservatoires, postgraduate only or distance-learning based.

Explanatory sequential designs conventionally adopt probabilistic sampling strategies in the initial quantitative phase to ensure adequate representation of the focal population (Teddlie & Yu, 2007; Creswell & Plano Clark, 2011). By utilising secondary and archival data for the quantitative phase, this study can examine the total population (bar one newer institution whose complete 5-year financial data were not available from HESA, due to ownership structure). Therefore, the sample in this study is effectively the total population. The term ‘sample’ is used for convention, perhaps to be regarded as samples from a theoretically infinite population of future results. However, as the 102-university sample represents almost the total population, selection bias should not hinder analysis and reasonable conclusions can be drawn from it to the population.

With the sample identified, the following section presents the operationalisation of the variables that form the basis of the analytical model.

5.4 Operational definitions of the variables, measures and data sources

In this section, the operational definitions, measures and data sources for the dependent variable, the explanatory variables and the control variable are described and justified. These variables underpin the hypotheses presented in chapter three. As Kaplan (1998) suggests operationalism provides meaningfulness to a construct because it specifies the operations that determine its application. Firstly, as explained in the research objectives for this phase, it is necessary to develop a model to measure levels of income diversification in the institutions and thus establish the dependent variable.

All data are measured at the interval or ratio level and all variable values reflect 5-year averages (2012/13-2016/17).

5.4.1 Dependent variable

The dependent variable in the hypotheses testing is the level of income diversification achieved by a university. As Hair et al. (2010) suggest, it is especially important that the dependent variable is an accurate and consistent measure of what it is intended to measure as the sum of the analysis rests upon it. In the research methods chapter (four), the established measure for income diversification is presented. In this section, the process is applied and in doing so addresses the first and second research objectives in this study.

The income diversification index for this study is calculated based on six income categories that reflect the disaggregation of third-stream income, thus developing a new model to measure income diversification in the jurisdictions these data are available for.

The income category model on which the Hirschman-Herfindahl calculation is based (illustrated in figure 5.1), considers two sets of data submitted to HESA. Firstly, income data in the Finance Report (which reflects the university's annual statutory accounts) that categorises income under; tuition fees and contracts, funding body grants, research grants and contracts, other income, and income from investments and donations. And secondly, as third-stream income is 'hidden' within the Finance Report headings, this study draws from the annual mandatory Higher Education Business and Community Interaction (HE-BCI) survey that captures income from: collaborative and contract research, consultancy, facilities and equipment, continuing professional development and continuing education courses, regeneration and development, and intellectual property (Fuller & Pickernell, 2018).

Building on the published HESA guidance (HESA, 2018c) and (HESA, 2018d), and confirmed as reasonable by HESA during several meetings and communications October 2017 to May 2018. The six-income category model comprises the five standard university financial reporting categories extended by the disaggregation of third-stream income data to form a sixth category. The total of all annual income categories equals the total income for each institution published in HESA Finance Report Table 7 Head 8 each year.

The model is populated with 5-year averages of data obtained for 2012/13 to 2016/17 in the annual HESA finance reports 2013-2018 (HESA Table 7) and the HE-BCI reports of the same period (HESA Tables 1a, 1b, 2 and 3). Note, this study uses the HESA Finance Report 'IP income' under 'Other income' as the HE-BCI figure is gross income before disbursements to investors and interested parties and includes sale of shares from spin-offs

(i.e. the Finance Report figure is lower and a better reflection of actual income to the university).

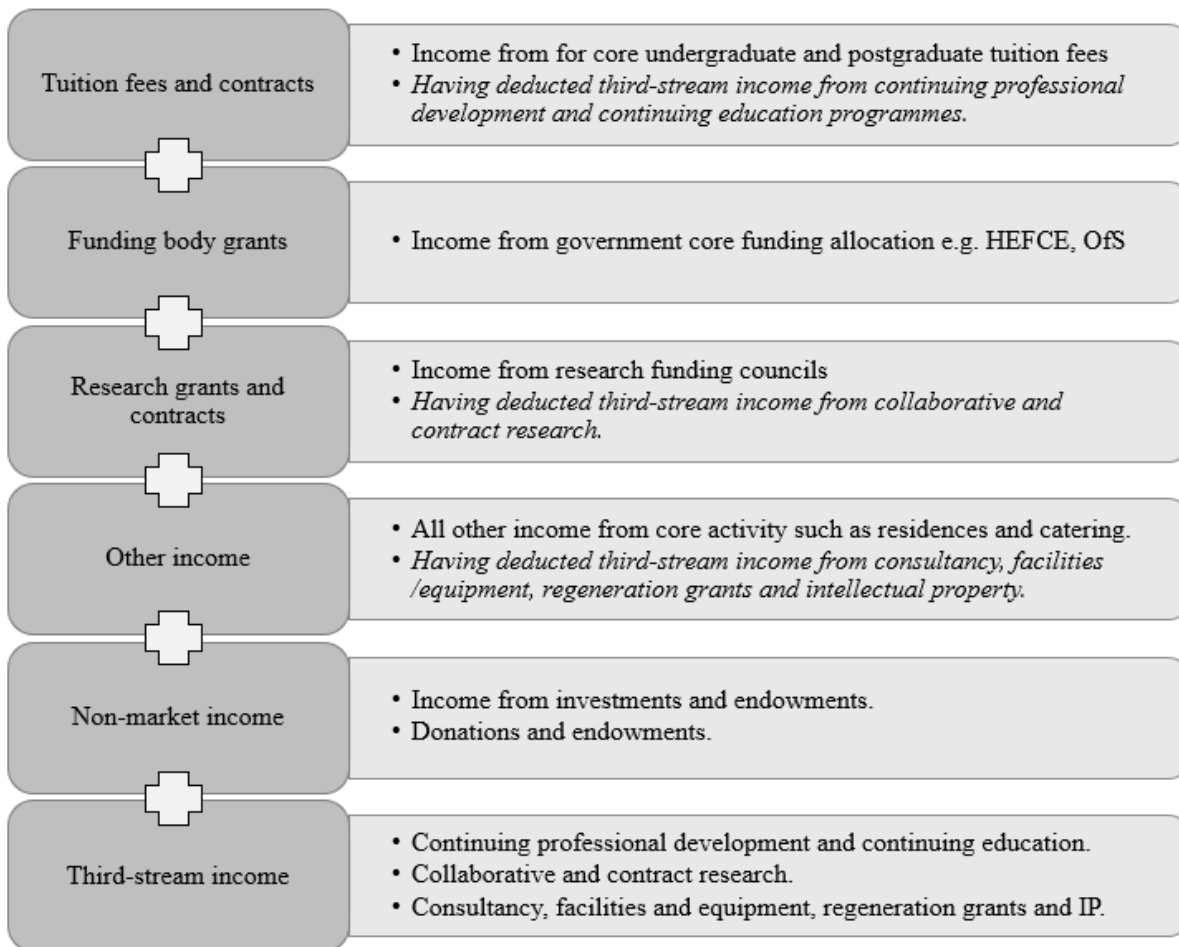


Figure 5.1: The six-income category model to measure income diversification

5.4.1.1 Variable name: HHI

Using the Hirschman-Herfindahl Index formula described in the previous chapter, the proportion of income in each of the six categories described in figure 5.1 is used to calculate each institution's income diversification index score. That score forms the dependent variable for subsequent analysis. The more balanced the proportions of income in each source in the portfolio, the better the income diversification index score i.e. the closer to zero.

5.4.2 Explanatory variables

This section presents the explanatory variables for this study and how they are operationalised for measurement. As Hair et al. (2010) strongly advises, the selection of the

explanatory variables should be based on available research that suggests a relationships to the dependent variable. Thus, this study harvests factors from the extant literature discussed in chapter two to bring together the following explanatory variables that are grounded and structured by the theoretical framework described in chapter three, namely tangible resources, intangible resources that are assets (what the university has), and intangible assets that are capabilities (what the university can do). Firstly, the variables associated with a university's tangible resources are discussed.

5.4.2.1 Variable name: Regional location

Whilst the location of a university is recognised as a factor in ability to diversify income (Prince, 2007), there does not appear to be a consistent nor established operationalisation of the concept in this context. Building on the rationale adopted by Teixeira et al. (2014), location is operationalised in this study by considering whether the university is located in a growing centre of economic activity as measured by the United Kingdom Competitive Index (UKCI). Endorsed and used by UK Research and Innovation (UKRI), UKCI findings have been “used by policymakers across the world and cited by 80 authorities in the UK alone” (UKRI, n.d.). Data for the nine regions in England are taken from the UKCI report published in 2016. Launched in 2000, the index is not published every year, so the 2012/13 values are used additionally for 2013/14 and 2014/15. The 2015/16 values are used additionally for 2016/17, before the 5-year average is calculated. The figure used is as the 5-year average of the available data.

5.4.2.2 Variable name: Size of endowment

The role of investment income in balancing the income portfolio was not mentioned in the available higher education literature, so this variable is included on the theoretical basis that higher levels of investment income have a balancing effect and thus help to diversify the income portfolio. According to Lerner et al. (2008) the size of a university's endowment is a good predictor of its investment income, and hence its contribution to income diversification. Data on the size of a university's endowment were obtained for 2012-2017 from the HESA Finance Reports Table 3 (2013-2018).

Secondly, the variables associated with a university's intangible resources that are assets are discussed. There are several assets of interest to this study; namely reputational assets, the degree to which the strategic plan is embedded, the level of staff incentives, the proportion

of staff dedicated to technology transfer, development and alumni relations, and finally a university's entrepreneurial outlook.

5.4.2.3 Variable name: *Reputational assets*

Although reputation, brand and prestige were frequently cited in the available literature as having an influence on ability to generate additional income and thus diversify the income portfolio (Prince, 2007; Teixeira & Koryakina, 2013), no study attempted to measure it. As noted in the previous chapter, the variable *reputational assets* in this study is the result of a factor analysis performed on a number of established measures of university reputation drawn from the available research. The component measures are presented in table 5.1.

Table 5.1: Measures of University Reputation Within the Reputational Assets Factor Score

Measure	Reference	Operationalised	Data source
Age of the university	(Volkwein & Sweitzer, 2006)	Year elapsed since granted university status	Each university website
Media ranking of the university	(Boliver, 2015)	The numeric score	The Sunday Times University League Table 2013-2018
Proportion of staff with a PhD	(Teixeira et al., 2014)	Number of staff with PhD divided by total academic staff	Table 8 annual HESA HE staff report 2013-2018
Proportion of students from overseas	(Jenkins & Wolf, 2016)	Number of students from non-European union + other European Union divided by total student numbers	Table 1 HESA Student report 2013-2018
Proportion of students enrolled on postgraduate programmes	(Teixeira et al., 2014)	Number of students enrolled on postgraduate taught + postgraduate research programmes divided by total student numbers	Table 1 HESA Student report 2013-2018

This study uses The Times & The Sunday Times league table data to assess media ranking because research intensity is not included in their measure (Boliver, 2015). Therefore, any

potential collinearity with the study's own measure of research intensity as an explanatory variable is avoided.

The measures for the five components of reputation are factor analysed and load on to one factor with an eigenvalue of 3.77 which considerably above the Kaiser criterion minimum 1.0 (Warner, 2008) and explains 98% of the variance. This confirms the five measures of reputational assets contribute to measuring the same construct. Cronbach's α for these five items is .87 which indicates there is a high level of internal consistency among the five different items (Hair et al., 2010). Consequently, a composite measure of a university's reputational assets is developed based on standardised factor scores grounded in the literature.

5.4.2.4 Variable name: Embedded strategic plan

As Estermann and Pruvot (2011) contend, it is important to ensure the plan for diversified income generation is embedded in the academy. However, there is not an established measure for the concept in this context. In this study, the degree to which the plan for business engagement is embedded is operationalised through the Likert responses to Question 5 in Part A of the HESA HE-BCI survey (and thus is somewhat more subjective than other measures). Responses are on a scale of 1-5 and values are averaged from the responses 2013-2018. 1) No strategic plan in place. 2) Between 1 and 3. 3) Strategic plan developed and only partially implemented. 4) Between 3 and 5. 5) Strategic plan developed and implemented as a result of an inclusive process across the whole HEP [Higher Education Provider].

5.4.2.5 Variable name: Level of incentives

While Estermann and Pruvot (2011) and Teixeira and Koryakina (2013) confirm the importance of staff incentives in engaging with commercial activity to diversify income, there is not an established measure for the concept in this context. In this study, the degree to which university staff are incentivised to generate additional income from commercial business engagement is operationalised through Likert responses to Question 7 in Part A of the HESA HE-BCI survey (and is therefore somewhat more subjective than other measures). Responses are on a scale of 1-5 and values are averaged from the responses 2013-2018. 1) Barriers outweigh any incentives offered. 2) Between 1 and 3. 3) Some incentives in place, but with some barriers remaining. 4) Between 3 and 5. 5) Strong incentives in place.

The available literature highlighted the importance of having staff dedicated to income diversification efforts both in terms of commercial business engagement and also fundraising (Estermann & Pruvot, 2011). These variables are operationalised as follows.

5.4.2.6 Variable name: Staff dedicated to TT

Although Van Looy et al. (2011) and others, simply measured ‘the presence’ of a Technology Transfer Office (TTO), this study additionally considers the proportion of total staff dedicated to the function as a more robust indicator of the importance to the university (a dedicated office may exist but only have one person in it). As noted in chapter two, in the UK technology transfer (TT) is variably also referred to as knowledge exchange (KE) and/or knowledge transfer (KT).

The proportion of total staff dedicated to technology transfer is measured utilising data from Part A of the HESA HE-BCI report and HESA Staff report for one year only. Whilst a 5-year view is desirable, the 2012/13 HE-BCI survey (published in 2014) was the last time the question of ‘how many staff’ was asked. Whether the institution has a TTO was still asked for this 5-year period, so an initial cross-check was performed and any subsequent years that returned a ‘no’, the staff figure was reduced to zero. To test the appropriateness of using the 2012/2013 TTO staff proportion figures for the period up to 2016/17, 10% of the sample were telephoned and the office asked if their staffing had risen or declined since the 2012/13 return. The majority confirmed that the staffing levels stated in 2012/13 had not varied since 2012, and some provided detail of any changes. Additionally, the institutions showing high proportions of staff were telephoned, again the figures were deemed to have contemporary relevance. During the qualitative phase, these figures were also cross-checked with participants’ understanding of their staffing levels, no dissimilarities were identified.

The study calculated the proportion of the total staff using HESA staff data reports 2012/13, otherwise the proportion would decrease as the staff numbers increased over the years (and if number of TTO staff were increased by the percentage of staff growth over the period, the proportion would stay the same!).

5.4.2.7 Variable name: Staff dedicated to DAR

Motion and Beney (2011) contend the number of staff dedicated to development and alumni relations (DAR) supports income diversification in UK universities, yet there is not an

established measure for it. In this study, the proportion of staff dedicated to development and alumni relations was calculated utilising data from the annual Ross-CASE survey reports 2013-2018 and HESA staff data reports 2013-18.

5.4.2.8 Variable name: Entrepreneurial outlook

The extant literature uses a variety of archival measures to consider a university's entrepreneurial outlook. The number of patents granted to the university is a proxy for entrepreneurial behaviour in Anderson, Kreiser, Kuratko, Hornsby, and Eshima (2015). The number of university spin-offs are seen as an indicator of entrepreneurial activity and orientation for Van Looy et al. (2011). This study adopts the approach used by Guerrero and Urbano (2012) and creates a measure by adding the count of patents granted, licences issues and spin-offs launched together to indicate an observable outcome of entrepreneurial outlook. Being grounded in extant research provides a reasonable indication the measure is measuring what it claims to (Ketchen Jr, Ireland, & Baker, 2013) i.e. a university with a higher number of patents, licences and spin-offs is reflecting its stronger entrepreneurial outlook. Data are collected as follows from Part B of the HESA HE-BCI reports 2013-2018; number of patents granted in year as reported in Table 4a, total software and non-software licences granted in year as reported in Table 4a, and total number of spin-offs in year as reported in Table 4b.

Finally, the variables associated with a university's intangible resources that are capabilities are discussed.

5.4.2.9 Variable name: Experienced TTO

The age of the technology transfer office (TTO) is an oft-used proxy for the level of experience the team has in this type of activity (Lockett & Wright, 2005; Caldera & Debande, 2010; Vinig & Van Rijsbergen, 2010; Rossi, 2018), and as such provides a reasonable indication of the measure is measuring what it claims to (Ketchen Jr et al., 2013). Following Vinig and Van Rijsbergen (2010), it is operationalised in this study as the number of years that the office had at least 0.5 FTE dedicated professional staff. This is calculated from Part A of the HESA HE-BCI reports 2013-2018.

5.4.2.10 Variable name: Experienced DARO

The available literature is less developed in the context of a university's Development and Alumni Relations Office (DARO), but using the prior argument, the age of the development and alumni relations office is used as a proxy for the level of experience the team has in this type of activity. The age of the development and alumni relations office is obtained from the annual Ross-CASE survey reports 2013-2018.

5.4.2.11 Variable name: STEMM orientation

Building on the measures used by (Lach & Shankerman, 2008; Rossi, 2018), a university's orientation toward science, technology, engineering, maths and medicine (STEMM) subjects was operationalised as the proportion of academic staff they had allocated against relevant subject cost codes. Data for this measure are obtained from HESA staff reports 2013-2018. Counting proportion of total academic staff recorded against i) Biological, mathematical and physical sciences, ii) Medicine, dentistry and health, and iii) Engineering and technology.

5.4.2.12 Variable name: Research intensity

A report prepared for HEFCE by PACEC and the Centre of Business Research at the University of Cambridge (2006) measures research intensity as total research income divided by the number of full-time equivalent (FTE) staff in academic departments. Similarly, Rossi (2018) measures research intensity as the ratio of research income to academic staff. Thus, a university's research intensity is operationalised by the total research income divided by total academic staff. Data for this measure are obtained from HESA Staff reports and HESA Finance Reports for 2013-2018.

5.4.3 Control variable

A control variable should reflect alternative explanations for the level of income diversification not covered by the consideration of its resources and capabilities. By including the size of a university as a control variable, it means that size is taken into account when evaluating the coefficients of the other variables in the model, therefore the results are more accurate. It could be argued the size of a university is a resource, however it was not a factor identified in the available literature as having an influence on level of income

diversification. Moreover, the size of an organisation is a common control variable in related research taking a resource-based view (Powers & McDougall, 2005).

5.4.3.1 Variable name: University size

University size in the context of additional income generation has been measured both in terms of total academic FTE (Van Looy et al., 2011; Rossi & Rosli, 2015) and total staff FTE i.e. including professional staff (Seeber, Cattaneo, Huisman, & Paleari, 2016; Fini, Fu, Mathisen, Rasmussen, & Wright, 2017). Although in the latter, size is used as a control variable and hence that measure is adopted here. Data for this measure are obtained from HESA Staff reports for 2013-2018.

5.5 Impacts on data collection

Working with secondary and archival data over a long period, a researcher can be faced with the issue of things changing over the period. This study was fortunate that, as predominantly government designated data bodies were used, any changes were well documented. Changes to universities in the focal population over the period of study were monitored through the HESA web pages dedicated to publishing such information (HESA, 2018e). The following had an impact on data collection.

5.5.1 Name changes

There were a few subtle changes to some names of institutions over the period. For example, in 2015/16, The City University changed to City, University of London, and The University of Keele changed to Keele University. These changes did not present any issues other than alphabetical listings being different each year and needing to be standardised to the most recent name adopted.

5.5.2 Mergers

Institute of Education (IOE) merged with University College London in December 2014, creating UCL Institute of Education as a single-faculty school of UCL. Both providers continued to make separate returns for the 2014/15 HESA reporting period but made a single return for 2015/16 under University College London. This study added IOE returns to the

UCL figures for 2011/12, 2012/13 and 2013/14 for the student data, staff data, finance data and the HE-BCI related variables.

5.5.3 Other

In 2015/16 Liverpool School of Tropical Medicine (LSTM) made their first separate data return for Student and Destinations of Leavers data when previously their data for these records were returned under University of Liverpool. This study added LSTM student data to the University of Liverpool figures for 2015/16 and 2016/17 student data. Although LSTM had made separate returns previously for staff, finance, estates management and HE-BCI from 2013/14, LSTM as a separate institution is not in this sample as it is specialist and postgraduate.

5.5.4 Changes to financial reporting standards

As this study draws on financial data over the period 2012-2017, it is important to note that the issuance of Financial Reporting Standards (FRS) 100, 101 and 102, effective on or after 1 January 2015 had an impact on the Statement of Recommended Practice (SORP) and therefore changed some aspects of the HESA Finance Report from 2015/16 onwards (HESA, 2017). However, how *income by source* data are reported was not affected by these changes (albeit some HESA headings changed). The most recent 2016/17 headings have been used in this study i.e. Table 7 Income by source (previously 6b). A document showing the mapping between the old HESA Finance tables and the current Finance tables is presented in appendix B.

Although *Table 3 Consolidated balance sheet* underwent considerable changes with the new SORP, the HESA guidance for the endowment figures only had some ‘structural’ modifications. Endowment income had previously been captured in Table 3 as line 13c ‘Total endowments’, but from 2015/16 was captured in line 10a ‘Income and expenditure reserve – endowment reserve’, this was confirmed by HESA (Baldwin, personal communication 8th June 2018). Performing a comparison of 2014/15 data in the old template and the 2014/15 re-stated figures that appeared in the new 2015/16 template. It was clear that the new SORP had not affected what was contained within ‘endowment’ figures as the majority of the providers re-stated the same or very similar figures. As explained previously, the re-stated figures should be identical to the final audited financial statements, so it is in

drawing up the formal financial statements often changes occur, but these are due to the provider's accounting process and not due to major changes in reporting.

5.5.5 Other changes to HESA reporting

Changes to the HESA reporting format and guidance over the period of study were monitored through the HESA web pages dedicated to publishing such information. Points of note are described.

Investment income and income from donations was only split-out in HESA Finance Reports from 2015/16 onwards (so has been combined in this study). (HESA, 2018c).

A new category of spin-off was added to the HESA HE-BCI report in 2013-14: 'Social enterprises' (HESA, 2018e). It has been assumed that these types of spin-offs were recorded previously under the headings that existed in 2012/13.

In the 2012/13 HESA HE-BCI report, Table 3 Regeneration income only asked for programme income and the guidance stated that the figure was not to include any capital income. From 2013/14, a separate column was added to Table 3 to capture Capital income. Higher education providers were invited to re-state i.e. add, 2012/13 capital income figures (HESA, 2018e). HESA confirmed that it would be reasonable for this study to use the 2013/14 figures in the 2012/13 calculations but raised a caveat that it was voluntary to enter this data, so the data may not capture true 2012/13 picture for every institution (Jewer, personal communication, 3rd May 2018).

5.6 Quantitative analysis and results

The purpose of this section is to describe the process of the statistical analysis undertaken and to present the key results from that analysis. The validity and reliability of the results are also evaluated. Firstly, the characteristics of the sample are discussed.

5.6.1 Sample characteristics

This section presents some general characteristics of the sample as 5-year averages for the period 2012-2017. To highlight the heterogeneity in the sample (and thus the population), Bishop Grosseteste University is the smallest institution with a 5-year average of 228 full-time equivalent staff. The institution was granted university status in 2012 and 0.2% of its

students come from overseas. It has an average endowment fund of £278,000. Bishop Grosseteste has an average of 0 patents granted in the period. In contrast, The University of Oxford is the largest institution with a 5-year average of 11,836 full-time equivalent staff. The institution was granted university status in 1096 and 30% of its students come from overseas. It has an average endowment fund of £825,035,600. The University of Oxford has an average of 179 patents granted in the period.

As table 5.2 illustrates, the majority of the 102 non-specialist, publicly funded universities in England were established after 1992. Of the 40 universities established before 1992 in England, 50% are members of the Russell Group.

Table 5.2: Non-specialist, Publicly Funded Universities by Year of Establishment (N=102)

Established	Number	Percent of sample
Pre-1992	40	39%
Post-1992	62	61%

5.6.1.1 Levels of income diversification England's publicly-funded universities

To address the first research question in this study, appendix A presents the full income diversification index for all publicly-funded, non-specialist universities in England, including the proportions of income within each of the six income categories. To offer a general picture, table 5.3 shows the average level of income diversification and portfolio mix across the sample.

Table 5.3: Average Level of Income Diversification for the Period (2012/13 to 2016/17)

HHI index	Core tuition	Core funding	Core research	Core other	Invest / donative	Third-stream
0.42	59%	15%	4%	13%	1%	8%

However, this high-level view masks considerable variation within the sector. By way of example, two universities' 5-year income portfolios are contrasted in tables 5.4 and 5.5.

Table 5.4: King's College London, 5-year Income Portfolio 2012/13 to 2016/17

Year	Index score	Core tuition	Core funding	Core research	Core other	Invest / donative	Third-stream
2012/13	0.20	26.0%	22.3%	15.2%	16.2%	1.1%	19.2%
2013/14	0.21	30.2%	20.3%	16.0%	13.9%	1.0%	18.5%
2014/15	0.21	31.3%	16.5%	18.5%	15.2%	0.8%	17.8%
2015/16	0.21	32.3%	16.9%	15.0%	16.5%	3.6%	15.7%
2016/17	0.22	35.0%	15.8%	14.7%	15.6%	3.8%	15.1%
5-year	0.21	31.0%	18.3%	15.9%	15.5%	2.0%	17.3%

Table 5.5: University of Sunderland, 5-year Income Portfolio 2012/13 to 2016/17

Year	Index score	Core tuition	Core funding	Core research	Core other	Invest / donative	Third-stream
2012/13	0.47	62.9%	24.8%	1.1%	7.9%	0.3%	3.0%
2013/14	0.58	74.7%	14.5%	0.7%	7.4%	0.1%	2.6%
2014/15	0.63	78.0%	11.1%	0.4%	8.4%	0.3%	1.7%
2015/16	0.62	77.8%	9.9%	0.8%	5.3%	0.2%	6.2%
2016/17	0.68	81.7%	7.8%	0.5%	4.8%	0.1%	5.1%
5-year	0.60	75.0%	13.6%	0.7%	6.7%	0.2%	3.7%

It is evident King's College London is less dependent on any one source of income and is more financially diversified than the University of Sunderland, who for 2016/17 was dependent on core tuition fees for 82% of its income.

Table 5.6 presents the ten most financially diversified non-specialist, publicly-funded universities in England as measured by the Hirschman-Herfindahl Index (HHI) measure applied to average values for 5-year income data 2012/13 to 2016/17. Table 5.7 then presents the ten least financially diversified institutions. Information on the balance in their respective portfolios can be found in the national diversification index presented in appendix A.

Table 5.6: The Ten Most Financially Diversified Universities by HHI Index Score

University	HHI index score
The University of Oxford	0.19
Imperial College of Science, Technology and Medicine	0.20
King's College	0.21
The University College London	0.22
The University of Bristol	0.23
The University of Liverpool	0.24
University of Manchester	0.24
University of Southampton	0.25
University of Birmingham	0.26
University of Leeds	0.26

Table 5.7: The Ten Least Financially Diversified Universities by Index Score

University	HHI index score
Bath Spa University	0.57
Birmingham City University	0.58
Liverpool John Moores University	0.58
Sheffield Hallam University	0.58
Bishop Grosseteste University	0.58
De Montfort University	0.59
The University of Bolton	0.59
The University of Sunderland	0.60
Newman University	0.61
Norwich University of the Arts	0.62

The income diversification index scores reflect the balance in the university's income portfolio i.e. the proportions of income attributable to the six income categories described previously. Whilst it is interesting to perhaps note those universities that generate the most additional income through investments and donations and third-stream (see tables 5.8 and 5.9); income diversification is about the equality of the proportions of income in each category. To achieve a fully diversified income portfolio i.e. an HHI index score of zero, would mean exactly 16.66% of income residing in each of the six income categories. So,

although on average 21% of Loughborough's income is from third-stream activity, it does not necessarily follow their diversification score is high as they may still have the remaining income coming from only one or two sources.

Table 5.8: Top 10 Universities by Investments, Endowments and Donations

University	Percentage
The University of Reading	9.5%
The University of Oxford	4.8%
London School of Economics	4.7%
The University of Surrey	4.6%
SOAS University of London	3.7%
The University of Cambridge	3.1%
Imperial College London	3.1%
University of Durham	2.4%
The University of Liverpool	2.3%
The University of Manchester	2.2%

Source: HESA 2013-2018

Table 5.9: Top 10 Universities by 5-year Average of % Annual Income from Third-stream

University	Percentage
Loughborough University	21%
The University of Southampton	20%
Newcastle University	19%
Anglia Ruskin University	19%
The University of Lancaster	19%
The University of Birmingham	18%
Imperial College London	18%
The University of Leicester	17%
The University of Oxford	17%
King's College London	17%

Source: HESA 2013-2018

To provide some further insight into the third-stream income category, figure 5.2 illustrates the proportion of third-stream income for 2016/17 attributable to particular third-stream activities or funding.

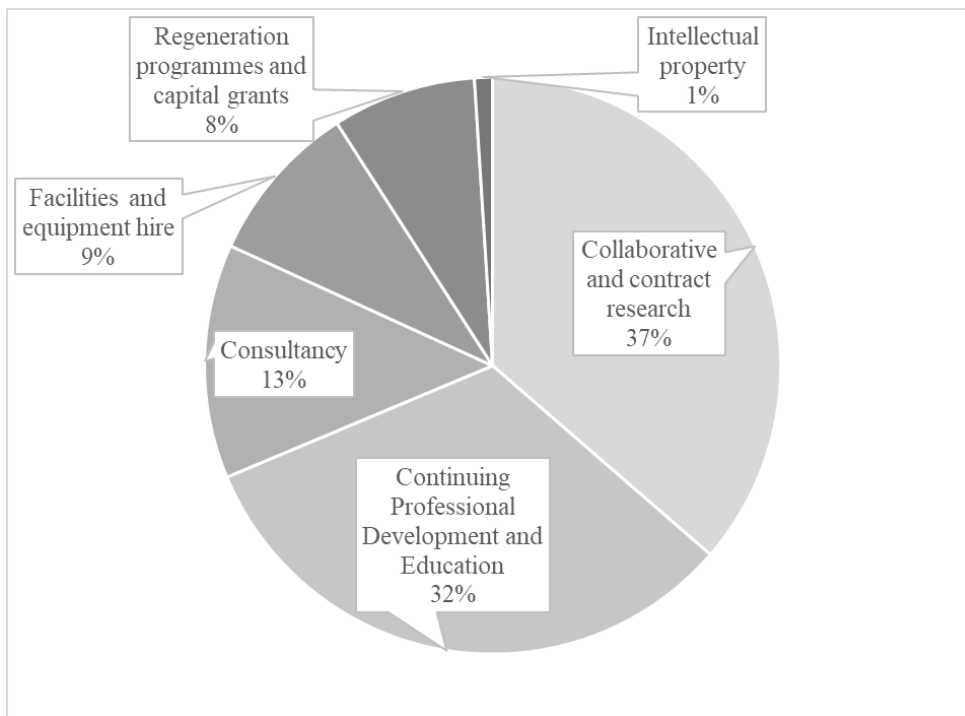


Figure 5.2: Third-stream income 2016/17 by income activity or source. Source: HESA 2018.

5.6.2 Statistical analysis

As described in the previous chapter, univariate, bivariate and multivariate approaches to statistical analysis are selected to address the second research question. These analyses are presented in the following section, but firstly the data characteristics are discussed.

5.6.3 Data characteristics

As Pallant (2013) contends, is important to conduct an initial examination of the data prior to employing the inferential statistical techniques to answer research questions and associated hypotheses. Exploring the characteristics of these data reveal two areas of concern to be addressed before proceeding with the bivariate and multivariate analysis.

5.6.3.1 Two distinct groups within the sample

The Hartwig and Dearing (1979) recommendation to always conduct a *visual* inspection of data first, is reinforced in this study. A histogram of the dependent variable suggests two

very clearly differentiated groups within the sample; each of which individually approximates a normal distribution (see figure 5.3).

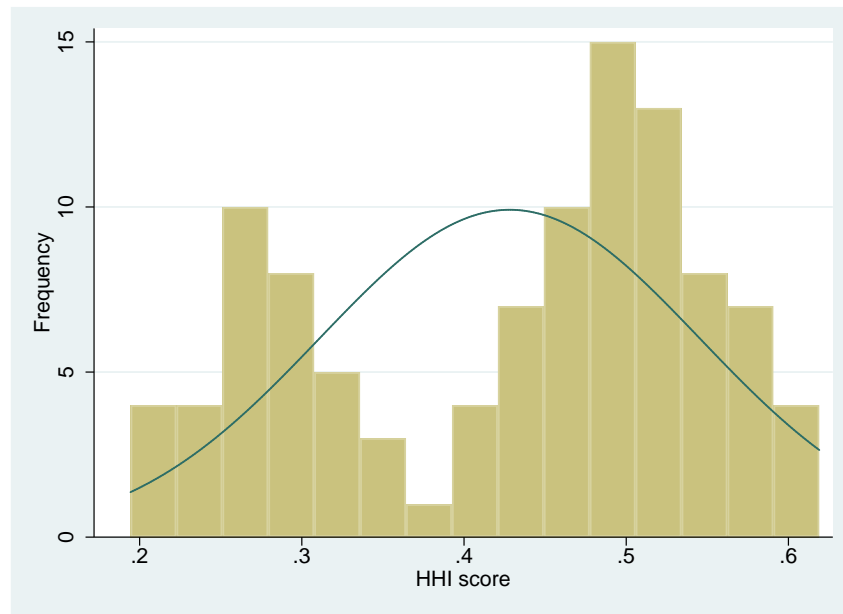


Figure 5.3: Frequency of Hirschman-Herfindahl Index scores in non-specialist, publicly funded universities in England.

Analysing two different populations as if they were a single homogenous group may confound and obscure the effects being investigated and be a threat to the internal validity of the results (Onwuegbuzie & McLean, 2003). Examination of the HHI scores for all universities in the sample revealed that (with a few exceptions), the 40 institutions established before 1992, held the top 40 places in terms of most diversified income. Thus, it was necessary to treat the pre-1992 and the post-1992 universities as two separate samples. From this point forth, pre-1992 universities will be referred to as 'Pre '92' and the post-1992 universities as 'Post '92'.

The use of a dummy variable to control for Pre and Post '92 was also explored but rejected; there is a limit to the extent to which binary dummy variables can differentiate the models and the results did not meet the assumptions of linear regression. However, splitting the sample into two groups has a negative impact on the sample size; rather than one sample of 102 universities, this study has two samples of 40 Pre' 92 universities and 62 Post '92 universities. Although as discussed, these samples are effectively the total population, so no untoward bias can surface. This decision is further reinforced through the subsequent analyses that shows the model performs differently between the two groups.

As Pallant (2016) suggests, to confirm the significance of the differences between two groups, where there is a categorical variable with only two groups (e.g. Pre '92 and Post '92 universities), and a continuous dependent variable (e.g. Hirschman-Herfindahl index score), a two-tailed t-test of differences in means can be performed. Therefore, an independent-samples t-test was carried out to compare the Hirschman-Herfindahl Index scores between Pre and Post '92 universities and confirm there are significant differences. The analysis indicated there is a significant difference in the Hirschman-Herfindahl Index scores for the Pre '92 ($M = .309$, $SD = .081$) and Post '92 ($M = .504$, $SD = .059$) universities; $t(100) = -14.20$, $p = .000$, two-tailed. The magnitude of the differences in the means (mean difference = $-.20$, 95% CI : $-.22$ to $-.17$) was large, the effect size statistic eta-squared = $.302$. Note, the assumption of equal variance was not violated (Levene's test for equality of equal variance sig. = $.093$). These results suggest that there is a statistically significant difference in levels of income diversification between universities established pre-1992 and those established after.

Pre and Post '92 universities are accordingly analysed and reported separately in this study.

5.6.3.2 Outliers in the data

Having separated the data into two samples, it was evident there were more extreme values in the variables for the Pre '92 group (largely the effect of Oxford and Cambridge, but also Imperial), which positively skewed some of the data. These outliers had an impact on the shape of the distribution for several variables and thus on the linearity of some of the bivariate relationships (Hair et al., 2010). It is sometimes suggested to alter scores or even remove extreme cases in order to deal with the influence of outliers (Tabachnick & Fidell, 2013). However, in the context of this research, these univariate outliers are considered important data and their removal could affect the internal validity of the results (Onwuegbuzie & McLean, 2003). As noted, universities are a heterogeneous population and some extreme values are to be expected. A more favoured strategy is that of transformation (Field, 2017).

Logarithmic transformation is a way to reduce the impact of outliers, reduce positive skew and help linearise bivariate relationships (Tabachnick & Fidell, 2013). As Kahane (2008) confirms, a common way to improve linearity of relationships is to work with the natural logs of either the dependent variable(s), independent variable(s) or both. In preliminary analysis, experimenting with transforming just the dependent variable, then just the

independent (explanatory) variables, and finally, both the dependent and independent variables, found that working with the natural log of just the dependent variable offered the most improvement to the overall solution for the Pre '92 group. Logarithmic transformation had the beneficial effect of improving the shape of the distribution of the dependent variable and therefore the linearity of the various relationships with it. Although normality of variables is not essential to multiple regression, the solution performs better when more normal distributions are present (Tabachnick & Fidell, 2013). Addressing this ensured that both Pre and Post '92 data were suitable for parametric tests of significance (Warner, 2008). Further assumptions of linear regression are tested in subsequent sections of this chapter along with detailed post-estimation diagnostics.

5.6.4 Descriptive statistics

Descriptive statistics are used to describe the data in the sample and are presented in the units of measurement for each variable. No inferences about the wider population are drawn from descriptive statistics.

Measures of central tendency characterise continuous variables with a single representative value, most commonly the mean i.e. the average value in the data (Fallon, 2016). Measures of spread are also single values, this time describing variability in the sample. Normally this is reported by the standard deviation statistic i.e. how much values differ in terms of deviation from the average (Fallon, 2016). Dispersion in the data can also be evaluated by simply looking at the range of values i.e. the interval between the highest and lowest values in a distribution (Field, 2017).

The mean, range of values and standard deviations for the variables in the Pre '92 and Post '92 university samples are shown in tables 5.10 and 5.11.

Table 5.10 Descriptive Statistics Pre '92 Universities 5-year Average 2012-2017 (N=40)

Variables	Range		Mean	Std. Deviation
	Minimum	Maximum		
HHI index score ^a	.19	.56	.31	.08
University size (total FTE) ^b	990	11836	4409.4	2745.03
Competitive index of region	83.38	115.80	98.84	10.99
Size of endowment £'000s	475.20	1451343.60	101368.95	256705.25
Reputational assets ^c	-.125	6.57	0	1
Embedded strategic plan	3.40	5.00	4.28	.524
Level of incentives	2.80	5.00	3.91	.621
Staff dedicated TT (%)	.100	3.10	.900	.700
Staff dedicated DAR (%)	.200	2.70	.700	.600
Entrepreneurial outlook	2.20	4526.00	396.87	847.34
Experienced TTO	4.00	46.00	21.21	10.70
Experienced DARO	4.00	37.00	17.09	7.57
STEMM orientation	.001	.955	.580	.186
Research intensity (£)	6105.49	95945.42	36680.58	20504.92

Note:

a dependent variable.

b control variable.

c constructed on the basis of factor scores.

In the Pre '92 group, extreme values are impacting the mean for some variables. For size of endowment and entrepreneurial outlook, the median is a better measure of central tendency (32930.0 and 106.0 respectively).

Table 5.11: Descriptive Statistics Post '92 Universities 5-year average 2012-2017 (N=62)

Variables	Range		Mean	Std. Deviation
	Minimum	Maximum		
HHI score ^a	.30	.62	.50	.06
University size (total FTE) ^b	228	3930	1602.76	972.57
Competitive index of region	83.38	115.80	97.54	10.24
Size of endowment £'000s	.000	7393.40	852.76	1348.91
Reputational assets ^c	-.455	-.177	-.302	.081
Embedded strategic plan	2.00	5.00	4.11	.766
Level of incentives	2.00	5.00	3.46	.713
Staff dedicated TT (%)	.000	7.60	1.40	1.50
Staff dedicated DAR (%)	.000	.700	.200	.200
Entrepreneurial outlook	.000	308.20	55.00	69.53
Experienced TTO	.000	31.00	14.56	8.09
Experienced DARO	.000	50.00	9.43	9.00
STEMM orientation	.000	.674	.348	.163
Research intensity (£)	.000	18380.37	3690.69	3443.63

Note:

a dependent variable.

b control variable.

c constructed on the basis of factor scores.

Notable in Post '92 universities are the zero values in the range. Some universities simply do not undertake research which means they have no technology transfer strategy, nor IP led entrepreneurialism. Many Post '92 institutions are not science, technology and engineering oriented. Similarly, many do not have a development and alumni relations function.

In reviewing Pre and Post '92 universities, on average, the income of Pre '92 universities are more diversified than those of Post '92 institutions. Note the standard deviations are larger in the Pre '92 group, again this is a reflection of the wide ranges in the data and the impact of outlier institutions. The Pre '92 universities also tend to be much larger. Other points of note include; the outlook of the Pre '92 universities is on average much more entrepreneurial than their Post '92 counterparts i.e. they produce more patents, licences and spin-offs; this is evident even when median values are used (Pre '92: 107 and Post '92: 28).

Pre '92 universities have significantly higher research output per FTE and are more likely to be oriented toward science, technology, engineering, maths and medicine. Interestingly, the mean age (therefore experience) of technology transfer offices and their levels of dedicated staff that commercially leverage research are not that dissimilar.

This section has considered the descriptive value of measures of central tendency, however, measures of association such as correlation are both descriptive and inferential, thus they are presented as a separate discussion.

5.6.5 Bivariate correlation analysis

Correlation analysis is a bivariate measure of the direction and strength of an association between any two continuous variables (Hair et al., 2010). It looks at the covariance between two variables using standardised units of measurement to better enable comparisons (Field, 2017). The Pearson product-moment correlation (r) is the most common measure of correlation, where ± 1.0 suggests perfect positive/negative correlation (Warner, 2008). Note in this study, a low HHI score indicates a high level of income diversification, hence negative relationships between the dependent variable and the explanatory variables are anticipated i.e. an increase in X causes Y to go down. In the context of correlation, the coefficient of determination (R^2) shows how much variance the two variables share (Pallant, 2013).

According to (Cohen, 1988), an absolute value for r between .10 and .29 indicates a weak relationship, between .30 and .49 a moderate relationship, and between .50 and 1.0 suggests a strong relationship. In this study, 1-tailed significance tests for the correlation coefficient are used as the hypotheses are directional (Field, 2017). Relevant to this data, Pallant (2013) notes that significance of r can be influenced by sample size. In smaller samples there may be moderate correlations that do not achieve statistical significance. To reflect this, significance has been relaxed to $<.10$ in this analysis.

The correlation matrices for Pre and Post '92 universities are presented in tables 5.12 and 5.13 respectively. 1-tailed significance tests for the correlation coefficient are used as the hypotheses are directional (Field, 2017). Further to the previous discussion, the correlation matrix for Pre'92 universities has been developed using the log transformed dependent variable. This ensures the Pearson correlation coefficient does not underestimate the strength of the linear relationship (Pallant, 2013).

The correlation matrices not only highlight correlations between the dependent variable and the explanatory variables of interest, but also potential correlations between the explanatory variables themselves (Tabachnick & Fidell, 2013). Independence of the explanatory variables is important in statistical testing since highly correlated explanatory variables can effectively be explaining each other and may create multicollinearity issues which impact the accuracy of any regression analysis (Hair et al., 2010). Using the Webb, Shavelson, and Haertel (2006) suggested level of $r \geq .80$, no undue inter-correlations are observed in the Post '92 data. However, in Pre '92, there is a collinear relationship between a university's reputation and the size of its endowment, and also the size of a university and its research intensity. The potential impact of these relationships is considered further in the post-estimation regression diagnostics section 5.6.7 to follow.

Table 5.12: Pearson Product-moment Correlations Between Measures of Income Diversification and University Resources Pre '92 Universities

Variables	Log HHI	Reput. assets	Embed plan	Experien TTO	Experien DARO	Level incentiv	Staff TT	Staff DAR	Entrepr eneurial	Regional location	Size of endow	STEMM orient.	Resch. intensity	Univers. size
Log of HHI score	1.00													
Reputational assets	-.343**	1.00												
Embedded plan	-.088	.064	1.00											
Experienced TTO	-.148	.233	-.046	1.00										
Experienced DARO	-.164	.457	.145	.084	1.00									
Level of incentives	-.143	-.075	.395	.026	-.036	1.00								
Staff dedicated to TT	-.075	-.152	.147	.062	-.245	.266	1.00							
Staff dedicated to DAR	-.037	.229	-.185	.021	.493***	.041	-.062	1.00						
Entrepreneurial outlook	-.189	.295	.132	.351	.283	.071	-.025	.178	1.00					
Regional location	.052	.056	-.245	-.186	.039	.061	-.317	.266	-.220	1.00				
Size of endowment	-.309**	.923***	-.006	.317	.400	-.130	-.157	.777	.321	.018	1.00			
STEMM orientation	-.608***	.221	.095	.177	-.053	-.041	.301	-.196	.245	-.215	.243	1.00		
Research intensity	-.853***	.561	.009	.222	.259	-.014	.039	.301	.215	.065	.561	.674	1.00	
University size	-.732***	.665	.159	.090	.438	-.054	-.033	.382	.315	.016	.631	.592	.863***	1.00

Statistical significance *p<.1, **p<.05, ***p<.01 (1-tailed)

Table 5.13: Pearson Product-moment Correlations Between Measures of Income Diversification and University Resources Post '92 Universities

Variables	HHI	Reput. assets	Embed plan	Experien TTO	Experien DARO	Level incentiv	Staff TT	Staff DAR	Entrepr eneurial	Regional location	Size of endow	STEMM orient.	Resch. intensity	Univers. size
HHI score	1.00													
Reputational assets	-.220**	1.00												
Embedded plan	-.121	.295	1.00											
Experienced TTO	.017	.447	-.084	1.00										
Experienced DARO	-.146	.184	.114	.332	1.00									
Level of incentives	-.106	.115	.481	.063	.097	1.00								
Staff dedicated to TT	-.303**	.201	.314	.071	.038	.353	1.00							
Staff dedicated to DAR	-.045	.104	.051	.041	.198	-.327	-.164	1.00						
Entrepreneurial outlook	-.202*	.359	.198	.263	.198	.212	.155	-.017	1.00					
Regional location	-.204*	.130	-.147	.098	-.020	-.336	-.133	.295	.077	1.00				
Size of endowment	.061	.293	.165	.169	.148	.117	.091	.162	.293	.086	1.00			
STEMM orientation	-.213**	.607	.204	.414	.231	.174	.329	-.208	.145	-.092	-.024	1.00		
Research intensity	-.516***	.499	.251	.157	.227	.172	.106	.203	.208	.062	.137	.347	1.00	
University size	-.165*	.705	.275	.516	.401	.301	.310	-.035	.419	-.035	.424	.465	.397	1.00

*p<.1, **p<.05, ***p<.01 (1-tailed)

Although largely in the expected direction, only five explanatory variables in the Pre '92 group and seven in Post '92, appear to have a statistically significant association with the dependent variable (when p is relaxed to 0.1). For Post '92 universities, all relationships are generally less strong, with only research intensity reaching above $r = .50$ (at $-.517$) and proportion of staff dedicated to technology transfer being moderate at $r = -.303$. Table 5.14 presents the correlations in order of statistical significance for both Pre and Post '92 institutions.

Table 5.14 Pearson Product-moment Correlations Pre and Post 92 Universities Presented in Order of Statistical Significance

Pre '92	Log HHI	Post '92	HHI
Research intensity	-.853***	Research intensity	-.516***
University size	-.732***	Staff dedicated TT	-.303**
STEMM orientation	-.608***	Reputational assets	-.220**
Reputational assets	-.343**	STEMM orientation	-.213**
Size of endowment	-.309**	Regional location	-.204*
Entrepreneurial outlook	-.189	Entrepreneurial outlook	-.202*
Experienced DARO	-.164	University size	-.165*
Experienced TTO	-.148	Experienced DARO	-.146
Level of incentives	-.143	Embedded plan	-.121
Embedded plan	-.088	Level of incentives	-.106
Staff dedicated TT	-.075	Size of endowment	.061
Regional location	.052	Staff dedicated DAR	-.045
Staff dedicated DAR	-.037	Experienced TTO	.017

* $p < .1$, ** $p < .05$, *** $p < .01$ (1-tailed)

How these variables perform in a multivariate context is considered in the following section.

5.6.6 Multivariate analysis

Unlike correlation analysis which is a bivariate measure of the direction and strength of an association between any two continuous variables, regression reflects the impact of a unit change in the explanatory variable on the dependent variable. Where there are more than one

explanatory variables, the regression is termed multivariate or multiple regression (Hair et al., 2010).

The outputs of the hierarchical multiple regression approach as described in the previous chapter are presented in tables 5.15 for Pre '92 universities and 5.16 for Post '92. These are followed by a series of regression diagnostics and the model is subsequently refined before the assumptions of linear regression are tested.

As noted previously, a negative coefficient indicates a positive change i.e. the resources have influenced income diversification and thus the university's HHI score reduces.

Table 5.15: Summary of Hierarchical Regression: Effect of Resource Type on Income Diversification in Pre '92 Universities (N=40)

	R	R ²	Adj. R ²	SE of estimate	R ² change Δ	F	Sig. of change	F change	b	SE b	β	t	Sig.
Block 1: control variables	.732	.536	.524	.072	.536	43.93 (1,38)	.000	43.93					
(constant)									-.479	.107		-4.49	.000
University size									-5.110E+00	.000	-.733***	-6.58	.000
Block 2: plus tangible resources	.761	.578	.543	.071	.042	16.47 (3,36)	.000	1.80					
(constant)									-.465	.104		-4.482	.000
University size									-6.217E-05	.000	-.892***	-6.399	.000
Regional location									.001	.001	.061	.567	.574
Size of endowment									1.028E-07	.000	0.252*	1.81	.079
Block 3: plus intangible assets	.800	.640	.532	.072	.062	5.93 (9,30)	.000	.856					
(constant)									-.511	.172		-2.97	.006
University size									-6.481E-05	.000	-.929***	-5.88	.000
Regional location									.001	.001	.113	.844	.405
Size of endowment									2.746E-08	.000	.067	.209	.836
Reputational assets									.004	.024	.057	.184	.855
Embedded strategic plan									.039	.026	.194	1.48	.148
Level of incentives									-.047	.022	-.276**	-2.08	.046
Staff dedicated to TT									.451	1.89	.030	.239	.813
Staff dedicated to DAR									-3.54	4.89	-.820	-.724	.475
Entrepreneurial outlook									7.421E-06	.000	.060	.490	.628
Block 4: plus capabilities	.902	.814	.721	.055	.174	8.74 (13,26)	.000	6.06					
(constant)									-.451	.147		-3.06	.005
University size									-1.207E-05	.000	-.173	-.750	.460
Regional location									.002	.001	.179	1.68	.104
Size of endowment									1.604E-07	.000	.393	1.39	.178
Reputational assets									-.004	.019	-.055	-.228	.821
Embedded strategic plan									.005	.022	.026	.245	.809
Level of incentives									-.027	.018	-.160	-1.51	.143
Staff dedicated to TT									1.44	1.56	.095	.921	.365
Staff dedicated to DAR									-1.86	4.68	-.430	-.396	.695
Entrepreneurial outlook									-1.043E-06	.000	-.008	-.082	.935
Experienced TTO									1.847E-05	.001	.002	.018	.986
Experienced DARO									.001	.002	.077	.620	.540
STEMM orientation									.007	.093	.012	.071	.944
Research intensity									-4.640E-06	.000	-.908***	-4.24	.000

Statistical significance *p<.1, **p<.05, ***p<.01

Note. Numbers such as 1.24E-02 are scientific notation for very small numbers (Pallant, 2013).

Table 5.16: Summary of Hierarchical Regression: Effect of Resource Type on Income Diversification in Post '92 Universities (N=62)

	R	R ²	Adj. R ²	SE of estimate	R ² change Δ	F	Sig. of change	F change	b	SE b	β	t	Sig.
Block 1: control variables	.165	.027	.011	.058	.071	1.7 (1,60)	.197	1.70					
(constant)									.638	.071		8.93	.000
University size									-2.395E-05	.000	-.172	-1.38	.172
Block 2: plus tangible resourc	.316	.100	.054	.057	.029	2.18 (3,58)	.100	1.88					
(constant)									.650	.071		9.10	.000
University size									-3.512E-05	.000	-0.252*	-1.85	.070
Regional location									-.001	.001	-0.228*	-1.84	.071
Size of endowment									8.190E-06	.000	.188	1.37	.176
Block 3: plus intangible asset	.466	.217	.084	.056	.117	1.63 (9,52)	.129	1.330					
(constant)									.655	.119		5.49	.000
University size									-6.216E-07	.000	-.004	-.023	.982
Regional location									-.001	.001	-0.241*	-1.78	.081
Size of endowment									9.059E-06	.000	.208	1.50	.140
Reputational assets									-.090	.133	-.124	-.68	.500
Embedded strategic plan									.001	.012	.015	.10	.919
Level of incentives									-.008	.013	-.097	-.60	.552
Staff dedicated to TT									-1.11	.518	-0.290**	-2.13	.038
Staff dedicated to DAR									-2.46	4.46	-.077	-.55	.583
Entrepreneurial outlook									.000	.000	-.137	-.99	.326
Block 4: plus capabilities	.669	.447	.300	.049	.230	3.05 (13,48)	.002	5.09					
(constant)									.660	.118		5.58	.000
University size									6.773E-06	.000	.049	.25	.805
Regional location									-.001	.001	-0.248**	-2.07	.044
Size of endowment									6.971E-06	.000	.160	1.28	.208
Reputational assets									.022	.147	.030	.15	.882
Embedded strategic plan									.006	.011	.083	.60	.552
Level of incentives									-.001	.012	-.017	-.12	.906
Staff dedicated to TT									-1.18	.472	-0.308**	-2.49	.016
Staff dedicated to DAR									1.82	4.43	.057	.41	.683
Entrepreneurial outlook									.000	.000	-.135	-1.11	.274
Experienced TTO									.001	.001	.164	1.17	.249
Experienced DARO									-.001	.001	-.114	-.88	.383
STEMM orientation									-.006	.059	-.016	-.09	.925
Research intensity (£)									-8.868E-06	.000	0.519***	-3.96	.000

Statistical significance *p<.1, **p<.05, ***p<.01

Note. numbers such as 1.24E-02 are scientific notation for very small numbers (Pallant, 2013).

5.6.7 Regression diagnostics and assumption testing

In this section, the specified models and hierarchical estimation method reflected in the regression summaries (tables 5.15 and 5.16) are reviewed to consider goodness of fit, statistical significance and performance of the individual explanatory variables. The assumptions of linear regression are also tested.

The initial diagnostic analysis gives rise to refinement of the models which are re-specified as a result. In brief, the analysis begins with 12 explanatory variables and one control variable that perform well when testing the hypothesis that a university's overall resources and capabilities have an influence on its level of income diversification. The regression

output indicates the additional explanatory power of the different *types* of resources as they are entered in to the regression in hierarchical blocks. However, the model is not a parsimonious one, with numerous resources in each block. In seeking to establish the specific resources that exert the most influence, the model is re-specified to a leaner, and only moderately less, explanatory model overall.

5.6.7.1 Evaluating the measurement model

In evaluating the measurement model, the coefficient of determination (R^2) is a key indicator. The R^2 figure is the proportion of variance in the dependent variable that can be explained by the explanatory variables as a whole (it does not reflect the performance of individual variables). The analysis indicates the R^2 rises as additional resource *type* blocks are added in to the hierarchical regression (as described in the previous chapter). Moreover, the standard error of the regression decreases as the R^2 rises. The output summarised in tables 5.15 and 5.16 show the explanatory power of the model increases at each stage, to reach an R^2 of .81 for Pre '92 universities and an R^2 of .45 for Post '92 universities.

R^2 is influenced by the number of explanatory variables in the model relative to the sample size. Hair et al. (2010) comment that while a sample size of 10-15 cases for each variable is a common rule of thumb, an absolute minimum of four could be considered. When pushing these boundaries, the adjusted R^2 compensates for 'overfitting', to thus provide a more likely estimate for the population. If the number of observations is small, and the number of variables is large, there will be a much greater difference between R^2 and adjusted R^2 . In the final iteration of the hierarchical regression containing all the variables, the conservative adjusted R^2 estimates are indeed smaller than the R^2 values i.e. the model changes from explaining 81% of the variance in Pre '92s, to adjusted values of 72%; and from explaining 45% in Post '92s to adjusted values of 30%. This is indicative of the large number of explanatory variables considering the size of the samples (this issue is discussed further below). As there are no more universities in the focal population i.e. the sample cannot be made larger, the difference between the R^2 and the adjusted R^2 may be improved by a more parsimonious model specification i.e. reduce the number of explanatory variables.

Finally, it is noticeable that the model explains considerably more variance in Pre '92 institutions (81%) than in the Post '92 group (45%). This could be due to the model being mis-specified, or that there is more variation in the data for Post '92 universities. However,

conducting the Ramsey Regression Equation Specification Error Test (RESET) shown in table 5.17, failed to reject the null hypothesis that the model has no omitted variables.

Table 5.17 *Ramsey RESET Test Using Powers of the Fitted Values of HHI*

H0: The model has no omitted variables	
F (3, 46) =	1.74
Prob > F =	0.1728

Next it was considered whether the R^2 was lower due to greater variability in the data compared to the Pre '92 data. The standard error (SE) of the regression is the estimated standard deviation of the 'noise' in the dependent variables that cannot be explained by the explanatory variables, it is effectively a measure of the typical size of e_i , in the model (Kahane, 2008). However, the standard errors are very similar (Pre '92 SE=.052 and Post '92 SE=.047 they would both round to .05). This confirms that the measurement model is appropriate for both groups.

There does not appear to be a statistical explanation for the difference in R^2 between Pre and Post '92 universities. For some reason the Post '92 data contain an inherently higher amount of unexplainable variability than the Pre '92 data; suggesting that Post '92 universities are more unpredictable. This may stem from the more heterogeneous nature of these institutions, some as former polytechnics, teaching schools, art colleges etc. This could result in the fact that there simply isn't one model which would fit to all, whereas Pre '92 universities are in many ways, less diverse.

The fact that the model does not explain as much of the variance in income diversification for Post '92 universities, does not detract from the explanatory power of the statistically significant variables. The interpretation of the p -value and coefficient for the explanatory variables does not change just because the R^2 may be lower. For both models, significant p -values reject the null hypothesis that the coefficient equals zero (no effect). These coefficients estimate the trends in the data regardless of the overall fit (R^2). Therefore, interpretations of the statistically significant variables are the same for both the higher and lower R^2 models i.e. the influence of the statistically significant variables on income diversification are no less valid in the model with the lower R^2 .

5.6.7.2 Testing the statistical significance of the model

The overall significance of the regression model is assessed by the F test of significance (Kahane, 2008). As Field (2017) confirms, the test considers whether the group of variables as a whole in the model is significantly better at explaining changes in the dependent variable, than using the mean as a best estimate. Warner (2008, p. 566) terms it the ‘omnibus’ test. It effectively tests whether R^2 is different from zero (Hair et al., 2010).

In hierarchical regression the F -statistic can go down if the variables added do not make a sufficient contribution to the explanatory power (R^2) that outweighs the loss of degrees of freedom from including additional variables (Warner, 2008). As seen in tables 5.15 for Pre ’92 and 5.16 for Post ’92, the F -statistic declines as more variables are added, until the final regression in the hierarchy when the ‘capability’ variables outweigh the degrees of freedom they consume, and the F -statistic rises. However, in neither group of universities is the F -statistic particularly high through any of the regression stages. This suggests the individual variables within the blocks of variables may not be the most efficient in explaining changes in levels of income diversification (as already indicated in the bivariate analysis).

Significance of F is used to assess the statistical significance of the group of variables, it could be considered the ‘ p -value’ for the model (Kahane, 2008). In Pre ’92, the F -statistics through the hierarchical steps are significant to $<.001$, although for Post ’92 it is only in the final regression with the inclusion of the capability variables, that the F -statistic is significant to $<.05$. This shows the variable blocks earlier in the hierarchy are not significantly better than the mean at explaining changes in the dependent variable (confirmed by the low R^2 in the previous hierarchical stages). The following section considers the statistical significance of the individual variables and proposes that a more refined group of variables may be able to explain similar amounts of variance (R^2) but with a greater and more significant F -statistic.

5.6.7.3 Examining statistical significance of the explanatory variables

Although in combination the explanatory variables are explaining a high percentage of the variance in the Pre ’92 group, and a reasonable amount in Post ’92; there is an apparent lack of statistical significance for many of the individual variables. To assess their unique contribution to the model, the t -test is applied to each of the explanatory variables. The t values test the hypotheses that the coefficient is different from 0, thereby showing the importance of the variable in the model and its unique contribution (Hair et al., 2010). To

reject the hypothesis, the t value needs to be greater than 1.96 (for 95% confidence); t values are obtained by dividing the coefficient divided by its standard error, so a larger standard error will reduce its impact (Warner, 2008). The statistical significance of the t -value is also important in determining the variable's significance in the model. In the final hierarchical model for the Pre '92 group there is only one variable with a t -value >1.96 (p -value $<.05$) making a unique contribution. In Post '92 there are three variables with t -values >1.96 (p -value $<.05$). Twelve explanatory variables but only a few making a statistically significant contribution suggests the model could be refined.

A lack of statistical significance of individual variables may be due to a) collinearity leading to large standard errors which reduces their significance (Field, 2017) or b) the inclusion of irrelevant variables which indicates the model may be overfitted (Hair et al., 2010). Each of these are discussed in the following narrative.

As mentioned previously, collinearity is the association between two variables, it is measured as the correlation and hence the importance of the correlation matrix in diagnostic procedures (Hair et al., 2010).

In multiple regression, the focus becomes 'multicollinearity' where three or more explanatory variables may be correlated when regressed together (Hair et al., 2010). The impact is that it reduces an individual variable's explanatory power by the extent it is related to the other independent variables (Hair et al., 2010). According to Tabachnick and Fidell (2013), values of .90 and above in the correlation matrix are indicators of substantial collinearity; however, Webb et al. (2006) are more conservative and point to values above .80 as cause for concern. To assess the degree to which the regression is affected by multicollinearity, the Variance Inflation Factor (VIF) of each explanatory variable is calculated. Hair et al. (2010) suggest a common cut-off threshold is a VIF above 10.00. In the descriptive statistics and bivariate correlations section, it was noted there may be a potential issue with inter-correlation between some of the explanatory variables in the Pre '92 group. Post-estimation analysis also confirmed presence of multicollinearity. This collinearity can make determining the unique contribution of each explanatory variable difficult because when they are highly correlated with each other, they may compete to explain proportions of the same variance (Warner, 2008). The variables of concern are shown in table 5.18.

Table 5.18: *Intercorrelations in Pre '92 University Analysis*

Correlation matrix indicated:	
Endowment size + Reputational assets	Pearson's $r = 0.92$ (Sig. 1-tailed .000)
University size + Research intensity	Pearson's $r = 0.86$ (Sig. 1-tailed .000)
Post-estimation indicated:	
Endowment size	VIF 11.23 (tolerance 0.09)
Reputational assets	VIF 8.23 (tolerance 0.12)

Because of the complexity of the relationships, even with the VIF values it can be unclear which variables are inter-correlated. Hair et al. (2010) and Tabachnick and Fidell (2013) both present an approach that further helps diagnose the extent of multicollinearity and identify variables of concern by using more detailed collinearity diagnostics. Firstly, the condition index which shows the collinearity of combinations of the explanatory variables; and secondly, the regression coefficient variance-decomposition matrix, which highlights the proportion of variance for each regression coefficient that can be attributed to each condition index. Although analysis on the Pre '92 data set identified two condition indices above the threshold value of 30; no explanatory variables could be identified with variance proportions above 90%, even if the condition indices threshold was lowered to 15. Tabachnick and Fidell (2013) indicate variance proportions greater than .50 for at least two different variables are cause for concern; even with this more stringent approach, no dimension has more than one variance proportion greater than .50. This suggests that whilst present, multicollinearity is not significantly reducing the explanatory power of the variables in the Pre '92 group. In the Post '92 universities data, multicollinearity is not evident. The highest VIF value is 3.59 and all tolerances are above 0.2. The average VIF is 1.91 indicating there is no collinearity within the data (Field, 2017).

This turns focus to the potential inclusion of irrelevant variables in both the Pre and Post '92 models. Albeit drawn from extant research, a lack of statistical significance in both bivariate and multivariate contexts indicates questionable relationships between some of the antecedent factors and income diversification outcomes.

This means the models are potentially overfitted and therefore mis-specified. Although the inclusion of irrelevant variables does not lead to bias, it may affect the estimation of the more

relevant variables (Asteriou & Hall, 2015). The inclusion of irrelevant variables also reduces model parsimony, which may be important in interpretation of the results (Hair et al., 2010).

Whether the concern is multicollinearity or specification error, the accuracy of the models are likely improved by the removal of the non-significant variables (Warner, 2008; Hair et al., 2010; Asteriou & Hall, 2015). This is particularly important in addressing the research question seeking to identify which specific resources have the greatest influence on income diversification. Indeed, a more refined group of variables may be able to explain similar amounts of variance (R^2) but with a greater and more significant F -statistic.

5.6.7.4 Sample size

A final concern in the regression diagnostics is the size of the sample in relation to the number of variables in the model. As explained earlier, the objective to test 12 explanatory variables (and one control variable) was developed when the sample size was 102 universities, this was closer to the general rule of 10-15 cases to each explanatory variable therefore supporting generalisability of the results (Hair et al., 2010). However, the bimodal distribution of the dependent variable suggests analysis proceeds using two separate sample groups. This led to the smaller sample sizes of 40 Pre '92 universities and 62 Post '92 universities. Thus, the risk of overfitting is given due consideration. Two options are available; increase sample size or reduce the number of variables. As noted, there are not any more publicly-funded universities in England, hence the latter option was explored with each sample group. First, adopting the method used to develop the reputational assets variable, an exploratory factor analysis was conducted in the hope of being able to form meaningful clusters of variables (Field, 2017). But with little collinearity between the variables, no cohesive groupings could be established. Partial least squares regression was also briefly considered, but as Warawati, Susetyo, and Syafitri (2016, p. 28) confirm, "partial least squares regression (PLSR) is a method to overcome the multicollinearity in data. This method also can be applied data with high dimensionality problem, i.e. where the number of variables is much larger than the number of observations", neither of which really apply in this study. Moreover, risks of overfitting may be viewed as minimal, firstly as this study will not be using the coefficients to make predications, it is simply concerned with identifying the overall explanatory importance of the variables in the model. And secondly, the sample is effectively the total population.

However, recognising how few of the explanatory variables are making a unique contribution to the model in both the Pre and Post '92 groups, the variables selected for inclusion would benefit from review (and in doing so, test the available literature from where they were harvested). Therefore, an exploratory approach to variable selection was adopted and is described in the following section.

5.6.7.5 Revised variable selection method

As noted earlier, the variables in the model were selected on the basis of their positive presence in prior studies. In search of a more parsimonious model, an exploratory approach to variable selection is adopted to test whether other variables become statistically significant as the least significant are removed and to determine the 'best model' with the least number of variables.

Sequential search methods (also often referred to as stepwise methods) provide an objective method for exploratory variable selection, the goal being to maximise the explanatory power with the smallest number of variables employed (Hair et al., 2010). Warner (2008) describes it as a data-driven approach. Tabachnick and Fidell (2013) confirm that this more statistically-led method is useful for developing a subset of highly statistically significant explanatory variables by eliminating those that do not make any additional contribution over and above those already in the model. Interestingly a prior study establishing the characteristics of higher education institutions that have an influence on proportion of income from non-public sources, also adopted this method "to obtain the smallest number of explanatory variables and to provide clearly identified models" (Teixeira et al., 2014).

In the sequential search process, variables are individually assessed for their contribution to the explanation of the dependent variable and added or removed from the model based on their relative influence (Hair et al., 2010). In *forward addition*, the variable making the greatest contribution is entered first, subsequent variables are then selected based on their incremental contribution. In *backward elimination*, the regression model begins with all the explanatory variables included (saturated model), then variables that do not contribute significantly to the model are removed one by one, and the model re-estimated until all of the remaining variables are making a statistically significant contribution (Warner, 2008; Hair et al., 2010; Tabachnick & Fidell, 2013). In each iteration, the variable with smallest *F*-statistic, as calculated from the current regression, is eliminated (if this *F*-statistic does not exceed a specified value). The common criterion for removal is the probability of *F* being

greater than or equal to .10 (Draper & Smith, 1998). In other words, the R^2 change when removing the variable is not statistically significant.

This study favoured the backward approach over forward addition for a number of reasons. Firstly, Nau (2018) advocates the backward approach when dealing with non-statistically significant variables, citing it as more akin to a manual researcher-led process of elimination. Draper and Smith (1998) agree, it is preferred by statisticians who like to see all the variables start in the equation so as to be sure not to miss anything. Secondly, according to Field (2017), the backward method is less prone to excluding variables influenced by suppressor effects that occur when an explanatory variable has a statistically significant effect, only when another variable is held constant. Thus, backward elimination is less likely than forward addition to lead to a Type II error.

This revised approach to variable selection was used within the hierarchical regression model already established. All that changed was method of entry for the variables in each of the blocks in the SPSS analytical software (from forced entry, to backward elimination). Therefore, the regression is hierarchical over the blocks, but statistical within the blocks (Tabachnick & Fidell, 2013). The outcome of this analysis is presented in tables 5.19 and 5.20 in the section testing the hypotheses toward the end of this chapter, the retained variables are shaded grey.

Hair et al. (2010) advise caution when interpreting results after a sequential search selection processes as multicollinearity can have an impact on the final model i.e. if one variable remains in the model it is unlikely its collinear partner will also be retained. The backward elimination process will retain the variable with the highest explanatory power; this does not necessarily mean the deleted variable is not useful, it is just that the other one is more useful (Hair et al., 2010). Accordingly, the section that discusses the hypothesis testing (section 5.6.8) gives due consideration bivariate correlations as well as performance in the initial and revised regression models when assessing the importance of the variable in relation to income diversification. Also, for completeness, forward addition was also performed. The results agreed with the backward approach i.e. research intensity was the most important factor in Pre '92 universities, and research intensity plus staff dedicated to technology transfer in Post '92. The only difference with the forward approach is that it did not bring in staff incentives (Pre '92) and regional location (Post '92). This mirrors their lesser importance in the backward approach, but the model is richer for their inclusion.

It is worth remembering this sequential search selection process is only about trying to identify more clearly the supporting factors. Research intensity explains 73% of the R^2 in Pre '92 model and 27% of the R^2 in Post '92, this process is just trying to get a clearer view on what else may be contributing overall.

5.6.7.6 Some final model diagnostics

An additional diagnostic consideration is that of outliers and influential cases in the regression solution. It is important to consider both, as an influential case may not necessarily be an outlier (Hair et al., 2010).

An outlier is a case that differs considerably from the trend established in the data. In other words, it is an observation whose dependent variable value is unusual, given its value on the explanatory variables. Outliers can affect the values of the coefficients, thus causing the model to be biased (Field, 2017). The impact of outliers on the linearity of some bivariate relationships and the necessity for logarithmic transformation of the dependent variable for the Pre '92 group has already been discussed in the initial data characteristics section of this chapter.

As will be observed in the next section, residuals are important in testing the assumptions of linear regression, but they can also be utilised to identify outliers (Hair et al., 2010). Residuals are the difference between the observed data and the values predicted by the regression model, therefore large differences could indicate outliers (Tabachnick & Fidell, 2013). Unstandardised residuals are in the original units of measurement, so as Field (2017) suggests, it is easier to establish a universal benchmark if working with *standardised* residuals (z-scores). In a normally distributed sample, 95% of z-scores should be between +/- 1.96, 99% should be between +/- 2.58 and 99.9% between +/- 3.29. Tabachnick and Fidell (2013) suggest standardised residuals greater than +/-3.29 are cause for concern, whilst Hair et al. (2010) are more conservative at +/- 2.58. Both Stata and SPSS offer an option to save residual data for post-estimation analysis. Reviewing the standardised residuals for both the Pre '92 and Post '92 universities, none have a standardised residual greater than +/-3.29. Although, in the Pre '92 group City University with a standardised residual of 2.49 comes close to the Hair et al. (2010) benchmark. City University (case 8) can be seen in the box plot of standardised residuals (Figure 5.4). As the label has an 'open dot', it is deemed a mild outlier (Pallant, 2013), and therefore is not having a significant impact on the values of the coefficients (City University is much more teaching-focused than

its research-intensive Pre '92 counterparts). No cases were highlighted on the box plot for the Post '92 group.

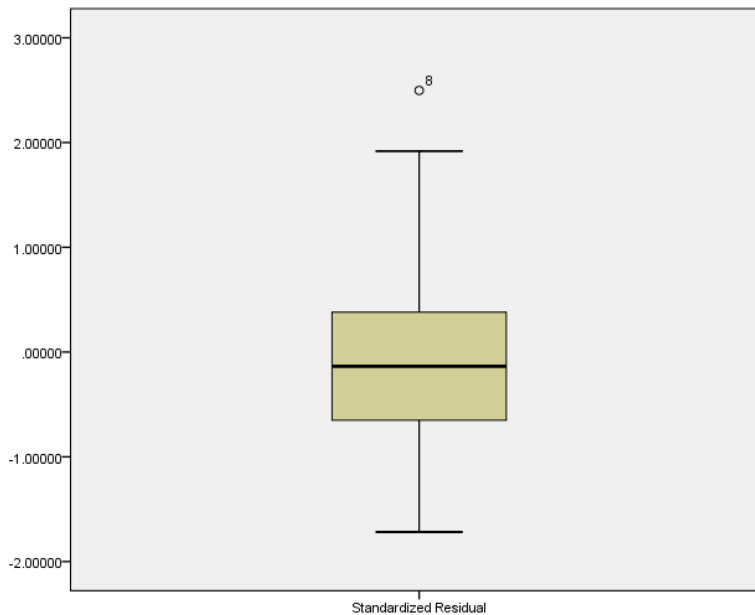


Figure 5.4: Box plot showing the distribution of the standardised residual for Post'92 universities

Mahalanobis distance can also be used to identify multivariate outliers (Tabachnick & Fidell, 2013). It is a measure which considers the distance of the observation from the mean in multivariate space, not the impact on the predicted values (Hair et al., 2010). Mahalanobis distance can be assessed for each case using the chi-squared distribution (Tabachnick & Fidell, 2013). The criterion for identifying an outlier is Mahalanobis distance at $p < .0001$. The distance is assessed as chi-squared with degrees of freedom set equal to the total number of variables (13). For both Pre and Post '92 universities, the probability that the Mahalanobis distance value is from the chi-square distribution is computed, no probabilities were below .0001. It can therefore be concluded there are no multivariate outliers in the data.

An influential case is one that exerts undue influence on the parameters in the regression model (Field, 2017). According to Hair et al. (2010), Cook's distance is viewed as the most representative measure of the influence of a case on the overall model. It considers the impact of a case from two perspectives; the size of changes when the case is omitted as well as the case's distance from the other cases i.e. its leverage (Hair et al., 2010). Cook and Weisberg (1982) suggest that values greater than 1.0 may be cause for concern. No Cook's distances greater than 1.0 are observed in the case summaries. The case with the highest Cook's distance in Pre '92 is Cambridge (.643) and in Post '92 is Coventry (.562), these are both well below 1. As Stevens (2002) states "If a point is a significant outlier on Y, but its Cook's

distance is <1 , there is no real need to delete that point since it does not have a large effect on the regression analysis” (p.135). The leverage versus squared residuals plots in figures 5.5 Pre '92 and 5.6 Post '92 reflect the previous Cambridge, City University, Coventry discussion.

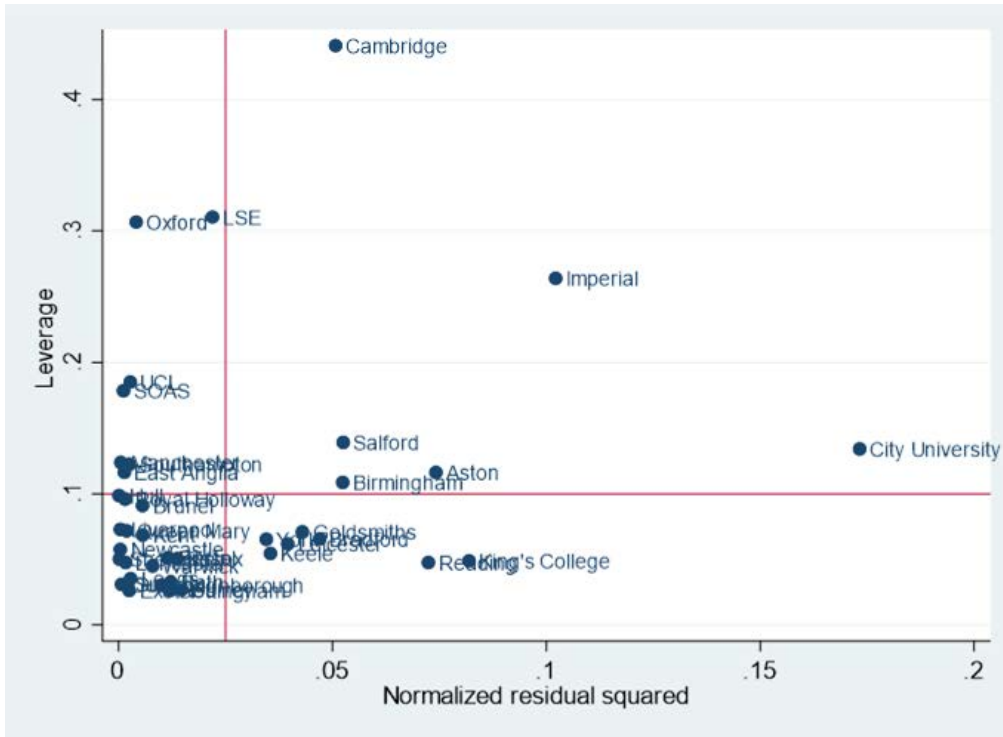


Figure 5.5: Leverage versus squared residuals plot for Pre '92 universities.

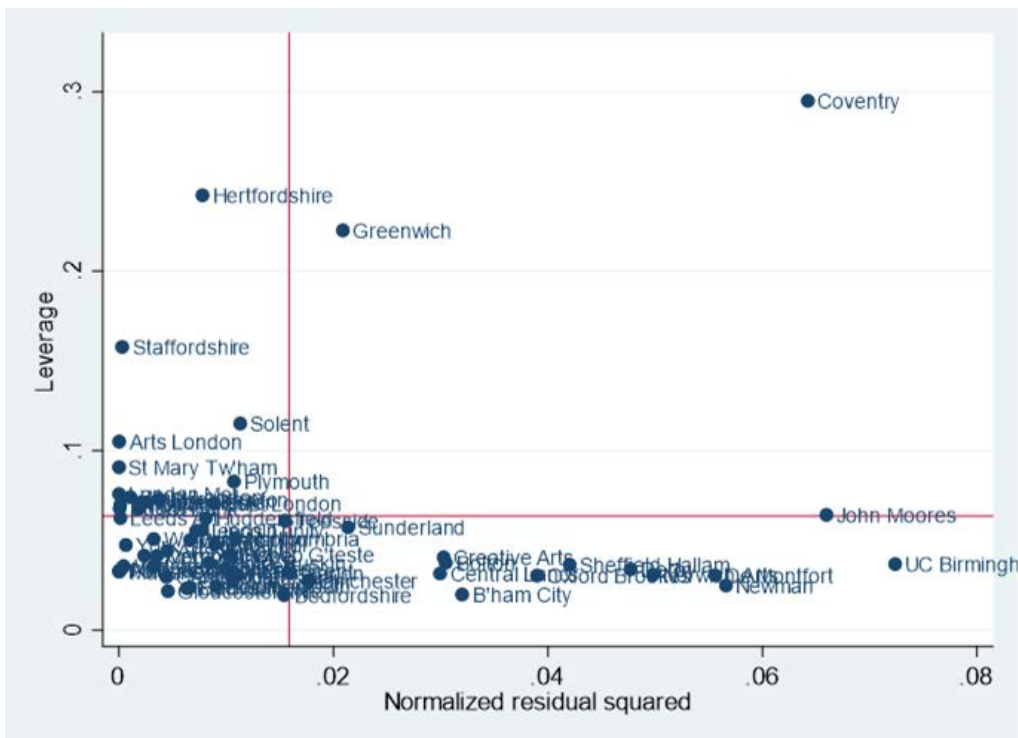


Figure 5.6: Leverage versus squared residuals plot for Post '92 universities.

5.6.7.7 Testing remaining regression assumptions

In order to carry out statistical inference from these models, it is important to ensure the assumptions of linear regression are met (Field, 2017). Requirements concerning data types, linearity, model specification, case ratios, outliers and multicollinearity have already been considered elsewhere. This section focuses on the assumption that the residuals of the model are normally distributed, that the variance of the residuals remains constant at all predicted levels of the dependent variable, and that residuals have a linear relationship with the predicted dependent variable values (Tabachnick & Fidell, 2013).

5.6.7.7.1 Normality of residuals

The residuals in the Pre and Post '92 groups are found to be normally distributed. Reviewing the histograms and kernel density plots in figures 5.7, 5.8 and 5.9, it is common for distributions in smaller samples to *look* potentially non-normal even when they are in fact within acceptable bounds (Field, 2017). The mean of the residuals in both groups is zero, this is an initial indication of normally distributed residuals (Kahane, 2008). This can be confirmed by taking a deeper statistical approach using the Shapiro-Wilk test of normality (Warner, 2008). The test returns a value between 0 and 1, the further away from one, the less normally distributed are the data (Shapiro & Wilk, 1965). The Pre'92 residuals have a Shapiro-Wilk statistic of .97; for Post '92 it is .98 confirming normality in both groups. Another aspect of this test is the significance value, the null hypothesis under test is that the distribution of the residuals is normal; therefore, to accept the null hypothesis, the *p*-value needs to be greater than 0.05. In the Pre '92 group, $p = .32$ and in Post '92 $p = .28$, supporting the null hypothesis that the data are normally distributed.

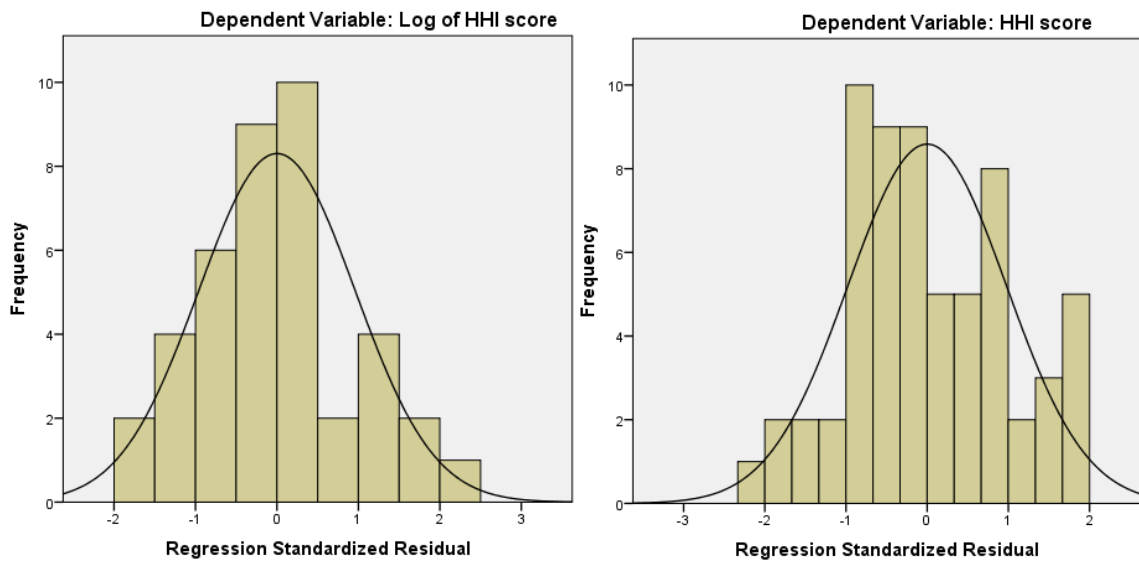


Figure 5.7: Histograms showing distribution of residuals in Pre '92 and Post '92 groups.

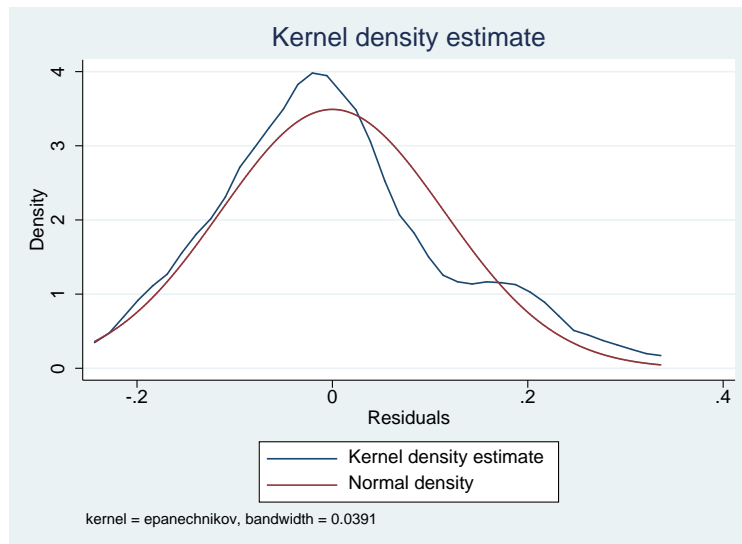


Figure 5.8: Kernel density plot of the residuals in the Pre '92 regression model.

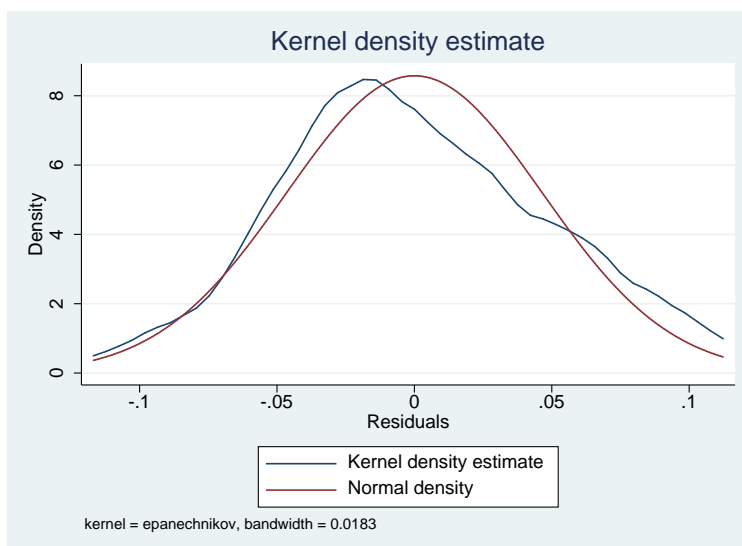


Figure 5.9: Kernel density plot of the residuals in the Post '92 regression model.

5.6.7.7.2 Homogeneity of variance in the residuals

The next assumption tested is that of homogeneity of variance, in other words, the spread of residuals is constant for all values of the dependent variable (Y). If the variances are unequal, they are said to be heteroscedastic (Hair et al., 2010). There are graphical and non-graphical methods for identifying heteroscedasticity (Asteriou & Hall, 2015). Figures 5.10 and 5.11 plot the Pre '92 and Post '92 standardised residuals against the predicted values for Y, with a reference line at Y=0 for clarity. Whilst there are a couple of outliers, the spread above and below the line is reasonably constant for all values of the dependent variable. This is confirmed statistically using the Breusch-Pagan test which tests the null hypothesis that the variance of the residuals is homogenous (Breusch & Pagan, 1979). In the Pre '92 group, the p -value of .534 means we can accept the null hypothesis that the variance is homogeneous. Similarly, Post '92 p -value of .251 suggest no correction for heteroscedasticity is required in either group.

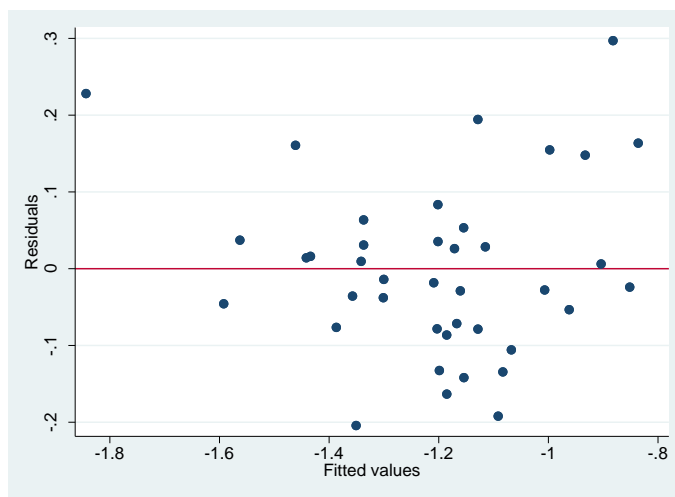


Figure 5.10: Standardised residuals plotted against predicted values of Y in Pre '92 group.

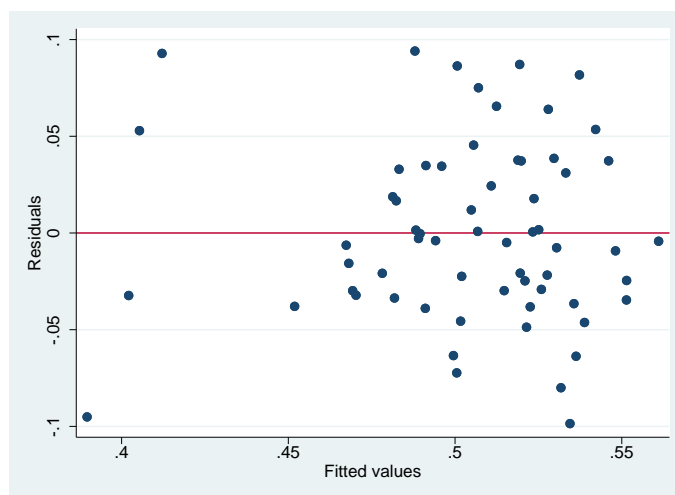


Figure 5.11: Standardised residuals plotted against predicted values of Y in Post '92 group.

The next consideration also utilises the standardised residual plots in figures 5.10 and 5.11, this time to detect nonlinearity in the residuals. If nonlinearity is suggested, the overall shape of the plot is curved rather than rectangular (Tabachnick & Fidell, 2013). There are no indications of a curvilinear relationship in either group.

Finally, there is an assumption of independence of error terms, as Field (2017) explains, it is assumed that the cases are independent and hence the residuals should be also. Independence of errors can be assessed using the Durbin-Watson statistic as a measure of autocorrelation, it tests for serial correlation between errors (Tabachnick & Fidell, 2013). The test statistic can vary between 0 and 4 with a value of 2 indicating that the residuals are uncorrelated. Although the size of the Durbin-Watson statistic depends upon the number of explanatory variables in the model and the number of cases. Making reference to tables within Durbin and Watson (1951), the following is confirmed; Pre '92 universities, sample size 40 with three regressors has a lower and upper boundary of dL1.338 – dU1.659. With a Durbin-Watson statistic of 1.82, the value is greater than the upper bound so the null hypothesis of non-autocorrelated errors is not rejected. Post 92 universities, sample size 62 with three regressors has a lower and upper boundary of dL1.480 – dU1.689. The Durbin-Watson statistic of 2.20 is also above the upper bound, so the null hypothesis is not rejected.

This section has been primarily concerned with testing the final parsimonious model from the hierarchical regression with backward elimination. It is this model that is used to test the hypotheses related to individual resource contribution. However, the initial model that confirmed the resource-based view and the types of resources making the most contribution did similarly meet these remaining assumptions. The Shapiro-Wilks test and Breusch-Pagan test with *p*-values greater than 0.5 supported the null hypotheses of normality of residuals and homogeneity of variance respectively. The Durbin-Watson values for samples of 40 and of 60 with 13 regressors were also within the bounds to not reject the null hypothesis of non-autocorrelated errors.

5.6.8 Testing hypotheses

This section provides detailed analysis of the hypotheses testing, a summary of whether or not the hypotheses are supported is presented in table 5.21. This section also contains the outcomes of the sequential search process for variable selection for the Pre and Post '92 models (tables 5.19 and 5.20 respectively).

The outcomes of hypotheses testing run the risk of two types of errors associated with whether the conclusions reached match reality. Type I errors occur when a conclusion is drawn that there is an effect (e.g. a positive influence on levels of income diversification), when in reality there is no effect. Type II errors are when the conclusion states no effect, when in reality there is an effect (Field, 2017). Challenges around whether the conclusions of the analysis match reality often occur as a result of the sample not being representative of the population. As the sample in this study reflects almost the total population, the risk of Type I and Type II errors are minimised (Pallant, 2013).

The initial hypotheses in this study are concerned with establishing the overall contribution of a university's resources to its level of income diversification, thus these are discussed first before considering the effects of the individual resources.

5.6.8.1 Overall resource contribution

The first hypothesis set is centred on the resource-based view and considers whether there is a relationship between a university's overall resources and its level of income diversification.

Hypothesis 1a: A university's unique bundle of resources have a statistically significant, positive effect on its level of income diversification.

Hypothesis 1b: Within a university's unique bundle of resources, it is the capabilities of the institution that has the greatest statistically significant effect on its level of income diversification.

These hypotheses are tested using hierarchical regression which presents a final view to address Hypothesis 1a, but also enables investigation of what additional explanatory power the types of resources confer above and beyond those already in the model, therefore addressing Hypothesis 1b.

This narrative refers to the initial hierarchical regression model (i.e. without backward elimination) presented in tables 5.15 and 5.16 previously, as the focus is on the resource-type 'blocks' and not the individual resources within them. However, these findings are also supported by the outcome of the more complex backward elimination approach (tables 5.19 and 5.20 presented shortly).

The results of the hierarchical regression indicate that collectively, a university's resources account for 81% of the variance in income diversification within Pre '92 institutions and 45% within the Post '92 group. The standard error of the estimates for both groups are similar (at .055 and .049 respectively). The *F*-statistics are significant at .000 and .002.

These results suggest that an institution's unique bundle of resources have a statistically significant, positive effect on its level of income diversification and hypothesis H1a is supported.

Which resource *types* have the greatest influence (H1b) is considered by analysing the hierarchical stages of the regression in the following narrative.

The data were entered into the hierarchical regression in four blocks, the first block comprising just the control variable: university size. The second block: control plus tangible resources; the third block: control plus tangible plus intangible assets, and the final block: control plus tangible, plus intangible assets, plus capabilities. This nested approach ensured the effects of subsequent blocks were evaluated after simultaneously accounting for the contents of the previous block(s). Thus, investigating what explanatory power additional types of resources confer above and beyond those already in the model.

Following the hierarchical regression procedure, support for each resource type was determined by the statistical significance of the subsequent change in the coefficient of determination (R^2).

After the first regression with just the control variable: This is the starting point, here the R^2 figure is the proportion of variance in income diversification that can be explained by the control variable alone (effectively a bivariate analysis). At this stage the R^2 change figure is indicating a change from R^2 being equal to 0 if no variables are present. University size, as measured by total staff FTE, and had not been identified in the literature as an influential factor. Moreover, it is frequently used as a control in relevant resource-based studies, note it is accounting for a high proportion of the variance in Pre '92 universities (54%), whilst only (2.7%) in Post '92. The R^2 change is statistically significant ($<.05$) in the Pre '92 analysis, but not in Post '92.

After the second regression with tangible resources added: By introducing tangible resources into the analysis, the change in R^2 is minor. An institution's tangible resources only explain an additional 4% of the variance in Pre '92 universities income diversification,

and an additional 3% in Post '92. The F -statistic has declined as the added tangible resource variables have not made a sufficient contribution to the explanatory power (R^2) to outweigh the loss of degrees of freedom from including these additional variables. Therefore, tangible resources only bring minor additional power to explaining levels of income diversification after simultaneously accounting for the effects of the control variable. This is congruent with the resource-based view. The F -test indicates the R^2 change is statistically significant ($<.05$) in the Pre '92 analysis, although not in Post '92.

After the third regression with intangible assets added: By introducing intangible assets into the analysis, the change in R^2 is moderate. An institution's intangible assets only explain an additional 6% of the variance in Pre '92 universities income diversification, and an additional 11% in Post '92. The F -statistic has declined again as the added intangible asset variables have not made a sufficient contribution to the explanatory power (R^2) to outweigh the loss of degrees of freedom from including these additional variables. So, intangible assets only bring moderate additional power to explaining levels of income diversification after simultaneously accounting for the effects of tangible resources (and the control variable). This is congruent with the resource-based view. The F -test indicates the R^2 change is statistically significant ($<.05$) in the Pre '92 analysis, yet not in Post '92.

After the fourth regression with capabilities added: By introducing capabilities into the analysis, the change in R^2 is significant. This estimate also has the lowest standard error of the four regressions. An institution's capabilities explain an additional 17% of the variance in Pre '92 universities income diversification, and an additional 23% in Post '92. The F -statistic has risen as the predictive power has outweighed the degrees of freedom consumed by the inclusion of the additional capability variables. Note in the Post '92 group, the F -statistic is statistically significant ($<.05$) for the first time. Thus, capabilities bring significant additional power to explaining levels of income diversification after simultaneously accounting for the effects of tangible and intangible assets (and the control variable). This is consistent with the resource-based view. The F -test indicates the R^2 change is statistically significant ($<.05$) in both the Pre '92 and Post '92 groups.

These results suggest, of the various resource types, it is an institution's capabilities that have the greatest statistically significant influence on diversifying its income and hypothesis H1b is supported.

It is worth noting, the adjusted R^2 coefficients are closer to the unadjusted R^2 in the initial hierarchical regression but become more disparate as the number of variables increases. This is likely due to the relatively small sample sizes considering the number of variables. In the revised hierarchical model with backward elimination, and a much-reduced number of variables (resources) in each block, this 'distance' is reduced and the adjusted R^2 coefficients are closer to the R^2 . This suggests greater accuracy in the revised model when generalising to the population. As previously mentioned, the more complex hierarchical regression with backward elimination also supports the findings of the initial hierarchical approach i.e. in combination, it is an institution's capabilities that have the greatest influence on level of income diversification. However, the more complex approach is not used to test these general resource hypotheses as the backward elimination process is about improving the statistical significance of the model and establishing the optimum combination of individual variables. Therefore, its objective is to remove variables; so whilst the F -statistic is much improved, rising from 8 to 41 (Pre '92) and from 3 to 11 (Post '92) in the revised model; the R^2 actually *reduces* from 81% to 78% (Pre '92) and from 45% to 37% (Post '92) because there are less resource variables contributing (albeit in a very small way) to the explanation.

In hypotheses H1a and H1b, the analysis is focused on groups of resources and the overall solution (the R^2 and F -statistic), the remaining hypotheses are concerned with individual resource contribution and hence the coefficients are examined (refer to tables 5.19 and 5.20 that follow).

5.6.8.2 Individual resource contribution

Explanatory variables with higher and more statistically significant coefficients make a stronger unique contribution to explaining changes in the dependent variable, than those with lower values and less statistical significance (Tabachnick & Fidell, 2013). Identifying the antecedent factors that have the greatest influence on levels of income diversification addresses the second research question.

The relationships are evaluated using both bivariate correlations and multivariate regression analysis. The purpose of the bivariate analysis is to establish the direction and strength of any relationship between income diversification and the individual resources. The purpose of the multivariate analysis is to test whether the independent relationship persists when allowing for the combined effect of all resources and their unique variance (Hair et al., 2010).

Also, to find out if any new relationships become significant when resources are considered in combination (Field, 2017).

For reasons justified previously, a hierarchical regression with backward elimination is employed to address these individual resource hypotheses in the multivariate context. This facilitated the development of a more parsimonious model whilst also enabling other potentially statistically significant parameters to surface when irrelevant variables were removed. Tables 5.19 and 5.20 that follow display results from the process for both Pre and Post '92 universities. The tables show the variables retained in the final model (shaded), but also include the eliminated variables' coefficients when it left the process and at what stage.

As noted previously, a negative coefficient indicates a positive change i.e. the resources have influenced income diversification and thus the university's HHI score reduces.

Table 5.19: Parameter Estimates Following Backward Elimination within Hierarchical Regression in Pre '92 Universities (N=40)

Parameter	<i>b</i>	<i>SE</i>	β	<i>t</i>	Sig.	95% confidence interval for <i>b</i>		Correlations				Collinearity Statistics		Entered in block	Stage eliminated	
						Lower bound	Upper bound	<i>r</i>	<i>R</i> ² (%)	Partial	Part	Part ² (%)	Tolerance			VIF
University size (control)	.000	.000	-.173	-.750	.460	.000	.000	-.732***	53.6%	-.145	-.063	.40%	.134	7.44	Control	1st
Regional location	.002	.001	.177	1.68	.104	.000	.004	.052	.27%	.308	.141	2.0%	.633	1.58	Tangible	2nd
Size of endowment	.000	.000	.281	.992	.330	.000	.000	-.309**	9.5%	.184	.086	.74%	.093	10.70	Tangible	3rd
Embedded strategic plan	-.003	.021	-.013	-.124	.902	-.045	.040	-.088	.78%	-.023	-.011	.01%	.683	1.46	Intangible	4th
Entrepreneurial outlook	.000	.000	-.035	-.349	.730	.000	.000	-.189	3.6%	-.064	-.030	.09%	.731	1.37	Intangible	5th
Staff dedicated to TT	.568	1.46	.038	.389	.700	-2.41	3.55	-.075	.56%	.070	.033	.11%	.756	1.32	Intangible	6th
Staff dedicated to DAR	-2.65	4.38	-.062	1.97	.057	-11.53	6.22	-.037	.14%	-.107	-.051	.3%	.679	1.47	Intangible	7th
Reputational assets	.006	.012	.076	.479	.635	-.019	.031	-.343**	11.8%	.084	.040	.16%	.269	3.72	Intangible	7th
Experienced TTO	.000	.001	.024	.280	.782	-.001	.002	-.148	2.2%	.049	.023	.05%	.920	1.09	Capabilities	8th
Experienced DARO	-.001	.001	-.038	-.384	.703	-.003	.002	-.164	2.7%	-.066	-.031	.10%	.676	1.48	Capabilities	9th
STEMM orientation	.041	.074	.073	.554	.583	-.109	.191	-.608***	36.8%	.093	.044	.20%	.370	2.71	Capabilities	10th
Level of incentives	-.026	.013	-.157*	-1.99	.055	-.054	.001	-.143	2.0%	-.314	-.157	2.5%	1.00	1.00	Intangible	Retained
Research intensity	.000	.000	-.904***	-10.91	.000	.000	.000	-.853***	72.6%	-.876	-.862	74.3%	.909	1.10	Capabilities	Retained
(Constant in final model)	-.272	.055		-4.94	.000	-.384	-.160									
<i>R</i> ² final model .775 (standard error .052)																
Adjusted <i>R</i> ² .757																
F41 (3,36)***																

p*<.1, *p*<.05, ****p*<.01

Note. dependent variable: Log of HHI score

Correlations sig. 1-tailed

b unstandardized coefficients

SE standard error unstandardised coefficients

β standardised coefficients

r zero-order Pearson's product-moment correlation coefficient

*R*² coefficient of determination

Table 5.20: Parameter Estimates Following Backward Elimination within Hierarchical Regression in Post '92 Universities (N=62)

Parameter	<i>b</i>	<i>SE</i>	β	<i>t</i>	Sig.	95% Confidence interval for <i>b</i>		Correlations				Collinearity Statistics		Entered in block	Stage eliminated	
						Lower Bound	Upper Bound	<i>r</i>	<i>R</i> ² (%)	Partial	Part	Part ² (%)	Tolerance			VIF
University size (control)	.000	.000	.049	.249	.805	.000	.000	-.165*	2.7%	.035	.026	.07%	.294	3.40	Control	1st
Size of endowment	.000	.000	.169	1.43	.160	.000	.000	.061	.38%	.198	.150	2.3%	.786	1.27	Tangible	2nd
Level of incentives	.000	.012	.000	-.001	.999	-.024	.024	-.106	1.1%	.000	.000	.00%	.540	1.85	Tangible	3rd
Staff dedicated to DAR	2.03	4.00	.063	.508	.614	-5.99	10.05	-.045	.20%	.070	.053	.29%	.715	1.40	Intangible	4th
Embedded strategic plan	.007	.009	.095	.780	.439	-.011	.026	-.121	1.5%	.106	.082	.66%	.740	1.35	Intangible	5th
Entrepreneurial outlook	.000	.000	-.108	-.936	.354	.000	.000	-.202*	4.1%	-.126	-.097	.95%	.813	1.23	Intangible	6th
Reputational assets	.090	.110	.124	.817	.417	-.131	.311	-.220**	4.8%	.109	.085	.72%	.473	2.11	Intangible	7th
STEMM orientation	-.011	.046	-.032	-.248	.805	-.104	.081	-.213**	4.6%	-.033	-.026	.07%	.659	1.52	Capabilities	8th
Experienced DARO	-.001	.001	-.086	-.772	.443	-.002	.001	-.146	2.1%	-.102	-.079	.63%	.855	1.17	Capabilities	9th
Experienced TTO	.001	.001	.137	1.31	.196	-.001	.003	.017	.03%	.169	.134	1.8%	.963	1.04	Capabilities	10th
Regional location	-.001	.001	-.213**	-2.03	.047	-.002	.000	-.204*	4.2%	-.255	-.209	4.4%	.976	1.02	Intangible	Retained
Staff dedicated to TT	-1.072	.400	-.281**	-2.68	.009	-1.871	-.272	-.303**	9.2%	-.330	-.277	7.6%	.969	1.03	Intangible	Retained
Research intensity	.000	.000	-.473***	-4.55	.000	.000	.000	-.516***	26.6%	-.509	-.469	22.0%	.983	1.02	Capabilities	Retained
(Constant)	.667	.059		11.21	.000	.548	.786									
<i>R</i> ² final model .373 (standard error .047)																
Adjusted <i>R</i> ² .341																
F12 (3,58)***																

p*<.1, *p*<.05, ****p*<.01

Note. dependent variable: HHI score

Correlations sig. 1-tailed

b unstandardized coefficients

SE standard error unstandardised coefficients

β standardised coefficients

r zero-order Pearson's product-moment correlation coefficient

*R*² coefficient of determination

Reviewing the output in tables 5.19 and 5.20, it is notable in the Post '92 universities group, that the variables that are considered statistically significant have not changed from the original hierarchical 'resource block' regression. However, in Pre '92, an additional variable, *level of staff incentives* has been revealed as statistically significant. The goal of parsimony has been achieved with only a moderate impact on R^2 which is 3.9% lower for Pre '92 and 7.4% lower for Post '92. The smaller number of variables means the difference between R^2 and adjusted R^2 is much reduced; a .018 difference Pre '92 and 0.03 difference Post '92. The overall statistical significance of the regression model has increased substantially; Pre '92 model has risen from $F9(13,26)$ to $F41(3,36)$ and Post '92 from $F3(13,49)$ to $F12(3,59)$, all significant to $<.001$. This group of variables is significantly better at explaining changes in the dependent variable. The ratio of cases to explanatory variables is now also much improved in this refined model. Despite the much-reduced number of explanatory variables, the Ramsey RESET (Regression Equation Specification Error Test) failed to reject the null hypothesis that the model has no omitted variables in the model for both Pre and Post '92 universities. Concerns regarding multicollinearity have also been resolved; the highest VIF across both groups is 1.10. All tolerances are above 0.2, indicating there is no collinearity within the data.

Results of these statistical analyses are used to test the hypotheses advanced by the theoretical framework in chapter three. As explained in that chapter, the hypotheses for the individual resource contributions read the same, save for the resource under consideration. To avoid repetition, just the first of the individual hypotheses is written in full and an example of the interpretation narrative included.

H2a: There is a statistically significant, positive relationship between a university's regional location and its level of income diversification.

H2b: The significant relationship persists when allowing for the combined effect of an institution's unique bundle of resources.

These hypotheses are tested using the bivariate and multivariate results presented in tables 5.19 and 5.20. These tables contain all the data described in this narrative. Bivariate correlations between the explanatory variables in this study are identified using Pearson's product-moment correlation coefficient. Pearson's r provides the same value coefficient as the standardised coefficient in a bivariate regression. The correlation coefficient (r) values range from -1 (strong negative relationship) to +1 (strong positive relationship) (Hair et al.,

2010). According to Cohen (1988), an absolute value for r between .10 and .29 indicates a weak relationship; between .30 and .49 a moderate relationship, and between .50 and 1.0 suggests a strong relationship. As mentioned previously, the significance has been relaxed to $p < .10$ to acknowledge the smaller sample size (Pallant, 2013). In the context of correlation, the coefficient of determination (R^2) shows how much variance the two variables share (Pallant, 2013) and is therefore also presented in the results.

Secondly, the multivariate results for each explanatory variable are considered i.e. do the relationships identified in the correlation analysis persist, when allowing for the combined effect of all resources and their unique variance? Note, the relationship may be reduced or enhanced.

In tables 5.19 and 5.20, the b values are the unstandardised regression coefficients, indicating to what degree each explanatory variable affects the outcome (if the effects of all other parameters are held constant). The b value represents the change in the dependent variable associated with a one unit change in the explanatory variable. (Tabachnick & Fidell, 2013). The standard error associated with each b -value indicates the degree to which these values would differ if generalised to different samples (Field, 2017).

If the model is reliable, similar results should be obtained from other samples. The confidence intervals of the b -values reflect that in 95% of these samples, the 'interval' would contain the true value of b in the population. Ideally the range between the lower and upper bounds of the interval will be narrow. Wider intervals reflect that the parameter, whilst statistically significant, may be less representative (Tabachnick & Fidell, 2013).

The standardised b -values i.e. beta (β) indicate the number of standard deviations that values of the dependent variable would change if there was one standard deviation unit change in the explanatory variable. Beta values benefit from not being in the units of measurement of the variables. This can make interpretation of the coefficients easier and enable them to be more directly comparable (Hair et al., 2010). With the dependent variable in this study having a range between 0 and 1, the unstandardised coefficients in the regression can be very small e.g. statistically significant and yet a coefficient of -.000005. For that reason, this discussion will focus on the standardised beta (β) values; using the same example, the standardised beta would be -.904.

As noted earlier, to assess the unique contribution to the model, a *t*-test can be applied to the each of the explanatory variables. The *t* statistic test the hypotheses that the variable has no explanatory power in the model or its coefficient is not different from 0, thereby showing the importance of the variable in the model (Hair et al., 2010). To reject the hypothesis, the *t* value needs to be greater than 1.96 (for 95% confidence); *t* values are obtained by dividing the coefficient divided by its standard error, so a larger standard error will reduce its impact (Warner, 2008). The statistical significance of the *t*-value is also important in determining the variable's significance in the model. To maintain consistency between bivariate and multivariate analysis, the statistical significance is relaxed to $< .10$. This has the additional benefit of capture a broader array of antecedents.

Finally, to compare relative importance, tables 5.19 and 5.20 also show the semi-partial correlation for each individual explanatory variable. Semi-partial or 'part' correlations consider the unique relationship between each explanatory variable and the dependent variable, controlling for all other variables in the model. When squared these values indicate the unique contribution made by the variable to explaining variance in the dependent variable and can be presented as a percentage, i.e. how much the overall R^2 of the model benefits from its inclusion (Tabachnick & Fidell, 2013).

By way of example, hypothesis two is evaluated thus:

The relationship between income diversification (as measured by a university's HHI score) and its regional location (as measured by the region's UKCI score) is initially investigated using Pearson product-moment correlation coefficient. Subsequently, this bivariate relationship is tested to see if it persists when allowing for the combined effect of all resources and their unique variance.

H2: In Pre '92 universities

Referring to table 5.19: The bivariate results (*r*), indicate the tangible resource of regional location and income diversification have a very weak association in Pre '92 universities and not in the expected negative direction. The relationship is also not significant at $p < .10$. Looking at the R^2 , regional location only shares .27% of the variance with income diversification.

In the multivariate context, the *t*-statistic and associated *p*-value for the regional location coefficient indicate the unique contribution of regional location to the explanatory model is

not statistically significant. The part correlation confirms the low importance i.e. regional location only contributes 2% to the overall R^2 of the model. Regional location is removed from the model in the 2nd stage of the hierarchical backward elimination regression process. The multivariate relationship was also not in the expected negative direction.

H2: In Post '92 universities

Referring to table 5.20: The bivariate results (r), indicate the tangible resource of regional location and income diversification have a weak association in Post '92 universities but in the expected negative direction and the relationship is significant at $p < .10$. Looking at the R^2 , location shares 4.2% of the variance with income diversification.

In the multivariate context, the t -statistic and associated p -value for the regional location coefficient indicate the unique contribution of regional location to the explanatory model is statistically significant at $p < .05$. The part correlation confirms moderate importance i.e. regional location contributes 4.4% to the overall R^2 of the model. Regional location is retained in the model during the hierarchical backward elimination regression process. The relationship is in the expected negative direction. Interestingly, the weak bivariate relationship is strengthened when in combination with other resources. Note location is also significant for Post '92 universities in the initial hierarchical regression (before the backward elimination process).

This analysis suggests, the regional location hypothesis H2a is weakly supported and H2b is supported in Post 92 universities, but neither hypothesis is supported in Pre '92 institutions.

The following table presents each hypothesis utilising the bivariate R^2 and the squared multivariate part correlation values as a summary position.

5.6.8.1 Hypotheses summary

Table 5.21: Evaluating Hypotheses by Percentage of Variance Explained by the Factor in Pre '92 and Post '92 Universities

Hypothesis	Pre '92		Post '92		Outcome
H1a: Resources help diversify	Overall 81% R^2		Overall 45% R^2		Supported Pre and Post '92
H1b: Capabilities help most	Additional 17%		Additional 23%		Supported Pre and Post '92
	Bivariate R^2	Multivariate Part ²	Bivariate R^2	Multivariate Part ²	
H2a: Regional location			4%*		Weak support Post '92
H2b: Regional location				4%**	Supported Post '92
H3a: Size of endowment	10%**				Moderate support Pre '92
H3b: Size of endowment					Not supported
H4a: Reputational assets	12%**		5%**		Moderate support Pre '92 Weak support Post '92
H4b: Reputational assets					Not supported
H5a: Embedded strategic plan					Not supported
H5b: Embedded strategic plan					Not supported
H6a: Level of incentives					Not supported
H6b: Level of incentives		3%*			Supported Pre '92
H7a: Staff dedicated to TT			9%**		Moderate support Post '92
H7b: Staff dedicated to TT				8%**	Supported Post '92
H8a: Staff dedicated to DAR					Not supported
H8b: Staff dedicated to DAR					Not supported
H9a: Entrepreneurial outlook			4%*		Weak support Post '92
H9b: Entrepreneurial outlook					Not supported
H10a: Experienced TTO					Not supported
H10b: Experienced TTO					Not supported
H11: Experienced DARO					Not supported
H11b: Experienced DARO					Not supported
H12a: STEMM orientation	37%***		5%**		Strong supported Pre '92 Weak support Post '92
H12b: STEMM orientation					Not supported
H13a Research intensity	72%***		27%***		Strongly supported Pre and Post '92
H13b Research intensity		74%***		22%***	Supported Pre and Post '92
Control: University size	54%***		3%*		Strong correlation Pre '92, not significant multivariate

Significance of the associated r or t * $p < .1$, ** $p < .05$, *** $p < .01$

Note. Strength of bivariate support is determined by Pearson's r (using Cohen 1988 boundaries).

Multivariate Part² refers to semi-partial correlations which consider the unique relationship between each explanatory variable and the dependent variable, controlling for all other variables in the model.

Thus, it measures the unique contribution made by the variable to explaining variance in the dependent variable. In other words how much the the overall R^2 of the model benefits from its inclusion.

5.6.9 Control variable performance

The control variable of university size is included in the regression model as an alternative explanation for the level of income diversification not covered by the consideration of a university's resources and capabilities.

In reviewing the bivariate correlations, it would appear the size of a university *does* have a relationship to its level of income diversification. However, in a multivariate context, the control variable has very little impact and is not statistically significant in the final hierarchical model in combination with all other resources. Albeit when it is entered as the first block, for the Pre '92 group it provided an initial R^2 of 54% but this diminished as the other variables were added. Note: when research intensity is excluded from the model, university size becomes the most statistically significant variable ($p < .001$) although the R^2 drops to 61%. If the control of university size is excluded, the model still achieves R^2 81% due to the importance of research intensity. This test also addresses the concern that university size and research intensity are highly correlated, research intensity is clearly the factor having the most effect.

In Post '92 institutions, there is only a weak bivariate association between university size and income diversification, significant at $p < .10$ and even without research intensity, is not significant in a multivariate context.

5.6.10 Quantitative results summary

This section summarises what has been found in the quantitative phase of this study designed to address the first two research questions. How diversified are publicly-funded universities in England is presented in appendix A. Regarding which resources and capabilities of a university have the greatest influence in achieving a diversified income portfolio, the following addresses that question.

The bivariate analysis suggests that a Pre '92 institution's research intensity, its size, and its orientation toward STEM subjects, has the strongest positive association with their level of income diversification. For Post '92 universities, it is only their research intensity that has a strong association. However, whilst this research has considered both bivariate and multivariate relationships, emphasis is placed on the multivariate results as:

Critics contend that the magnitude and direction of these [bivariate] associations may be artefacts of other organizational characteristics and forces, whose marginal influences can be measured and controlled by multivariate models. For example, some measure of an organization's size is frequently controlled in studies of organizational processes. (Hung & Hager, 2019, p. 15)

The multivariate regression analysis reveals that in Pre '92 universities, when an institution's unique bundle of resources is considered together; it is only research intensity and the newly significant level of staff incentives to leverage that research, that have a statistically

significant influence on income diversification. In Post '92 institutions, it is still their research intensity, but also the number of staff dedicated to leveraging that research, and the region in which the university is located.

The results of the final multivariate estimation model considering the combined effects of individual variables are visualised for Pre and Post '92 universities in figures 5.12 and 5.13. The original estimation models advanced in chapter four are also revisited. The revised estimation models can be presented as:

$$\text{Pre '92 IncomeDiversification} = \beta_0 + \beta_1 \text{Capabilities}_i + \beta_2 \text{Policies}_i + \epsilon_i$$

Where capabilities reflect research intensity and policies reflect level of incentives for business engagement and ϵ_i is the random error term.

$$\text{Post '92 IncomeDiversification} = \beta_0 + \beta_1 \text{Capabilities}_i + \beta_2 \text{Structure} + \beta_3 \text{Physical}_i + \epsilon_i$$

Where capabilities reflect research intensity, policies reflect level of incentives for business engagement, physical reflects regional location and ϵ_i is the random error term.

Although this study is not predictive in its goal, utilising standardised coefficients, the following can be stated:

$$\text{Level of income diversification in Pre '92 universities} = -.904 + -.157 + \epsilon$$

$$\text{Level of income diversification in Post '92 universities} = -.473 + -.281 + .213 + \epsilon$$

Note in the figures, standardised beta (β) values significance * $p < .1$, ** $p < .05$, *** $p < .01$ are indicated and R^2 is the proportion of variance in the outcome variable accounted for by the model.

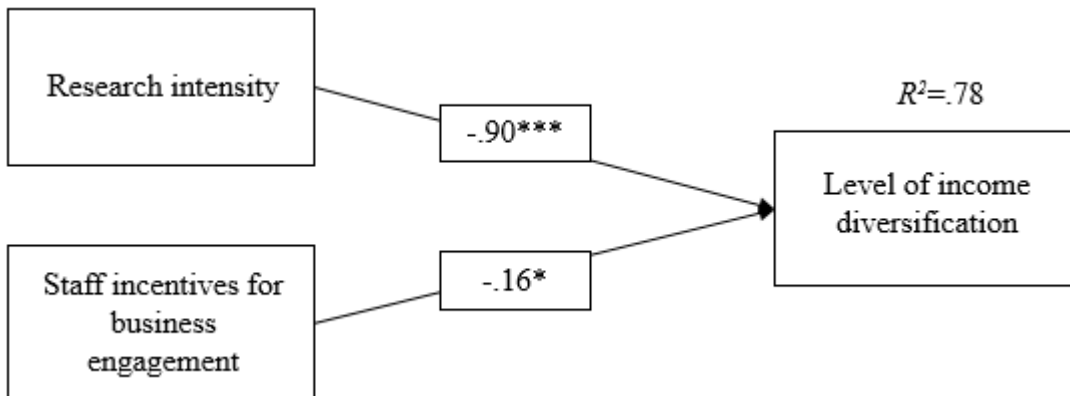


Figure 5.12: Standardised resource-based model for levels of income diversification in publicly-funded, non-specialist Pre '92 universities in England.

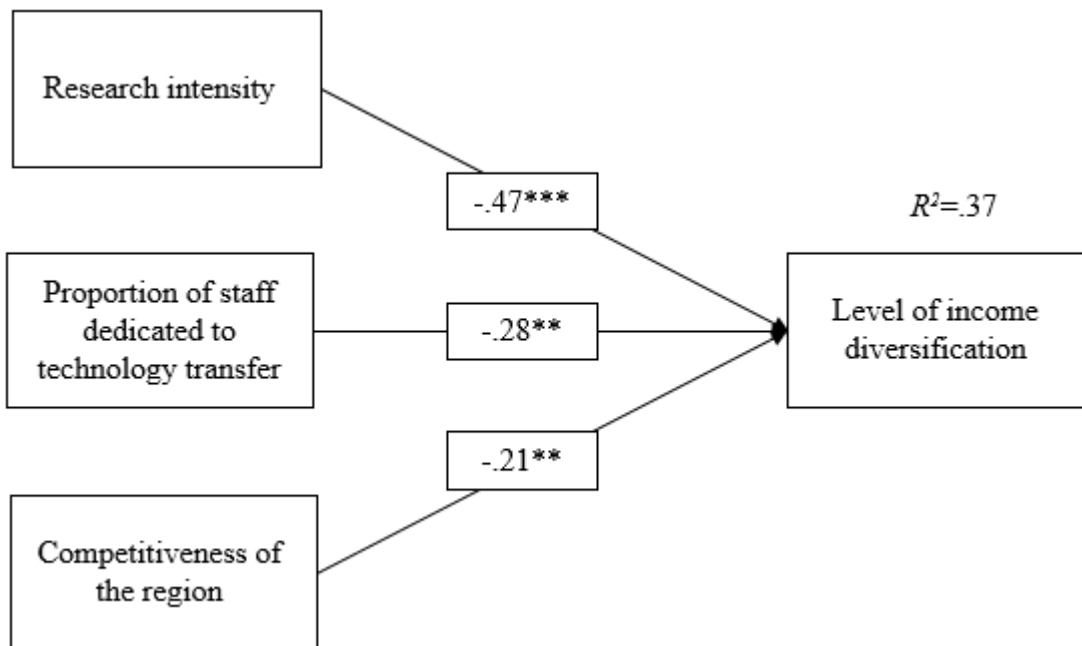


Figure 5.13: Standardised resource-based model for levels of income diversification in publicly-funded, non-specialist Post '92 universities in England.

5.6.10.1 Additional comment

As discussed in chapter two, the extant research as supported by modern portfolio theory and resource dependence theory suggests the institutions achieving a higher level of income diversification have reduced their exposure to financial risk and thus are less vulnerable. The qualitative phase that follows presents an opportunity to evaluate this theoretical assumption with the interview participants. This is of tangential interest to this study as towards the end

of the quantitative phase, HESA made their annual financial security index available on their subscription business intelligence platform 'HEIDI Plus'. The security index which measures relative financial security within the sector had not been published in 2015/16 due to the changes in SORP noted earlier. However, HESA had re-mapped the data to add 2015/16 and 2016/17 to the available reports. Of interest to this study was the observation that with only a couple of exceptions, the top 20 places on the HESA financial security index were occupied by Post '92 institutions when looking at averages for the same 5-year period. In other words, an inverse of the income diversification index established by this study. As touched upon in chapter one, Wellington (2007) found a similar picture which then became inverted when additional indicators including dependence on public-funding were added. Although tangential to the aims of this study, the reality of the HESA financial security index is also explored further in the qualitative phase.

5.6.1 Validity and reliability of quantitative results

As Creswell and Plano Clark (2011) outline, the final stage of the quantitative analysis process is to address issues of validity and reliability. Burr (2003) succinctly summarises that reliability "is the requirement that the research findings are repeatable" whilst validity concerned with whether the researcher's "description of the world matches what is really there" (p158).

Considerations of validity and reliability in research based on quantitative data, appear to be mostly concerned with development and testing of survey instruments. The quantitative phase for this study is grounded in secondary and archival data. Yet as Fallon (2016) suggests "with archival data sets, you have no control over selecting the measures. Still you can comment on their validity and reliability" (p.203).

In addition, studies using secondary and archival data may adopt proxies to represent the constructs of interest. So, similar to designing a survey, the consideration of whether the measure is measuring what it intends to measure remains. This is known as construct validity (Cronbach & Meehl, 1955) and consideration has already been given to this in chapter four outlining the operationalisation and measures for the variables used in this study.

Following the model adapted from Lincoln and Guba (1985) previously presented in the research methodology chapter. The validity and reliability of the quantitative results are assessed in terms of its internal validity, external validity, reliability and objectivity.

5.6.1.1 Internal validity

Internal validity is concerned with the issue of causality, i.e. is the conclusion drawn about the relationship between two or more variables valid (Bryman, 2016). Cook and Campbell (1979) highlight, there could be other factors confusing or confounding the outcome and propose 12 threats to internal validity. However, these are centred on experimental and quasi-experimental studies and lack relevance in the context of this study. Fortunately Onwuegbuzie and McLean (2003) building on the work of (Cook & Campbell) and expanding the framework to be more adaptable to quantitative methods more generally. In considering the (Onwuegbuzie & McLean) threats to internal validity in data analysis, this study recognises differences in the sample, creates two smaller samples of Pre and Post '92 universities, does not remove outliers, fully tests all assumptions of linear regression, addresses any multicollinearity concerns and finally, checks for omitted variable bias. Moreover, by using 5-year averages of financial data, the study allows for any time lag between the influence of a resource and the income diversification output. It also smooths out any impact to the portfolio from the substantial increase in student fees and the lifting of the numbers cap, both of which occurred in this period.

5.6.1.2 External validity

External validity questions whether the results of a study can be generalised beyond the specific research context in which they are generated (Bryman, 2016). The focus with external validity is often on how representative the sample is of the population (Robson, 2011). This research benefits from having (bar one), the entire focal population of publicly-funded, non-specialist universities in England comprising the sample for study. Onwuegbuzie and McLean (2003) also note specificity of variables as a threat to external validity i.e. variables are operationalised using local norms. Whilst this study has used measures based on the available secondary datasets specific to the UK, the constructs are universal to the sector and similar data is available in other jurisdictions outside the UK (note all data used in this study are available from HESA etc for Wales, Scotland and Northern Ireland).

5.6.1.3 Reliability

Reliability is concerned with whether the results of the research are repeatable (Bryman, 2016). Often commented on in the context of quasi-experimental and survey designs, it

reflects the stability or consistency of the approach to measurement (Robson, 2011). However, the use of secondary and archival data means the usual threats to reliability lack relevance (participant error, participant bias, observer errors and observer bias). Although Lincoln and Guba (1985) point out that “reliability is threatened by any careless act in the measurement or assessment process” (p.292). Therefore, in this study, numerous checks and balances were adopted to ensure the results were reliable. Interestingly performing the same analysis in two different statistical software packages (to maximise available functionality) gave reassurance when the results were identical.

5.6.1.4 Objectivity

As Lincoln and Guba (1985) suggest, objectivity is usually achieved through the methodological approach taken in the study; where the researcher is external to the research, the “outsider” (Van de Ven, 2007, p. 27). This quantitative phase seeks a nomothetic outcome and hence the detached use of secondary data enhances the objectivity of the study.

5.7 Chapter conclusion

This chapter presented the quantitative phase in its entirety in terms of sample selection, operationalisation of variables, data collection, analysis and results. It confirmed the hypothesis that a university’s resources and capabilities have a statistically significant influence on levels of income diversification, and that its capabilities exert the most influence. In considering which specific resources and capabilities, it is a focus on research that is key to achieving a diversified income portfolio (particularly when supported by organisational policies and structures).

In the following chapter, the explanatory sequential mixed method design advances to the next stage, namely a qualitative exploration of these quantitative results i.e. how and why these resources and capabilities influence level of income diversification.

It is in the discussion chapter (seven) where these data are then integrated, the qualitative findings are used to help explain the quantitative results.

Chapter 6: The Qualitative Research Phase

6.1 Chapter introduction

Having presented the quantitative research procedure, analysis and results, the purpose of this chapter is to present the qualitative phase in its entirety from sample selection to findings. As per the explanatory sequential design, the focus of the qualitative phase, is very much driven by the results of the quantitative phase. This phase does, however, also afford an opportunity to evaluate some of the assumptions in the available literature on which this study is predicated.

This sixth chapter positions the quantitative results and assumptions to be explored and provides an explanation and justification for the sample used. This is followed by a description of the process of data collection and preparation. Finally, the qualitative analysis and findings are presented with consideration of their validity and reliability. The chapter begins with a brief summary of the research objectives for the qualitative phase.

6.2 Research objectives for this phase

In this explanatory sequential mixed method design, the objective of this qualitative phase is to explore the underlying mechanisms behind the statistical relationships identified in the quantitative phase, thus developing a richer explanation of any causal effect (research objective four). Meeting this objective addresses the third research question, namely how and why do the resources and capabilities of a university have an influence on the level of income diversification achieved. According to Creswell and Plano Clark (2011), the quantitative phase of an explanatory sequential mixed method design not only suggests the relevant sample for the qualitative phase, but also the questions to ask. The questions to ask to meet the qualitative objectives are considered in the following section.

6.2.1 The quantitative results to explain

The quantitative results to be explored in this qualitative phase by asking the questions posed are presented in table 6.1. The purpose of these questions is to develop a deeper understanding of how and why university resources and capabilities may influence levels of income diversification and to help explain the statistical relationships established.

Table 6.1: *Questions Arising from the Quantitative Phase*

Quantitative results to explain	Questions to explore
There is a binary divide between Pre and Post '92 universities in terms of their level of income diversification.	1. Why is there a binary divide in level of income diversification?
An institution's resources and capabilities are positively related to its level of income diversification.	2. How and why does a university's resources give it a competitive advantage in diversifying its income?
Research intensity is positively related to income diversification in both Pre and Post '92 institutions.	3. How and why does research intensity influence level of income diversification?
Size is positively related to income diversification in Pre '92 institutions.	4. How and why does the size of a Pre '92 institution influence its level of income diversification??
An orientation to STEMM subjects is positively related to income diversification in Pre '92 institutions.	5. How and why does a STEMM orientation influence level of income diversification in Pre '92 institutions?
Staff incentives to engage with business are positively related to income diversification in Pre '92 institutions.	6. How and why do staff incentives for business engagement influence level of income diversification in Pre '92 institutions?
An institution's reputational assets are positively related to income diversification in Pre '92 institutions.	7. How and why do reputational assets influence level of income diversification in Pre '92 institutions?
The proportion of staff dedicated to business engagement is positively related to income diversification in Post '92 institutions.	8. How and why does having staff dedicated to business engagement influence level of income diversification in Post '92 universities?
A Post '92 university's regional location is positively related to income diversification.	9. How and why does a university's regional location influence its level of income diversification in Post '92 universities?
A number of resources were not found to be statistically significant.	10. Are any of the non-significant factors surprising in terms of not having a significant influence on level of income diversification?
Although statistical tests suggested no omitted variables in the model, may there still be other variables not considered?	11. What other factors should the quantitative phase have considered in relation to influencing levels of income diversification achieved?

Table 6.1: *Questions Arising from the Quantitative Phase*

Quantitative results to explain	Questions to explore
The HESA financial security index shows Post '92 institutions being in a stronger position than Pre '92s.	12. Why might there be an apparent contradiction between the HESA financial security and income diversification indices?

6.2.2 Theoretical assumptions to evaluate

This qualitative inquiry also presents an opportunity to evaluate some of the theoretical assumptions arising from the literature on which this study is predicated e.g. that universities are indeed trying to diversify their income and are doing so to reduce their exposure to financial risk.

The theoretical assumptions from the literature to be evaluated and the questions posed are presented in table 6.2.

Table 6.2 *Questions Arising from the Theoretical Assumptions*

Theoretical assumptions	Questions to explore
Universities are actively trying to diversify their income streams.	13. Are universities mindful of the need and diversifying their income?
The main drivers are to reduce exposure to financial risk and to achieve greater autonomy.	14. What are the main drivers for income diversification in universities?
Organisations less dependent on any one source of income will be less financially vulnerable.	15. Do institutions perceive themselves to be less financially vulnerable having a more balanced income portfolio (as a result of diversification efforts).

The questions in table 6.1 and table 6.2 are later used as a basis for the interview guide and form the *a priori* themes in the subsequent thematic analysis. The following section considers of whom to ask these questions i.e. what sample of the target population to approach.

6.3 Sample and justification

As the data collection method for this phase is individual interview, the sample selection process is effectively selecting those to be approached for interview.

6.3.1 Case selection

In qualitative research, cases and individuals that may provide insight are *purposefully* selected (Creswell, 2014; Bryman, 2016). In explanatory sequential mixed method designs, this purposeful selection for the qualitative phase is supported by the outcome of the quantitative phase (Teddlie & Yu, 2007). In other words, the results of the quantitative phase suggest the relevant sample for the qualitative phase (Creswell & Plano Clark, 2011). According to Ivankova, Creswell, and Stick (2006), the options for purposeful case selection in explanatory sequential designs include selecting typical cases i.e. average quantitative results, or seeking maximum variation in perspectives or exploring extreme cases.

Case selection is one of the connecting points between quantitative and qualitative phases in sequential designs, however there are no established guidelines to follow (Hanson et al., 2005). As the quantitative phase focuses on average results (Creswell, 2014), selecting the typical (average) cases may not add as much new insight as other approaches. With an institution as the unit of study, maximum variation in perspectives is also somewhat limited e.g. this is usually seeking variation in age, gender, race etc. (Creswell, 2014). This study opted for an extreme case strategy as the primary sampling technique in this qualitative phase. Variation in terms of types of institutions is naturally represented within these extreme cases. The justification for the extreme case approach is that those institutions highly successful in achieving income diversification, and have the identified antecedents such as an intensity of research, are “expected to yield especially valuable information about the topic of interest” (Plano Clark & Creswell, 2008, p. 205). As Teddlie and Yu (2007) confirm, extreme successes or failures may bring additional insight to the explanation; thus better explain the underlying mechanisms in the statistical relationships identified in the quantitative phase (Ivankova et al., 2006).

Universities to approach for interview are selected from within the top Pre and Post '92 institutions in terms of their income diversification index score i.e. the most financially diversified. Cook's distance values from the quantitative phase identifying statistical outliers are also considered in this extreme case selection.

The following section considers whom to approach within these extreme case institutions.

6.3.2 Key informant

As the unit of analysis in this study is at the institutional level, a key informant approach is used to select interview participants. According to Phillips (1981), unlike *respondents* who share information about themselves (e.g., their relationships with management), *informants* share their perceptions about specific organisational concepts and activities. Whilst Homburg, Klarmann, Reimann, and Schilke (2012) consider the risk of a single informant introducing bias and measurement error; in this sequential mixed method design, generalisations are not made from the qualitative findings, they only suggest potential explanation for the quantitative findings. In addition, the use of a single key informant is a common approach in organisational research (Lee, Lee, & Pennings, 2001), particularly when considering less directly observable organisational concepts (Slater, 1995).

Within the selected universities, the Director of Finance and/or, given the quantitative findings, the Pro Vice Chancellors for Research and Enterprise are chosen as the key informant to approach. The participant needs to be part of the institution's senior leadership team in order to have the strategic oversight to act as a key informant.

6.3.3 Policymaker

As research intensity is such a significant finding, the views of Research England are also sought. A senior member of staff heading up the on the Knowledge Exchange Framework (KEF) consultation is therefore included in the sample for interview.

6.3.4 Sample size

As mentioned, in an explanatory sequential design, the qualitative aim is not for generalisability as it was in the quantitative phase, but instead an aim of understanding, thus sample sizes tend to be smaller (Creswell, 2014). As Brinkmann and Kvale (2015, p. 140) contend "simply interview as many subjects as necessary to find out what you need to know", they go on to suggest that 15 interviews +/- 10 is common, largely as a result of balancing time and resources available, with the law of diminishing returns.

This study interviewed 16 participants from 14 universities, this represents 13.7% of the quantitative sample (all publicly-funded, non-specialist universities in England). Eight Pre '92 universities were represented and seven Post '92. The sample also covered the majority

of the extreme cases i.e. the most financially diversified in each group. Towards the end of this set of interviews, no new insight was emerging.

Before describing the data collection and analysis process, it is important to consider how the role of the researcher in this process can be acknowledged. This is discussed in the following section.

6.4 Research notebook

With its greater degree of researcher involvement and subjectivity, qualitative research needs the researcher to acknowledge the assumptions, experience and views they bring to the research, and the influence they may have on the data (Braun & Clarke, 2006). Awareness of this serves to minimise researcher bias and aids confirmability (Lincoln & Guba, 1985). As Creswell suggests “researchers need to be reflexive and disclose what they bring to the narrative” Creswell and Miller (2000, p. 126). In recognition of this, a research notebook was maintained during the qualitative data collection and analysis process, serving a number of purposes.

Firstly, the research notebook was used to maintain a reflexive account of the data collection and analysis process. This is important to qualitative inquiry as the researcher should reflect on how they may be affecting the data (Braun & Clarke, 2013; Saunders et al., 2016). Moving from the descriptive to the analytic shows increasing researcher involvement, it is important to ensure this is captured (Gibbs, 2018). Reflexivity helps to minimise researcher bias and thus contributes to the confirmability of the qualitative findings (Guba, 1990). A brief reflexive account of the qualitative data collection and analysis process is presented in appendix G.

Secondly, the notebook also helped develop an audit trail of the decisions and choices made in the analysis procedure. Development of an audit trail supports the dependability of the findings (Lincoln & Guba, 1985). The concepts of dependability and confirmability are discussed in a later section when evaluating the trustworthiness of the findings in this qualitative phase.

Finally, following Gibbs (2018) recommendation, the research notebook was kept to capture interview context and also to write a brief case summary after each interview. As King and Brooks (2016) suggest, these case summaries should be quite impressionistic, thereby useful

for retaining the individuality of a case, that the rationalistic cross-case analysis could diminish. Rubin and Rubin (2011) also suggest writing down thoughts that occur during the interview process to capture ideas and general observations that may inform later analysis.

Understanding how the process will be reflected upon, the following section describes the interview data collection procedures adopted.

6.5 Data collection and preparation

This section explains the procedure of data collection and preparation for subsequent analysis in the qualitative phase of this explanatory sequential design.

6.5.1 The semi-structured interviews

The primary purpose of the semi-structured interviews in this qualitative phase is to develop a deeper understanding of how and why university resources and capabilities influence levels of income diversification. In order to do this, it is important to evidence that resources and capabilities do indeed have this influence, and therefore the semi-structured interview questions are based on the quantitative results. As mentioned, the interviews also present an opportunity to evaluate some of the theoretical assumptions arising from the literature, thus these questions are grounded in the extant research.

Semi-structured interviews are conducted with reference to an interview protocol or guide which is developed in advance (Bryman, 2016). The following section explains the development of the guide for this study.

6.5.1.1 The interview guide

An interview guide is usually structured around a selection of predetermined questions, with additional questions emerging from the conversation (DiCicco-Bloom & Crabtree, 2006).

As Kvale suggests:

The interview is a conversation that has a structure and a purpose determined by one party – the interviewer. It is a professional interaction, which goes beyond the spontaneous exchange of views as in everyday conversation, and becomes a careful questioning and listening approach with the purpose of obtaining thoroughly tested knowledge. (1983, p. 7).

Developing an interview guide therefore provides a useful frame for the discussion (Brinkmann & Kvale, 2015). The overall aim of an explanatory sequential mixed method design is to use the findings of the qualitative phase to explain the underlying mechanisms in the statistical relationships of the quantitative phase (Creswell & Plano Clark, 2011). Thus, the interview questions are grounded in the questions that arose from reviewing the quantitative results (presented previously in table 6.1). Brinkmann and Kvale (2015) describe this as thematic and dynamic approaches to developing the interview guide, in other words consider the researcher 'thematic' questions (what do you want to know), and then develop the interviewer 'dynamic' questions (what will you actually ask).

Gibbs (2018) contends, what you want to find out about should frame your interview topics. Therefore, during the interview, key results from the quantitative analysis were presented to the participants as the conversation unfolded. As mentioned, the rationale being, in asking how and why a factor may influence income diversification, the participant should be presented with evidence such a relationship existed. Moreover, as Bryman (2016) indicates, visual representations of data during an interview can aid understanding and act as a prompt for discussion.

In formulating the questions, care is taken to also consider the background knowledge and assumptions of the participants (Gibbs, 2018). All participants were asked the same core questions; by focusing on senior leaders in the institution the 'key informant' should be able to speak to the university's strategy whether their role was in finance or research and enterprise. Slight variation in questions reflected whether they were a Pre or Post '92 university (as the quantitative results differed).

The semi-structured nature of the approach gives freedom to explore certain concepts in more depth depending on the path of the conversation. In developing the interview questions, this study considered Berg and Lune (2017) model of: essential questions, extra questions, throwaway questions, and probing questions. However, Rubin and Rubin (2011) take a similar approach, but they make more focused distinctions; main questions (structure the interview to address the research question); follow-up questions (elicit depth) and probing questions (manage the conversation). These models are reflected in the interview questions presented in the guide. A couple of closed questions are included in the guide to channel the discussion toward a key topic. Open-ended questions are then offered to explore particular aspects of that topic in detail (Creswell, 2014).

The interview guide is presented in appendix D. The interview ‘pack’ which included visual summaries of the quantitative results was piloted with two senior leaders at the University of Gloucestershire (home institution). This process gave rise to very few modifications but led to a keen interest in the research from the Vice Chancellor’s Office and a request that the findings be presented to the executive committee.

DiCicco-Bloom and Crabtree (2006) advocate qualitative data analysis being conducted concurrently with collection to harness emerging understanding in shaping the questions being asked. This study has reservations about this approach e.g. the risk of steering conversation to elicit agreement with perspectives to date. Although as the interviews progressed, it became clear that some lines of questioning would benefit from minor modification and thus the interview guide was updated accordingly.

6.5.1.2 Securing the interviews

Using the extreme case purposive sampling technique meant there was a limited pool of universities who could make a meaningful contribution to this phase as it required them to have a high level of income diversification. Prospective participants were sourced through researching the senior leadership team on the target universities’ websites and sending the introductory email presented in appendix C. Recipients were offered the option to view the questions in advance to aid their decision to participate. Whether participants seeing questions in advance is cause for concern should be determined by the researcher and the context of the study (Seidman, 2013). As this research was more concerned with considered opinions than spontaneous responses, it was not considered detrimental should they have advance sight of the questions.

This study was fortunate to receive a high level of interest from the targeted Pro Vice Chancellors and Directors of Finance, securing a higher number of interviews than anticipated. Higher education finance and income diversification has been topic of keen interest to the sector for the duration of this project, but at the time of the interviews, “universities on the brink of bankruptcy” (Vaughn, 2018) type headlines may have been a factor in the high level of engagement received. Moreover, the opportunity for early insight into the quantitative results, appeared to act as an enticement.

With the interview guide developed, a schedule of interviews confirmed, the interviews were conducted, and the process is described in the following section.

6.5.1.3 Conducting the interviews

Interviews were conducted during October, November and December 2018. The interviews lasted between 45 and 60 minutes in duration. All but one, were face to face meetings at the participant's university. One interview was conducted via telephone to accommodate the participant's schedule. According to Bryman (2016) very little difference is usually observed between responses gathered face-to-face and over the telephone. The main difference being the lack of visible non-verbal communication (Kvale, 1983).

As per Creswell et al. (2003) and in line with University of Gloucestershire ethics guidelines noted previously, participants were briefed on the purpose of the research, assured of confidentiality, anonymity and their rights to withdraw. They were presented with a consent form (appendix E) for signature, prior to the interview commencing. However, as a key informant approach was taken, participants were asked that although anonymity was the default, would they consent to being named as a participant by job title and institution. All participants consented to this request and are presented in the section on sample characteristics shortly.

The interviews were audio-recorded using a small digital recorder placed unobtrusively (with their permission) on the desk. The participant for the telephone interview was informed the call was being recorded. As Bryman (2016) suggests, audio-recording not only creates an accurate record but enables the researchers to be more focused on what is being said, alert to inconsistencies, the need to probe etc.

The interview guide was used consistently to steer the conversation structured around the presentation of quantitative findings. The interviewer endeavoured to remain as objective as possible i.e. not indicating approval nor disapproval of any responses, just seeking clarification where needed. As Gibbs (2018) argues, whilst it is important to build rapport, the interviewer should not be seen to be agreeing with the participant's opinions.

There was no noticeable difference in the interviews where participants had prior sight of research questions and those that did not.

6.5.1.4 Challenges in data collection

Although a higher number of interviews than anticipated were secured, for some reason it was harder to obtain interviews with the Post '92 universities thus two of the sample were

not quite as financially diversified as would have liked i.e. the net had to be spread wider to those slightly less extreme cases. That said, Post '92 universities are simply not as financially diversified as their Pre '92 counterparts so the difference between income diversification index scores in the sample interviewed is very small.

As the quantitative results were presented to participants during the interview in the form of printed tables and graphs, there was a tendency for participants to point at things to contextualise what they were saying. This posed some challenges during transcription, so care was taken to interject a comment for the recording, as to what they were pointing at.

The only other issue that surfaced was one university having a different view of how collaborative research income should be categorised (as core research or third-stream). As it was a Russell Group university and a person of some influence, the interview was followed up by some additional analysis to allay any concerns this mismatch may have incorrectly influenced the outcome, the participant was subsequently satisfied the approach was valid.

Finally, the only other minor issue was the broad geographical spread of the universities, but that was a known risk of adopting a face-to-face interview approach.

6.5.2 Preparing interview data for analysis

As Kvale (1983) highlights, a key part of qualitative analysis is based on written text, considerable care is needed in transforming social interactions into the written word; the researcher is changing the media.

The interview data were prepared for analysis by being manually transcribed by this researcher into Microsoft Word documents as soon as possible after the interview. The software 'oTranscribe' was used to slow down speech and provide easy access to pause, rewind etc. Being dedicated software, it also rewound slightly each time paused which made it easier to pick up and continue. Although it took on average one hour to transcribe 10 minutes of audio, the benefit was realised of getting closer to the data and more aware of emergent themes (Bryman, 2016; Gibbs, 2018). As DiCicco-Bloom and Crabtree (2006) note, transcription can present a challenge as participants' spoken word may not always be clear and the researcher is required to make a judgement on what was said. Fortunately, the professional environment and quality of the audio recorder meant there were only a few

instances where a word was not clear, moreover the words in question were not integral to the point being made.

Gibb (2018) suggests that depending in the purpose of the study, certain conversational features need not be transcribed. As this is not a discourse analysis, repetition of words e.g. I mean..., I mean...were excluded as were excessive use of punctuational phrases such as 'you know'.

This made the narrative easier to follow and therefore analyse. Nevertheless, vocal emphasis and laughter were noted, as Bailey argues it is important to appreciate "the way that things have been said as well as what has been said" (2008, p. 127). However, as Brinkmann and Kvale (2015, p. 213) contend, the validity of a transcript is subjective "there is no true, objective transformation from the oral to the written mode".

Transcription is considered a balance between meaningfulness and accuracy (Bailey, 2008). The final outputs were 'cleansed transcripts' meaning it was only the participants words that were transcribed verbatim, the interviewer's questions were paraphrased (Seidman, 2013). The rationale being, the presentation of the quantitative results in contextualising the question, meant that the interviewer spoke for longer than may be considered usual, verbatim repeated context would not add any value to the analysis process. Following Gibbs (2018) recommendation, the final transcripts were read through as the original audio was played beginning to end.

The data collection process has been presented in detail; the narrative moves to describe the subsequent analysis of these data.

6.6 Qualitative analysis and findings

The purpose of this section is to describe the process of thematic analysis undertaken, and to present the key findings that arose from that analysis. The validity and reliability of the findings are subsequently evaluated. Firstly, the characteristics of the sample are described and the *a priori* themes established.

6.6.1 Sample characteristics

The extreme case and key informant purposive sample selection process ensured a reasonably even distribution of perspectives from financially diversified Pre and Post '92

institutions. Some institutions kindly proffered both finance and research leaders; this had the benefit of providing additional insight from two perspectives. In two universities the Pro Vice-Chancellor for Research delegated to senior a member of their team whilst confirming they would be able to speak at the required level. Finally, in two institutions other members of the Vice-Chancellors office focused on university strategy were nominated for interview. Table 6.3 presents the interview participants, note all participants consented to be named as indicated on their interview consent form (appendix E).

Table 6.3: *Interview Participants October to December 2018*

Institution	Established	Participant role
University of Manchester	Pre '92	Deputy Vice-Chancellor
University of Birmingham	Pre '92	Pro Vice-Chancellor (Research & Knowledge Transfer)
University College London	Pre '92	Director of Finance and Business Affairs
King's College	Pre '92	Senior Vice President (Quality, Strategy and Innovation)
King's College	Pre '92	Vice President (Finance)
University of Southampton	Pre '92	Vice-President (Research and Enterprise)
University of Bristol	Pre '92	Head of Research and Enterprise Policy
University of Leicester	Pre '92	Director of Finance
Coventry University	Post '92	Pro Vice-Chancellor (Enterprise and Innovation)
University Hertfordshire	Post '92	Group Finance Director
University of Plymouth	Post '92	Director of Finance
University of Plymouth	Post '92	Deputy Vice-Chancellor Research and Enterprise
Oxford Brookes	Post '92	Pro Vice-Chancellor, Research and Global Partnerships
University of Lincoln	Post '92	Head of Research and Enterprise
University West of England	Post '92	Director of Finance
Research England	Policy maker	Head of Knowledge Exchange Data and Evidence

Having presented the characteristics of the sample, the following section confirms the a priori themes that form part of the thematic analysis of the interview data.

6.6.2 Establishing the *a priori* themes

As noted in chapter four, the template analysis approach to thematic analysis allows for the use of *a priori* themes, these are “themes identified in advance of coding”, often used when there is a particular focus to the inquiry (King & Brooks, 2016, p. 29). These themes may be derived from existing theory, available literature or the interview guide itself (King, 2004). King further suggests:

Main questions from the guide can serve as higher-order codes, with subsidiary questions and probes as lower-order codes. This is most effective where the topic guide is fairly substantial and (in qualitative terms) structured, with the interviewer defining in advance most of the topics to be covered. (2004, p. 259)

The *a priori* themes for this analysis were drawn from the concepts and questions presented in table 6.1 and table 6.2 previously, and used to develop the interview guide. Therefore these *a priori* themes were based on quantitative findings and relevant theory arising from extant research. A case study in Brooks et al. take a similar approach where the results of the first phase of the study were used to inform selection of “pertinent *a priori* themes” (2015, p. 214).

In the template analysis process, *a priori* themes are as prone as any to modification, “should they prove ineffective at characterising the data” (Brooks et al., 2015, p. 218). However in this study they formed thematic categories under which to organise data and then code for sub-themes (Saldaña, 2013) and as such remained unaltered through the process.

Table 6.4 lists the *a priori* themes derived from the interview guide and used for the initial, deductive, ‘top down’ approach to the data (King, 2012).

Table 6.4: *A Priori Themes for Template Analysis with their Source*

Code label	Source
Why the binary divide Pre and Post '92	Quantitative phase
Overall competitive advantage	Quantitative phase
How and why research intensity	Quantitative phase
How and why size of institution	Quantitative phase
How and why STEMM	Quantitative phase
How and why reputational assets	Quantitative phase
How and why staff incentives	Quantitative phase
How and why dedicated staff	Quantitative phase
How and why regional location	Quantitative phase
Non-significant resources query	Quantitative phase
Other factors not considered in quantitative	Quantitative phase
HESA security index contradiction	Quantitative phase
Mindful of the need and are diversifying	Extant research
Drivers for income diversification	Extant research
Outcome means less vulnerable	Extant research

With the *a priori* themes established, the template analysis process is described in the following section.

6.6.3 Conducting template analysis

Template analysis is most commonly used where there are 10-20 interviews with an applied focus (King, 2012), with 16 interviews completed, template analysis remains an appropriate method of data analysis. The seven steps of template analysis as most recently outlined for business and management research in King and Brooks (2016) are followed and the process undertaken is described here. Although presented as linear, the process is iterative, thus notes were made in the research notebook to assist in documenting these steps which develop an audit trail to support the trustworthiness of the qualitative findings (Lincoln & Guba, 1985).

6.6.3.1 Step 1: Familiarisation with the data

As with most forms of qualitative analysis, the initial step was to become familiar with the data set (King & Brooks, 2016). Familiarisation with the data for this study began with

writing case summaries immediately after the interview, followed by manual transcription of the interview audio files. In line with the template approach (King, 2012), a subset of the data, were printed and read through in one session. Points of interest and potential sub-themes for the *a priori* themes were highlighted in preparation for the next step of preliminary coding.

6.6.3.2 Step 2: Preliminary coding

In common with most approaches to thematic analysis, transcripts were systematically analysed with the goal of identifying anything that may contribute to understanding the research questions (King & Brooks, 2016), so began the process of coding (Gibbs, 2018). According to Brooks and King (2014, p. 4) “Coding is the process of identifying themes in accounts and attaching labels (codes) to index them”. As Crabtree and Miller suggest, the important task is to code the transcripts “so that segments about an identified topic (the codes) can be assembled in one place to complete the interpretive process” (1999, p. 166). Adopting the Braun and Clarke (2013) recommendation, the labels created for the codes were able to stand alone i.e. could evoke the data and be understandable outside the context. Codes used were a mix of semantic (intended meaning) and latent (implied meaning) codes, (Braun & Clarke, 2013). Often termed ‘descriptive’ and ‘interpretive’ coding (King, 2012), King goes on to argue against the need for explicit definitions of code types, drawing out and labelling themes is in itself an interpretive act.

These codes reflect themes, and what constitutes a theme is the subject of much debate (Braun & Clarke, 2006). As this study utilises template analysis, the following definition provided by its proponent was adopted, a theme is a “recurrent and distinctive features of participants’ accounts, characterising particular perceptions and/or experiences, which the researcher sees as relevant to the research question” (King & Horrocks, 2010, p. 150). The term theme implies a sense of repetition i.e. it transcends that one case and ideally themes do not overlap (King, 2012). The implications of this are described more fully in the later section on developing the final template. Finally, King and Horrocks (2010) share the contention of Braun and Clarke (2006), that themes are not in the data waiting to be discovered, the researcher has an active role in knowledge production. This is relevant when we consider the *a priori* themes presented in table 6.4 that formed high-level thematic categories to which data could be coded (Saldaña, 2013). It was in the identification of sub-themes where coding became more complex.

As generally recommended in thematic analysis (Braun & Clarke, 2006; King, 2012; Saldaña, 2013), a document containing definitions of the themes was developed and maintained during the coding process. In template analysis this document is often referred to as a 'codebook' (DiCicco-Bloom & Crabtree, 2006). This codebook provides a useful reference during the coding process a) to ensure that data are coded to the correct theme when there may only be subtle differences between them and b) to provide transparency useful in establishing dependability. The final codebook is presented in appendix F.

Note, as previously mentioned, in developing the initial coding template, King (2012) suggests working with a subset of the data when there are ten or more hour-long interviews (e.g. a subset of five or six transcripts). Care was taken to ensure the subset represented a cross-section of the data to avoid a homogeneous selection (Brooks et al., 2015). The transcripts were analysed in the chronological order the interviews took place to capture any subtle evolutions of approach (DiCicco-Bloom & Crabtree, 2006).

Thus, a subset of transcripts was imported into the NVivo software and coded using a blend of deductively-derived *a priori* themes and inductively-derived *in vivo* sub-themes. Working within the thematic categories to drill down and identify sub-themes, focusing on things of relevance to the research interest (King, 2012).

As Brooks and King (2014) advise, once the preliminary coding process no longer produces any distinctly new themes, it was time to start to organise themes and formulate the initial template. This began with the clustering process described in the following section.

6.6.3.3 Step 3: Clustering

Development of the initial template started with clustering the preliminary sub-themes identified under the *a priori* thematic categories. This involved clustering similar ideas together and considering their overarching concept (Braun & Clarke, 2013); the aim being to create meaningful groups within which the hierarchical relationships could be identified (King, 2012; Saldaña, 2013).

In this step, similarly coded data in each of the thematic categories were grouped together because reasoning and intuition suggested they 'look alike' and 'feel alike' (Lincoln & Guba, 1985, p. 347). For example, several of the codes exploring why there is an apparent binary

divide between Pre and Post '92 universities, were clearly related to the intensity of their research and so they were clustered accordingly under a new research intensity sub-theme.

The use of *a priori* themes as thematic categories created somewhat of a head start in this process as the data were already clustered at a top-level. It soon became apparent that further clustering would be difficult whilst still working with the smaller subset of the data i.e. more perspectives were needed to identify more themes that would then enable further grouping. Therefore, the next step was to produce the initial template as described below.

6.6.3.4 Step 4: Producing an initial template

Having analysed a subset of the data, the initial template was produced; it reflected 16 top-level thematic categories and 89 codes in total. As Saunders et al. contend there are no right or wrong numbers of codes “The number of codes you create will be related to the meanings you wish to explore in your data set, the nature of your research approach and the focus of your research question” (2016, p. 584).

For clarity, a numbering format to indicate the hierarchical structure is adopted (King, 2012). The codes in the NVivo software were exported to Microsoft Excel where they could more easily be numbered and formatted to APA for presentation. At this stage the labels for the codes reflected shorthand for emerging thinking. The themes were not arranged with thought to the volume of sources or references they contained – it was considered too early in the analysis to be potentially influenced by this initial picture (King & Brooks, 2016). The next step was to apply the initial template to more of the data to iteratively develop the final version, that process is described below.

6.6.3.5 Step 5: Applying and developing the template

As King outlines “Once the initial template is constructed, the researcher must work systematically through the full set of transcripts...in the course of this, inadequacies in the initial template will be revealed, requiring changes of various kinds” (2012, pp. 436-438). Thus, further transcripts were analysed in the chronological order of the interviews although the cross-section approach was still maintained e.g. Pre and Post '92, finance, research etc. During this coding and recoding process the aim was for the codes and their groupings to become more honed (Saldaña, 2013).

Improving on the initial template involved an iterative process of adding codes, removing redundant codes, merging codes and moving codes between levels (King, 2012). As King goes on to explain, the ‘promotion’ of a code to a higher level is not necessarily a reflection of importance, but a reflection of breadth and scope of the theme. Clustering codes by conceptual sub-themes became easier when there were more data to work with. Working with a smaller data set is less overwhelming, but clusters of themes or patterns are easier to see when there are more themes to look at; this is a potential limitation of the subset approach.

The use of *a priori* themes to form high-level thematic categories that reflected the quantitative results to be explored phase meant that the main structure of the template was largely unchanged between the initial and final templates. Changes in this development step were limited mostly to the sub-theme level and were concerned with creating clarity in the hierarchy of the concepts reflected by the sub-themes. Therefore, the final template was more hierarchical in its presentation than the initial.

It is important to ensure the template only focuses on the aims of the qualitative inquiry (Crabtree & Miller, 1999). The interviews had produced some very interesting insights into the sector, but not necessarily relevant to the focal questions (codes had been created in the preliminary coding step which then required removal).

Other minor changes included labels for the themes being given fuller descriptions. In the final template, the total number of codes only increased from 89 to 90, however with some codes being merged or removed and some new added, the net total masks the changes that were made.

As mentioned, it is ideal that themes do not overlap, although King and Brooks (2016) suggest that ‘parallel’ coding is acceptable, but they caution to check that if data can be coded to more than one theme, consider that those themes may benefit from being merged. With a few exceptions, generally data were not coded to more than one theme in this analysis. There are a couple of similarly labelled themes in the final template for this study, but as the contexts are different, the same data are not coded to both. The codebook in appendix F provides definitions for themes to aid consistency of interpretation.

The codebook also presents the volume of sources (interviews) and references (pieces of narrative) for each theme. Participants were encouraged to speak about areas they were particularly interested in or were most relevant to them, therefore a high volume of

references reflected not only the breadth of the theme (King, 2012) but also potentially the importance to the sector.

In the final template, within each thematic category, the sub-themes in the hierarchy are presented in order of volume of references. Generally, any themes that had a single source (interview) and only a single reference were removed as it could not be said to transcend beyond the single case nor be important to the participant (King, 2012). Although as Saunders et al. contend, there can be exceptions where “an idea that assumes general importance to your research question and is therefore elevated to become a theme” (2016, p. 584). In this study there was one such exception where the perspective was particularly insightful (reference to the value of the research). A theme with two sources (interviews) clearly did transcend the single case and would naturally have more than one reference. The sub-themes are nested by volume of references within the *a priori* thematic categories, however the thematic categories themselves are presented in order of the quantitative statistical significance in the previous phase, followed by the theoretical assumptions being evaluated.

As noted earlier, King (2012) emphasises, it is important to not become obsessed with the template, it is just a tool to help tell the story of your data. With 15 top-level themes and 90 themes coded in total, the final template used to code the complete data set is presented in the summary of the qualitative findings section that follows the final step six.

The final step in the template analysis process develops and presents an interpretation of the coded data (King & Brooks, 2016). In other words, the findings of the qualitative phase.

6.6.4 Step 6: Final interpretation (presentation of findings)

A narrative approach organised around the high-level *a priori* thematic categories is adopted to present these findings. Working within the sub-themes, this section will present “an account structured around the main themes identified, drawing illustrative examples from each transcript as required” (King, 2012, p. 446). To aid clarity, quotations are edited to remove false starts in participants verbal responses (Corden & Sainsbury, 2006, as cited in Bryman, 2016).

The roles and institutions interviewed have been presented in table 6.3 previously. Whilst all participants agreed to this summary being shared, some were uncomfortable with quotes

being attributed to their individual institutions. It was thus agreed that participant quotations would be referenced at a high-level e.g. whether it was a Pre or a Post '92 university (Pre, Post), and whether the speaker was from a finance, strategy, or research and enterprise role (FD, ST, RE). Where there was only one university interviewed in a city, any references to location were redacted. Finally, as there was only one policymaker interviewed, their transcript contributed to the thematic analysis, but has not been quoted in this narrative. Following Gibbs (2018) recommendation, data were not anonymised until right at the end of analysis as retaining the context was important to the interpretation.

A data matrix for each thematic category was created in NVivo as a reference tool to aid interpretation. The matrix organises participant responses by row and themes by column and provides an excellent overview of the data (Nadin & Cassell, 2004). As King (2012) argues, it is not necessary to provide a narrative on every single theme that arose, or each theme in equal depth, therefore emphasis was placed on those themes where participants were particularly engaged that made the most contribution to the objectives of this qualitative phase.

This presentation of findings is organised around the *a priori* themes previously presented in table 6.4 that in turn were grounded in the quantitative phase and extant research. The findings explore how and why university resources and capabilities may influence levels of income diversification and evaluate some of the theoretical assumptions on which this study is predicated.

The word clouds in figures 6.1 and 6.2 provide a visual representation of the most frequently cited words in two of the most heavily coded themes.

6.6.4.1 Why is there a binary divide between Pre and Post '92 institutions' level of income diversification?

The two dominant themes arising from the interviews were the greater Pre '92 focus on research and conversely, the Pre '92 focus on teaching. As Post1FD reflected “the key to it is, research intensity is not as great in the Post '92s. Going back to their history, I mean many of them will not have done any research I guess 25 years ago”. A research focus was seen to create an advantage to income diversification in a number of ways. Firstly, research drives income which counter-balances teaching income. Talking about the Pre '92 dominant position in income diversification index scores, Post5RE commented “if you are a Pre '92 your research intensity is usually significantly higher, therefore you're immediately going to have much more significant levels of research income, so that starts to balance you out”. Moreover, research-related activity feeds a number of different income categories thus producing a more balanced portfolio of income overall. As Pre2RE explained:

Obviously, the research-intensive nature of our universities gives us that opportunity, and that spills over and you know, it's not just the research income side of things, it spills over into business engagement, CPD and a whole range of other things.

The longer-standing Pre '92 history of research was seen to build their reputation for it, which in turn has an influence on an institution's ability to diversify income. Pre5RE reflected:

There is something about having a long-standing, established reputation for research that drives your ability to diversify and generate income from other sources. Particularly if you are looking at resources like third-stream industry funding, philanthropy etc. rather than the more traditional sources.

Therefore, it was viewed that a reputation for and history of, research has a halo effect on other areas of income generating activity. It was felt Post '92s just did not have this research history and research reputation to draw upon.

Noted with similar frequency, the inverse of the Pre '92 focus on research is the Post '92 focus on teaching. With tuition fees making up such a large proportion of Post '92 income, it would need something substantial to create any sort of balance and increase their diversification index score. As Post4RE reasoned:

It must be something to do with the huge amount that is just teaching, that dominates everything. So therefore, because that's dominating everything, you haven't got much chance for anything else to affect the score...I'd imagine, if you've got 75% all in one category, you've only got 25% to share amongst other things, even if they were doing a balance of other things, you've only got a 25% bit to affect your score...if you've got

most of your thing in one, it must just be you haven't got much other to spread. So, I'd imagine that is why there is very little difference in score.

Ergo, with such large proportions of Post '92 income coming from teaching, it would take something very significant to balance the portfolio. As Post1FD put it "because they are mostly teaching institutions, they've got a lot less research...so that takes a big chunk away from your diversity". As Post3FD contended "there are only so many places that Post '92s can go to seek new income streams that will actually make any significant difference to their total income".

Therefore, the major themes in the discussion centred around Post '92 universities having limited opportunity to generate additional income with which to diversify their portfolio. A lack of research was cited as the main cause of this constraint. Pre3FD commented:

By and large they have very little third-stream activity, because your typical third-stream activity, is leveraged more off research activity, than it is leveraged off teaching. That's not entirely true, but a fair amount of it is - if it's consultancy, if it's CPD, if it's commercialising intellectual property, it tends to be leveraged off your research endeavour.

Recognising this, the Post '92 universities interviewed were actively building up their research capability (evidenced not least by the fact they were the most financially diversified Post '92s), however it was proposed the Post '92s still struggle to bridge the divide due to the time it takes for the benefits of research to be realised and thus diversify their income portfolio. As Post5RE pondered:

I think maybe there's something around still that time lag of how that's starting to then manifest itself. I wonder how much lag there is between having a large research portfolio over a significant portion of time, it needs that time to flow through to REFable activities. One of the most challenging aspects of the REF return is around the impact case studies. That's a factor of our time existing as an institution, so I just wonder if there is something around that lag in there [the divide].

This suggests Post '92s suffer from being relative newcomers to this research space. In addition, their focus on teaching creates capacity issues, staff simply do not have the time to look at other ways to generate income. As Pre4RE remarked "if your people are spending 75% of their time teaching, they just don't have the bandwidth to do it [enterprise]".

The broader history and reputation of Pre '92s was also cited to explain the apparent binary divide in level of income diversification "those institutions by the nature of their age and history, tend to have those assets that they can make money from" (Post5RE). Particularly when it comes to philanthropic income as Pre2RE considered:

I think being an older university, we were founded in the 1900s as one of the original civic universities. That has significance I guess in terms of philanthropic income and so on, and you know – a more historical basis for diversifying income.

It was felt that overall, the Pre '92 institutions with their history and reputations, simply had more opportunities to diversify because of who they were. Comparing Pre and Post '92 universities, Pre1ST commented “for instance we will have access to the billion in a year that comes out of Wellcome that these people absolutely won't have any access to”. Pre '92 institutions were also viewed to have a more “global presence” as Pre2RE termed it. Being in the top 100 of the world international ranking gives you broader opportunities to generate income from overseas.

The presence of the binary divide was acknowledged and accepted by all participants. It stimulated debate on the potential implications of this inequality in ability of an institution to diversify its income. A recurring theme in the conversations was the fact that the situation appears hard to alter. Pre5RE considered the dilemma:

A research-intensive institution could focus its strategy more directly towards teaching. Parts of such institutions will have a very strong strategic focus on teaching, particularly those areas that deliver income generating PGT [postgraduate taught] programmes for example. But for an institution that is teaching focused to turn that around, to generate a long-standing, established reputation for research, is much more difficult. It becomes quite circular - what would it take to enter that space?

This challenge was also noted by participants from Post '92 universities. Post6FD observed “one of the key areas [of difference] is really the research base; we will not be able to emulate that because that takes tens if not hundreds of years to get to where they got to”. As a Post '92 university actively trying to diversify its income through substantial investment in their research capability, Post2RE reflected on the value of this particular piece of research “so if you'd known this implication, if this university had known this implication 5 years ago, we might have invested £25m in research [earlier]”.

Participants commented that this hard to alter situation has serious implications for the sector. As Pre2RE contended:

This week's Times Higher Ed was talking about some universities actually going bankrupt, really on the edge and I am sure that these are the ones on the bottom of your list. So, it has big implications for the sector, for sure.

There was a view that the strong are able to get stronger as a result of their ability to diversify their income. Some reflecting that it is somewhat self-perpetuating, as Pre2RE reasoned:

It's cyclical in the sense that if you have that diversification, you're guarding more against risk, but actually it allows you to do some bolder things because you've got resilience in the system to do that. Which then self-propagates the situation.

There was also a sense of frustration about this hard to alter situation. As Post5RE observed:

There is a sense for me that the Pre '92s have pretty much done all they can to pull up the ladder behind them. So, in a way it doesn't surprise me that there aren't more people able to break through into that piece, so it's a bit of a club that is hard to break into.

In summary, these themes suggest the binary divide is due to Pre '92 universities having a greater focus on research and a history and reputation for having done so. This generates more research-related income which balances the income from teaching, leading to the achievement of a more diversified income portfolio than the teaching-focused Post '92 institutions; which appear to have less opportunity and capacity to generate income from other sources.

6.6.4.2 How and why does a university's resources give it a competitive advantage diversifying its income?

The most frequently cited theme was that an institution with a high-level of resource and capability meant it had the capacity to take a risk. As Pre5RE explained:

We have sufficient capacity as an institution (capacity in its broadest sense - people, money, and so on) to continue our business as usual at a high level, but also to invest in something new which may or may not be successful. Essentially, we have the capacity and resilience to take a risk, and taking a risk confers a competitive advantage because we are able to explore that opportunity in the way that a smaller institution might not.

This likely reinforces the binary divide in ability to diversify income, i.e. it is the Pre '92s that have the capacity to take a risk and therefore be more flexible in exploring different directions. Pre2RE remarks "because of our resources and capabilities we have more flexibility to take a short-term hit for a long-term gain".

Competitive advantage was also framed in terms of resilience and financial sustainability to "weather the storm" or the "rollercoaster" as Post3FD put it. Pre1ST commented "the sector changes but we are remarkably cushioned from it and we remain more cushioned from it than people who have less levers to pull, we can adapt".

In summary, these themes suggest that the resources and capabilities of a university has an influence on income diversification by creating the capacity to take a risk and generally being more resilient.

6.6.4.3 How and why does research intensity influence level of income diversification?

The most salient theme was again one of balance; as discussed previously, when considering an institution's income portfolio, research income can contribute to several different income categories and therefore has a more balancing effect. As Post2RE remarked "it obviously hits both the third-stream pot and the research pot as well", indeed noted by some, it also hits the core funding 'pot' in terms of QR funding. Interestingly Pre7ST championed that research also hits the tuition income category:

Although people argue about the extent to which research quality contributes to teaching quality, I can think of no country in the world, where students have got a choice of where to go, that they don't follow a hierarchy that approximates to the research intensity.

This interconnectedness of research with the wider business became quite an integral theme in this analysis, reinforced here by Pre5RE:

This [tuition fee income pot] is largely driven by your reputation and your reputation is largely driven by research...reputation is not about NSS scores when you are an international student. International student recruitment is predicated on your reputation, and your reputation is underpinned by your research - it's an argument that we keep coming back to...institutions have to remember this as decisions we make today about research will have long-term implications for our reputation.

Simply put, income related to research is seen to touch many aspects of an institution's various income streams which is how it contributes to higher Hirschman-Herfindahl income diversification index scores.

Participants also viewed research related third-stream income as capable of having a greater balancing effect than teaching related third-stream could be capable of. As Pre3FD observed:

There may be some education-like activities which are more commercial in focus, but they are not on the scale, or of the nature of some of the things you can do with the benefit of a rich research environment.

This suggests research is capable of generating much higher volumes of commercial third-stream income than teaching is, and therefore has more influence on an institution's Hirschman-Herfindahl income diversification index score.

Another key theme was around ‘opportunity’, it was felt that research naturally created opportunities to generate income; Pre6FD going as far as to say, “it is the thing that opens the doors to everything really”. Research gives you valuable expertise, and as Post4RE succinctly put it “research creates knowledge that people will pay for”, be that in the form of IP or consulting expertise etc. One of the more creative examples was income being generated by providing expert witnesses to legal proceedings (Pre3FD). Although it may simply be leveraging research-based facilities and equipment, as Pre4RE exemplified:

We’ve got facilities, large equipment facilities which we hire out. They were purchased and established to do research, but they seamlessly morph into what you need to do to provide applied research, contract testing capabilities etc.

Thus, research gives an institution something to leverage (and create those opportunities that generate income that balance the income portfolio).

There were a few cautionary themes however, largely around the fact that research itself is generally loss-making (discussed in more detail later). Post3RE contended:

But to have a clear decision to invest in research, particularly now, where we read the whole time that research costs us money and you've got to cross-subsidise it. It would be really quite brave for any institution, unless they have a clear mandate or they have some sort of war chest, that they dig up and they find that that's the way forward.

There is also the time lag as already mentioned, Post2RE lamented “it takes 5-6 years to improve between REFs”.

Finally, the question of why research intensity leads to a more diversified income portfolio led to a theme of interconnectedness. As Post1FD commented “appreciating that if you are more research intensive, you are more attractive to everything, everything goes up, everything gets better if your research is good”. In reflecting on the broader implications of a focus on research, Pre2RE stated:

It's a global reputation builder as well, if we're honest the things that internationally make a difference are the research intensity and the prowess of the university as opposed to how good we are at teaching. And therefore, that unlocks certain sources of international funding. We very conscious of the link for example between, the new degree apprenticeship which have been introduced and continuing professional development, and research. So research builds those relationships with businesses for example, which then drive opportunities for teaching income, different sources of continuing professional development etc.

This connection between research and reputation was also a recurrent theme; Post3RE noticed this broader connectivity around research and the need to take into account the relationship between research, reputation and the wider business:

If it [research activity] is generating papers which go into REF which are 4*, or impact cases which are 4*, or it's generating reputation which then means you attract grants, or you recruit particularly strong members of staff or even you recruit new undergraduates off the basis of that [then you see that wider impact].

This was viewed as particularly important in the context of international student fees. As Pre1FD confirmed “The main source of revenue and margin is international student fees, it absolutely tracks that international students are prepared to pay that higher fee to come to an institution that’s got that reputation”.

In summary, these themes suggest a focus on research has an influence on income diversification through its ability to create income generating opportunities and its influence on other income streams, both of which help to balance the income portfolio and thus improve Hirschman-Herfindahl income diversification index scores.

6.6.4.4 How and why does the size of a Pre '92 institution influence its level of income diversification?

The most frequently cited theme was that of the disciplinary breadth afforded by being a larger institution. As Pre2RE observed:

Having a certain scale naturally brings diversity. In terms of our disciplinary breadth, we are, well the last REF exercise we entered I think the fourth highest number of units of assessment for the country. We describe ourselves as broad and we are. So, I think having that disciplinary breadth brings opportunities.

Moreover, the view was that if an institution has a broader offering, it has more staff and if you have more staff there is an inherent diversity of income. As Pre7ST reasoned “you can have the wide range of capabilities that are needed to do interdisciplinary research that is wanted nowadays”, reflecting that it is “too riskier a business” to be dependent on a narrow base.

It was also viewed that size brings capacity to generate additional income. Commenting on the size of an institution in this context, Pre4RE illustrated:

It is the additional capacity that brings - actually putting someone to manage the relationship. This is one of our keys for working with SMEs which are difficult, we can put a professional engineer or work with them to give them results in a commercial time frame to commercial quality. They can draw in...someone like me to act as a consultant in the project, I can put an hour or two on it, but the engineer is managing the relationship. We can afford to have people like that and the upfront investment of getting them up to speed. It is also why our strong enterprise activities tend to accrete around strong research.... In larger places, if it is about access to equipment...you don't have the big wind tunnel or the big clean room or the microscopy, unless you've

got quite a lot of users who bring in the research income. When you are doing it right, it is quite a virtuous circle, which means you get bigger as well.

In summary, these themes suggest that for Pre '92 universities, size has an influence on income diversification by bringing a disciplinary breadth which can be leveraged and a capacity to maximise income generating opportunities.

6.6.4.5 How and why does a STEMM orientation in Pre '92 institutions influence level of income diversification?

Several different themes were identified, the most common one being that it was easier to engage commercially on these disciplines. As Post5RE contended: “I also know that has led to a significant rise in our knowledge exchange activity because we find it easier to engage with industry first around the science agenda”. It was felt that more substantial opportunities were available, Pre4RE commented that:

STEMM has a disproportionate ability to provide commercial competitive advantage. Quite a lot of our enterprise is with the NHS, they are willing to pay money. In the social sciences and humanities, you may get philanthropic donations and you may get, people want help for policy things, but they rarely pay much money to get it. It is a clear route to competitive advantage, particularly commercial interests and for us, the NHS is quite big in this.

Building on this, the STEMM disciplines were also felt to be particularly strong at attracting funding. As Post3FD noted “if I think about where our biggest awards come, they come in science and medicine”.

The STEMM disciplines were seen to attract international students which helps to diversify the tuition fee income category and reduce dependence on home/EU students. Several universities commented on their investment in engineering; as Pre1FD observed “when you look at the profile for demand from international students, it is pretty much every single engineering discipline is in strong demand from international students”.

Interesting to note that the available literature appears to view that STEMM supports income diversification because it creates more opportunities for patents, licences and spin-offs than other disciplines, however this concept only emerged organically once in the interviews, Pre3FD reflected “I think STEMM is where the marketable intellectual property is, so there is no doubt if you look at where we’ve made money out of licencing, inventions and spinning out companies, it’s all been in STEMM”. Although when prompted on this concept, Pre5RE contended:

But we still develop impact and commercialise research through our arts and humanities or our social sciences. It's not quite the same as the next generation of some engineering technology, or the next vaccine for something, but that's never going to be your predominant source of income as an institution because that's the magic thing over there, that happens once in a blue moon. No institution can depend on that as their strategy because it's so unreliable.

This may be an additional reason why the bivariate relationship between STEMM and Hirschman-Herfindahl income diversification index scores did not endure in the multivariate context.

In summary, these themes suggest a STEMM orientation in Pre '92 institutions influence income diversification through being easier to engage with on a commercial basis and its tendency to attract funding.

6.6.4.6 How and why do reputational assets influence level of income diversification in Pre '92 institutions?

The role of an institution's reputation in creating international opportunities and providing a historical basis for diversifying has already been discussed in the context of explaining the binary divide. As has the influence of research on reputation and thus on undergraduate choices. This concept was extended by Pre1FD to other areas "it opens up postgraduate markets as well, in particular executive education, particularly around business schools...they know what they are buying, they're buying the brand that will hopefully stick with them through life". As mentioned previously, reputation is particularly important in international student recruitment, as Post2RE reiterated "reputation is important to us of course, because it matters for the kind of students we get, especially internationally".

In summary, these themes suggest the influence of reputational assets in Pre '92 institutions on income diversification is a pervasive and interconnected one. It is potentially this pervasiveness which is responsible for the low statistical correlations.

6.6.4.7 How and why does the level of staff incentives for business engagement influence levels of income diversification in Pre '92 institutions?

The dominant theme was simply that incentives were needed to engage and motivate academics to seek commercial income generating opportunities. As Pre2RE reflected:

For many academic staff, it's not what they came in to, it's not what they became an academic for. There are a few who do, and I think in the new generation of academics

that we're recruiting, that there are some that area very clearly [appeals], already that is their main goal in life. We've a new member of academic staff we recruited last year and it's her first academic job and she's already getting £1m of investment in some spin-out operation. So, I think there is a generational thing, but I think if you take the vast group of people who are mid-career, they didn't necessarily think that is what they were going to do.

Participants shared that most incentives were financial in nature, largely reflecting a revenue-share approach. However, for two universities there were formal career development and promotion structures around enterprise. As Pre4RE exemplified:

For [us], I think one of the biggest ones is, in our academic job family, so education, research and enterprise, enterprise is there, and we have career pathways [for each]. So, you can be a classic balanced academic doing education, research and possibly enterprise, but you can also be education-led, research-led or enterprise-led. We have a couple of hundred people who are on the enterprise pathway out of 2,500 ERE [Education, Research, Enterprise] staff in the university. So, it's 10% or something like that, whose job it is, or the primary part of their job, they might do a bit of teaching, they might do a bit of research, but they're here to do enterprise. In appraisals that is recognised, in promotion that's recognised, and you can go all the way up to professorial equivalents, so Professorial Fellow: Enterprise is equal status, respect, pay to a professor or a Professorial Fellow: Education. And I think that is a really powerful thing, so I think in that sense, we're not doing anything to hold carrots, other than actually you can have a viable career [here] going all the way in enterprise. I've been told by UCEA we've got one of the more progressive employment policies.

This suggests a more intrinsic motivation can be achieved that has an influence on a university's ability to diversify income. Interestingly the two institutions with formal career structures around knowledge transfer and enterprise have some of the highest Hirschman-Herfindahl income diversification index scores.

In summary, these themes suggest staff incentives for business engagement in Pre '92 institutions influence income diversification through motivating academics to seek out the income-generating opportunities (either extrinsically or intrinsically).

6.6.4.8 How and why does having staff dedicated to business engagement influence level of income diversification in Post '92 universities?

The most frequently cited theme was that it means there are dedicated specialists with the right skills. Post2RE explained “we have specialist staff who will be more effective...we have absolutely reorganised ourselves now into; product, sales, ops, commercial management – we look like a business and we are”. Participants recognised the skills needed for business engagement were different and thus dedicated resource was more appropriate. Post6FD contended:

Unless you get the right staff with the entrepreneurship, even for degree apprenticeships for example, you can't expect a good academic, a senior academic all of a sudden to be able to go out and meet the management of a company to sell a programme, to become a salesman. It's about recruiting the right people to do the right thing.

It was also felt to be time-consuming and demanding and consequently unrealistic to expect an academic to have the time, Post6FD continued "the day job is demanding and when we pull in things like degree apprenticeships, bidding for the police contract etc., that is quite intensive, you really need to have separate strands in recruiting".

In summary, these themes suggest the proportion of staff dedicated to business engagement in Post '92 institutions influence income diversification through providing specialists with the capacity to maximise opportunities.

6.6.4.9 How and why does a university's regional location influence its level of income diversification in Post '92 universities?

The dominant theme identified in the various institutions' perspectives on the influence of location was that of 'attraction'. This manifested itself in a number of ways, firstly attractiveness to staff and students, particularly the London-based institutions. As Pre3FD remarked:

Also, being in London is helpful in terms of attracting talent, because despite how blinking expensive it is to live in London, it is a draw. Particularly for international academic talent who want to come and work in London, I think it is just the constellation of universities, hospitals, partners ...if you are a clinician academic for example.

These high calibre staff may be more capable of stimulating income generating opportunities. When considering diversification *within* sources of income, an attractive location was seen to create an advantage in attracting international students. Talking about the benefits of London Pre1FD observed "we've seen no drop in international students, we've seen no drop in applications from EU students, where most others have".

One of the more interesting examples of a location's influence on income diversification was [city redacted] attractiveness to international students for summer schools, particularly English language schools. As Post4RE commented:

We are in [attractive city] which is where summer schools want to be... so the minute the students go until when they come back in October, those [student] halls are 100% booked out to private summer schools...and the fact that those summer schools then rent teaching space as well contributes hugely.

A number of institutions cited particular quirks of their location that they felt supported their income diversification efforts. In the case of [university name redacted] a negative quirk had created the positive summer school benefit. Post4RE explained “this is the only city that imposes a limit on the numbers of students that can go into private houses, of 3,000...therefore we’ve had to invest in halls, therefore we’ve had halls available in the summer to use to make money”.

Secondly, a region’s ability to attract research funding was also cited as contributing to income diversification, as Post3RE pointed out talking about the university’s location as being “somewhere where ERDF funding is attracted...which by its very nature, the things you do, you have to do in collaboration with SMEs”. Which means it feeds the third-stream income pot and thus helps to balance the portfolio. Particular examples which could be deemed a quirk of location or certainly leveraging location, ranged from research to support healthcare in very rural communities to a very topical challenge, Post3RE explains:

We have moved into, in a strong position, around agri-tech and that came from the ERDF funding and we are involved in developing robots to harvest vegetables, cauliflowers and soft fruit. One of the reasons why is because when we're no longer in the EU, having the labour force to do those sorts of things is going to be tricky. And therefore, we're using ERDF funding to perhaps back-fill some of those losses. It's built quite an agri-tech community, but all of that has to be done with SMEs.

In contrast, the opportunities afforded by a big city were also frequently cited. As Pre3FD reasoned:

Having a London location as well is pretty important, to be honest, because we have privileged access to not just national, but international opportunities for developing that [research economy] for example, which undoubtedly, we have some benefit from being in the centre of London compared to other parts of the country.

The proximity to a density of hospitals was also referred to in the context of the locational advantages of London. Pre1ST explains “60-70% of the university is actually based in NHS hospitals, that provides you with a degree of flexibility...we can move between NHS property and ourselves, therefore the total resource is larger”. It is worth noting that not all the highly financially diversified institutions are in London, however after Oxford University, the top three (Imperial, King’s and UCL) are. To balance, Pre2RE commented “I think our location in a big city in the Midlands is a major factor [in ability to diversify income]”.

In summary, these themes suggest the location of both Pre and Post ’92 universities have an influence on their ability to diversify income, be that due to attractiveness, proximity or

simply big city opportunity. It was also noted that the measure adopted in the study may not be appropriate in this context.

6.6.4.10 Are any of the non-significant factors surprising to institutions in terms of not having a significant influence on level of income diversification?

The only factor to raise a significant degree of challenge from both groups of universities was the non-significance of entrepreneurial outlook. This was perceived as an inherently difficult thing to measure statistically and the established measures from the available research were not found to be relevant to the participants. As Post2RE remarked:

I guess I wouldn't necessarily measure it like that, I think entrepreneurial, so opening up a college in, or a university in [a small coastal town], wouldn't be measured by any of that, but it is entrepreneurial. Setting up the advanced manufacturing and engineering centre in a factory is entrepreneurial and wouldn't be measured by any of that. So, we have a thing here called the [university name] way, which is sort of undefined, it's a not written down way of doing stuff. We all know what it means for us and one way of describing that would be entrepreneurial. Open to have new ideas, to be challenging, try things out, prepared to say no, prepared to go with things. So, when things come to our leadership team, the worst thing somebody can do, it is catastrophic for them to say, 'we should be doing this because all the other universities are doing it', it just gets no further than that sentence. Go away and come back with something that no one else is doing, that's what we want to do. I think those feel like entrepreneurial style behaviours. Spin-outs and licencing and patents are directly related to research. So, it is a measure, but it is a measure that would need to be offset for QR funding, I guess.

As the interviews progressed it became clear counting the number of patents, licences and spin-offs was not an appropriate measure – particularly as these activities were seldom mentioned. A few participants remarked on STEMM not having an enduring statistical significance, this has already been covered previously.

In summary, with one exception, participants did not seem to challenge the factors found to be non-significant. The queries around entrepreneurial outlook did flag it was potentially not an appropriate measure in this context.

6.6.4.11 What other factors should the quantitative phase have considered in relation to influencing levels of income diversification achieved?

The predominant themes were around more subjective factors such as leadership, vision and culture. It was appreciated by participants that these would have been hard to measure

objectively at scale. Moreover, the view was that the factors that were analysed and had been presented were the key influencers in ability to diversify.

There was however a resource factor that analysis of the interviews surfaced as important that had not been considered in the quantitative phase. And that was the role of a university's estate, housing, facilities etc. in generating additional income. This had not been identified in the available research on income diversification and hence was not included in the quantitative phase. Both Pre and Post '92 universities gave numerous examples of how they were generating diversified income through leveraging their more tangible assets which suggests it has an influence on balancing their portfolio, but this has not been quantitatively tested and so less generalisable than the other factors.

6.6.4.12 Why is there be an apparent contradiction between the HESA financial security index and this study's income diversification index?

Previous questioning in the interviews had established that Pre '92 participants perceived their institutions to be less vulnerable than those not as financially diversified. Thus, the opportunity to explore the apparent contradiction between the HESA security index and this study's income diversification index was taken advantage of in the interviews with directors of finance. The prevailing view was that as the HESA security index was focused on borrowing and surpluses, the Pre '92s with their higher research overheads, lower surpluses, lower liquidity and the confidence to take advantage of borrowing would not fare as well on these types of measures but are nonetheless financially secure.

The Post '92 teaching intensive universities were viewed as having higher margins and lower overheads than the research-intensive Pre '92s. There appeared to be a consensus among the Pre '92 institutions that the Post '92s have benefited from the introduction of the £9,000 tuition fee level. Pre6FD contended, "lots of these [Post '92] universities have done very well out of the fee at £9,250, very well". This was attributed largely to their lower overheads. Pre3FD reasoned:

In the era of fees, certainly up until recently, there has been a divergence ...and the Post '92s have outperformed the Pre '92s in terms of surplus and liquidity. The reason they have is because actually their relative teaching intensity has served them well in a market where the demand is strong. Because if you think about it, Post '92 universities tend not to be science heavy, so the balance of their activity tends to be in the lower cost subject areas such as social sciences, business, computing, things like that. It's not medicine and physical sciences, but of course they are generating a £9,000 fee for every student, and the average cost of a social science undergraduate degree is

quite a bit less than £9,000. So, if your focus is just teaching and you don't have the drag of loss-making research on your activity, and you're predominantly teaching in the lower-cost subject areas, actually the economy is going to work quite well for you, and that is what we are seeing.

It is worth noting these were very much the perspectives of Pre '92 institutions i.e. that Post '92s may or may not be in agreement. Although it was viewed that this position will not last; the risk around demand was frequently cited, as Pre3FD went on to say "what we're starting to see now however, that's fine - but when student demand softens, then actually you are very quickly in an exposed position". Moreover, speaking about a university in the same city but less financially diversified, Pre6FD commented "they do a great job, but they are very vulnerable to what the Augar review finds for fees".

The Post '92 view of their position at the top of the HESA security index was mixed. As Post2RE pointed out "it perhaps doesn't show the whole picture i.e. the risks or the ability to respond to change". It was also suggested that Post '92s being in a more vulnerable position, were more likely to retain their surpluses and be reluctant to (or unable to) borrow which improved their security index score. Post3FD remarked:

Whereas we're probably being a bit more risk averse in terms of the decisions that we're making around borrowing and how low we're prepared to let our surpluses go. Certainly, we're sticking very hard to the line that we have to generate a surplus at any cost...well, almost any cost. I don't think the Russell Group feel that need to the same extent...they can rely on their long-term reputation to seek income from other sources.

Indeed, several Pre '92s confirmed a strategy to spend what they earn, sometimes more than they earn. As Pre1ST remarks "the [poor score on the] security index is reflecting the fact that we have relatively high borrowing and no surplus, but that is what we intend". Reassuringly, several participants viewed the study's income diversification index as a truer reflection of reality, for example Pre1ST went on to say:

We have a very strong credit rating because the credit rating agencies look at the data the way that you have done. So, we're generally A, then plus or minus depending on the UK government's credit rating rather than ours. So we are, compared with most businesses, we are a remarkably secure financial proposition, which is exactly what your data suggests.

This was echoed by Pre4RE in this comment "I do believe that the diversity of our income streams is a strength...when we received a bond rating from Moody's in 2017, they noted this diversity as a strength which was relevant to our receiving a strong rating".

In summary, participant responses in the qualitative phase would suggest that there are several reasons why Post '92s are the top 10 in the HESA security index while Pre '92s are

the top 10 in this study's income diversification index, but latter is potentially a longer-term indicator of vulnerability.

The qualitative interviews also provided an opportunity to evaluate some assumptions in the literature that the study is predicated on, therefore the following questions were posed.

6.6.4.13 Are universities mindful of the need and diversifying their income?

Whilst not an explicit research question within this study, the interviews afforded an opportunity to evaluate the assumption that universities in England are pursuing a strategy of income diversification. This was also the most-coded *a priori* thematic category which reflected participants engagement with the topic. Thus, participants were asked if they were mindful of the need to diversify their income.

The question was met with resounding agreement from both Pre and Post '92 universities. The expressions 'absolutely', 'very much so' or 'definitely' were used in nearly all responses. Post3FD added "for quite a while, at least since 2012, we have had a focus and a very strong directive which is to look at income diversification". Similarly, Pre7ST remarked, "it has been a priority strategy, both our current finance director and his predecessor have constantly stressed to us the importance of diversification". For most institutions it did appear to be a deliberate strategy and bearing in mind the sample was drawn from the most financially diversified institutions, these themes suggested the focus was working.

More tentative agreement came on two grounds, firstly the importance of margin or surplus. As Pre3FD succinctly put it "yes, although I think what we're interested in more is margin diversification, than income diversification". This concept was articulated by a number of universities, Post5RE captured it well:

Also, this is looking at income, rather than necessarily profit, or surplus or sustainability. So, you might have a diverse portfolio of activity, but if you've got a heavy research portfolio - that's probably costing you more than, well there's a trade of there in terms of what it's sucking out of the bottom line. I think often universities think about income rather than profit or surplus as the headline, which is very different to what a business would be. There's been quite a lot of debate for our income diversification group of whether we're chasing [income or surplus], it's interesting it's called an income diversification group rather than I don't know, a profit increase group or a surplus group.

The theme of challenges around margin was a consistent one, and conversations often came around to the concept of cross-subsidisation as there was a consensus that whilst it may support income diversification, research is generally loss-making. For example, as Post1FD explained:

TRAC numbers nationally basically demonstrate or suggest that research loses money. So just because you've got more research income, it's not necessarily a good thing if you are losing 20-30%, so you have to have tuition fee income to cross-subsidise, or something else to cross-subsidise research.

Succinctly stated by Pre7ST, "the basic model of a Russell Group university in this country is that home/EU teaching breaks even; research loses a lot of money which is made up by international student fees". These sentiments were echoed by participants from Post '92 universities, as Post3RE reflected:

Research is one of those things where trying to work out what the cost is and what the return is, is very difficult. I am fortunate in that my colleagues here appreciate how important research is, but when you have an institution that just looks at the bottom line – the argument would be that research costs you and that undergraduates particularly, cross-subsidise that.

A couple of Post '92 institutions recognised that broader non-core income generating activity had the potential to be much higher margin and thus you needed less of it to make a real impact on the bottom line. As Post6FD illustrated in talking about a recent real estate investment "whilst it is only 1-2% of the [tuition fee income] cake, actually it is 20% of the surplus"

Post1FD remarked, "[research] diversifies the income, but it adds to the cost base as well. So, it doesn't help enormously unless it spins in to something else, unless it brings in more undergraduate students etc". This reflects again how interconnected everything is, as Pre5RE contended:

It is not teaching in this box, research in that box. The brilliant research that we do informs our teaching and drives our reputation, which recruits the students. The best researchers are often the most inspiring teachers. The two are completely intertwined and it's certainly an argument we try to make, to step away from that 'this one costs us money, this one makes us money' perspective. We don't think in terms of profit and loss, but we do need to be sustainable overall.

By way of reinforcement, Pre1FD commented "all the data shows that institutions with strong research can command a premium in their [international] tuition fees, these things are strongly linked and connected".

The other cause for a more tentative agreement to the question of a strategic focus on income diversification stemmed from it not being a deliberate strategy per se, but rather a beneficial

bi-product of their broader aims as an institution. Post2RE clarified “we have a general policy about working where we can make a difference, where we can achieve our charitable objectives. But that leads us to be diverse in what we are and how we operate”. This was echoed by Pre1ST who stated:

It [income diversification] is a very reassuring bi-product, but it is not the intent...if your intent is to provide a balanced, rounded combination between your education activities, your research activities and your impact on society, then you would probably expect this to be an outcome of that. Because what you are trying to do is achieve a balance in your interactions with society, so you'd expect the funding to be a bit more balanced. It's not that we set out to have balanced funding.

That said, these participants certainly recognised the value of having diversified income streams in reducing exposure to financial risk, particularly in the current climate.

Another theme frequently related to an institution's strategy of income diversification, was the need to diversify *within* each of the sources of income. This was exemplified by Pre6FD:

Even within our fee income we are diversified by subject group, and we're diversified by postgraduate and undergraduate, by home and overseas, so we're really quite balanced in terms of our portfolio...for example, in research, in fact at the senior management team yesterday, we talked about have we got the balance between the different UK research councils right, because we are probably punching above our weight with two of them, two of them we're probably OK, but there is one in particular where we ought to be earning more than we are. We're even thinking about funder level areas where we're probably not quite right...so we're also mindful of diversifying below these [high-level income categories].

Then within overseas income, institutions were mindful to balance the countries students were drawn from, as Pre4RE commented “in different areas we have conversations about for instance over exposure to students from China”. Participants could see potential risks caused by external forces beyond their control. Pre2RE remarked “we still need to have more overseas students, but we need to diversify away from that heavy concentration in China and in the Business School in particular because there are certain risks that come from that”. As Pre6FD put it:

We are dependent on that particular country, you only have to look at what we've got in the press, even earlier on today, there's this kind of threat...trade wars, China going to do something against Apple and 20% of Apples sales are in China. So, we're aware that it's a country that if it makes its mind up to do something it does it.

In summary, these themes suggest that universities are mindful of the need and are diversifying their income as suggested in the available literature.

6.6.4.14 What are the main drivers for income diversification in universities?

The interviews afforded an opportunity to also evaluate the literature in regard to the main drivers for adopting a strategy of income diversification. Thus, participants were asked what they perceived to be the main drivers behind their strategy of income diversification. Note, as mentioned, a couple of universities felt that income diversification was a beneficial bi-product rather than an explicit strategy so there was not an explicit intent nor driver.

The dominant driver cited by almost all participants was the desire to reduce exposure to risk through having a diversified funding base. As Pre2RE remarked “the driving force was very much about diversifying income and reducing exposure to risk in the current climate”.

Participants from both Pre and Post '92 institutions had a largely shared view on the risks they were seeking to mitigate by having a diversified income portfolio. Pre1FD summarised it well:

It is certainly part of our plan, just mitigating the general competitive environment domestically and internationally. Part of it is mitigating the macroeconomics stuff around and uncertainties around Brexit. Political risk is increasing as well, universities have had a lot of bad press in the last couple of years and that will play out in all sorts of ways. Funding reviews, increased compliance and all that sort of stuff. So we've been doing quite a bit over the last couple of years, almost deliberately to mitigate some of those risks which manifest in diversifying our revenue streams.

But for Post '92s, the pressing concern was the exposure to risk stemming from their overdependence on student fees (in context of the competitive market and recent Augar review). Several universities cited this as the key driver to seek to balance the income portfolio through diversification, remembering that participant universities were the least dependent of the Post '92s but still dependent compared to Pre '92s. As Post5RE recalled “we viewed ourselves as having the highest dependency percentage-wise across the whole sector in terms of reliance on student fees. We've made quite a lot of progress on that...I think strategically we won't feel comfortable until we're sat below about 50%”. This dependence was seen as a very significant threat, talking about a recent conversation with a colleague at a Post '92 institution, Pre3FD recounted:

They are really feeling the pinch at the moment because they really have felt that competitive pressure in terms of student recruitment. And he was saying, well look we've got nowhere else to go, because if our student recruitment starts turning down, then that's it frankly, we've got no other income source to rely on. It just becomes a question of how quickly we can shrink our cost base to respond to a reduction in demand or find other means of stimulating demand or look for richer veins of activity. He's just in a depressing cycle of closing courses, shrinking faculties, laying people off, not recruiting staff. At least I think having a research economy alongside your

teaching economy, if there is a downturn in student demand, then it is not quite as - you're not as exposed.

There is clearly pressure in the sector, both Pre and Post '92 institutions commented on the present climate creating major challenges, but it was the Post '92s, being less financially diversified, who were the more acutely aware. As Post6FD put it "for the university to rely on undergraduate teaching for ever and a day – it's just too risky".

The other theme developed in the context of drivers for income diversification was that of autonomy. Participants cited this was either in terms of financial freedom, Post6FD remarking "when you diversify your income, you also generate a stream of income where you could use it for something innovative. You can support things you might otherwise not be able to from tuition fees etc.". Or enhance institutional freedom more generally, as Post5RE contended:

The more dependent you are on government or some other sort of funder, the more restricted you are likely to be in terms of your thinking and development. Also, within this, we've come a huge way as a university since we became the University of [place] in 2001. There is so much more we want to do and if we're reliant on one source of income, that constrains our ability to grow and that independence as well probably.

Indeed, as Post1FD put it "the more dependent you are on tuition fees, especially UK tuition fees, the more you're hamstrung by government policy". So, other sources of funding can bring more freedom and autonomy.

In summary, these themes suggest that risk management and autonomy are drivers for income diversification as suggested in the available literature.

6.6.4.15 Do institutions perceive themselves to be less financially vulnerable having a more balanced income portfolio (as a result of their diversification efforts)?

Although not a focus of this study, the interviews afforded an opportunity to evaluate the assumptions presented in the literature review chapter, namely that an organisation is less vulnerable financially if it has diverse sources of income. Thus, participants were asked if they perceive their institution to be less financially vulnerable having a more balanced income portfolio (as a result of their diversification efforts).

The main theme was that of clear agreement in both Pre and Post '92 institutions. That said, whilst all participants perceived their institutions to be *less* vulnerable, that didn't mean they were not without their financial challenges. As Pre3FD described:

Yes, I think so, undoubtedly yes [less vulnerable]. Things like, if the government cut tuition fees to £6,500, that would be pretty serious, but it is not going to be life threatening to us...we'd have to make some tough decisions and cut costs and so on, but I think a lot of things would have to go wrong across a range of things before it really starts to get [difficult].

As a Post '92 Post5RE reflected “absolutely [less vulnerable], like I say, where we have come from and where we've got to...I feel a lot more comfortable now than I did back then”.

The [at the time, impending] outcome of the major review of post-18 education led by Philip Augar was an oft-cited context to these discussions, Pre6FD shared that:

Quite often when I talk to FDs in Post '92s, that get 75% of their income from home/EU students, that's quite a scary place to be. Whereas for us, yes of course the fee review is really, really important, but a decision that is less good on the fees review is not going to sink us - it will give us a big challenge, whereas there are some institutions where it could genuinely give them questions about their viability.

As identified previously in the analysis around drivers for income diversification, participant responses related to vulnerability echo the need to diversify away from dependence on student fee income.

Finally, being less financially vulnerable was also sometimes positioned being more resilient. Pre5RE remarked “it's common sense, the more diverse your portfolio, the more resilient you are”. As noted previously, this resilience was seen as a competitive advantage

In summary, these themes suggest that institutions perceive themselves to be less financially vulnerable as a result of income diversification as suggested in the available literature.

The findings of this qualitative phase are used to help explain any causal effect in the statistical relationships established in the quantitative phase when the data are integrated in the discussion chapter (seven).

6.6.5 Qualitative findings summary

A summary of the findings is presented. These findings suggest the underlying mechanisms for how and why the antecedent factors identified in the quantitative phase influence levels of income diversification. Note: Some thematic labels have been edited for purposes of fitting on to page, full titles can be found in the codebook in appendix F.

1. Why the binary divide Pre & Post '92

- 1.1 The Pre '92 focus on research
 - 1.1.1. Drives income, balances the portfolio
 - 1.1.2 Reputation, history of research
 - 1.1.3 Disciplinary breadth & scale
- 1.2 Pre '92 overall history and reputation
 - 1.2.1 Access to funds and fundraising
 - 1.2.2 International reputation
- 1.3 Pre '92 scale and scope
- 1.4 The Post '92 focus on teaching
 - 1.4.1 Lack of research
 - 1.4.2 Limited opportunity inc generation
 - 1.4.3 Income concentrated in tuition fees
 - 1.4.4 Lack of capacity
- 1.5 Time lag for research
- 1.6 Implications and challenges
 - 1.6.1 Hard to alter situation
 - 1.6.2 Resentment
 - 1.6.3 Strong get stronger
 - 1.6.4 Bankruptcy

2. Overall competitive advantage

- 2.1 Capacity to take a risk and be flexible
- 2.2 Resilience and financial sustainability
- 2.3 Some constrained by resources
- 2.4 Something to build on

3. How and why research intensity

- 3.1 Balances the portfolio
- 3.2 Creates opportunity to generate income
- 3.3 Enables applied collaborative
- 3.4 Research interconnectedness
- 3.5 Creates IP
- 3.6 Can leverage it

4. How and why size of institution

- 4.1 Breadth brings opportunity
- 4.2 More resources available to exploit

5. How and why STEMM orientation

- 5.1 Easier to engage on commercially
- 5.2 Attracts funding
- 5.4 Attracts international students
- 5.5 It's not about patents, licences etc

6. How and why staff incentives

- 6.1 Engaging or motivating academics
- 6.2 Examples of approaches

7. How and why reputation

- 7.1 Reputation interconnectedness
- 7.2 Creates international opportunities
- 7.3 Provides a historical basis

8. How and why dedicated staff

- 8.1 Dedicated specialists
- 8.2 More responsive and flexible

9. How and why location

- 9.1 Attraction
 - 9.1.1 Attracts staff and students
 - 9.1.2 Attracts funding
 - 9.1.3 Attracts summer schools
- 9.2 Big city offers more opportunities
- 9.3 Proximity to market opportunities
 - 9.3.1 Proximity to business sector
 - 9.3.2 Proximity to public sector
- 9.4 Quirks creating opportunities
- 9.5 Less local competition from institutions

10. Non-significant resources query

- 10.1 Entrepreneurial outlook
- 10.2 Post '92 STEMM orientation
- 10.3 Level experience business engagement

11. Factors not considered

- 11.1 Leadership
- 11.2 Estate, housing and facilities
- 11.3 Strategy and vision
- 11.4 Culture, confidence and flexibility
- 11.5 Disciplinary mix

12. HESA security index contradiction

- 12.1 Post '92 lower overheads, higher surplus
- 12.2 Doesn't show whole picture
- 12.3 Pre '92 lower liquidity, tendency borrow
- 12.4 Pre '92 lower surpluses

13. Mindful of the need to diversify income

- 13.1 Agreement
- 13.2 Diversified as a side-effect of strategy
- 13.3 Key considerations
 - 13.3.1 Diversified margin
 - 13.3.2 Cross-subsidies
 - 13.3.3 Diversifying within the sources
 - 13.3.3.1 Overexposure China students
- 13.4 Strategic issues

14. Drivers for income diversification

- 14.1 Reducing exposure financial risk
 - 14.1.1 Overdependence student fee income
- 14.2 Autonomy and freedom

15. Outcome means less vulnerable

Although the results of the previous quantitative phase are considered generalisable to the higher education sector in similar jurisdictions; the insight gained in this qualitative phase advances no generalisable inferences. These findings simply offer a range of perspectives which suggest explanations for generalisable quantitative results.

The following section explores the concepts of validity and reliability in the context of this qualitative phase.

6.6.1 Validity and reliability of the qualitative findings

Validity and reliability are terms more usually associated with quantitative research; to embark on a discussion regarding the validity and reliability of qualitative research is to open a major line of debate (Bryman, 2016). As Creswell suggests, they do not “carry the same connotations in qualitative research” (2014, p. 201), thus the notions of validity and reliability are positioned by Guba (1990) more as, establishing the trustworthiness of the qualitative findings. Using the evaluative criteria proposed by Lincoln and Guba (1985), the validity and reliability (or trustworthiness) of this qualitative phase is assessed in terms of its credibility, transferability, dependability and confirmability.

6.6.1.1 Credibility

Establishing credibility is one of the most important factors to confer confidence in the findings (Lincoln & Guba, 1985). Creswell and Miller (2000, p. 124) reinforces this point “qualitative inquirers need to demonstrate that their studies are credible”. According to Bryman (2016), evaluating the credibility of qualitative findings, parallels assessing the internal validity of quantitative results. A number of steps were taken to ensure credible findings in this qualitative phase.

6.6.1.1.1 Member checking

According to Teddlie and Tashakkori, member checking, or respondent validation as it is sometimes known, is “perhaps the most important strategy for determining the credibility of the researcher’s interpretation of the participants’ perceptions (2009, p. 213). Bryman (2016) suggests respondent validation is to “seek corroboration or otherwise of the account the researcher has arrived at” (p.385), therefore participants were sent a copy of their transcript with quotations highlighted alongside the final summary of qualitative findings. They were

offered the opportunity to comment, clarify or suggest changes that better reflected their views. One participant replied with a request to edit some sections to clarify the point being made rather than the stream of consciousness given at the time. The remaining responses were all simply confirmatory, no concerns were raised. Moreover, a number of participating universities also asked for the findings to be presented at a subsequent senior management meeting, these presentations did not raise any query relating to analysis and interpretation.

6.6.1.1.2 Peer debriefing

Peer debriefing is a review of the data and analysis by someone who is familiar with the study (Creswell & Miller, 2000). This was largely provided through the supervisory team, the data matrices produced to support interpretation proved particularly useful in gathering feedback on how transcriptions had been coded and hence interpreted.

6.6.1.2 Transferability

According to Merriam transferability “is concerned with the extent to which the findings of one study can be applied to other situations” (2016, p. 223). Bryman (2016) suggests, evaluating the transferability of qualitative findings, parallels assessing the external validity of quantitative results. Whilst the intent of qualitative research is not generalisability (Creswell, 2014), it behoves the researcher to describe and document the process in sufficient detail for others to be able to assess the degree to which the findings are transferable to other scenarios (Lincoln & Guba, 1985). Thus, the appropriateness of the generalisation is the responsibility of the person doing it. This thesis aims to present the context and the rationale for all decisions made in sufficient detail to enable readers to make an informed decision as to the transferability of the findings.

In analysing the volume of references to each theme, it became clear why qualitative findings are not considered generalisable (Creswell, 2014). Despite this study conducting 16 interviews, some [potentially valuable] concepts were only raised by a few people. As mentioned, it is up to others to assess the transferability, however extreme case purposive sampling as used in this study is seen to support the notion of transferability (Teddle & Yu, 2007). Moreover, the high-profile nature of the participants interviewed may lend some further support; particularly as they were being asked their opinion on concepts of interest to the sector, not recounting their lived experience of a phenomena.

6.6.1.3 Dependability

As Merriam and Tisdell (2016) suggests, the dependability of a qualitative study is reflected in the ability for others to follow the procedures and processes used to gather, analyse and interpret the data. According to Bryman (2016), evaluating the dependability of qualitative findings, parallels assessing the reliability of quantitative results.

This qualitative phase chapter sought to document the data collection and analysis processes in sufficient detail for others to demonstrate the reliability of the methods and research practices employed (Robson, 2011). As Lincoln and Guba (1985) suggest, an ‘audit trail’ was also maintained. Creswell and Miller (2000, p. 129) also reinforce the need for “research logs to document the rigor of our research processes”. Similarly, the procedure for template analysis also emphasises the need to keep an audit trail “as a record of the way your analysis developed and the key analytical decisions you made” (King & Brooks, 2016, p. 41).

Development of the audit trail was supported by the use of the research notebook, memos in NVivo (Bazeley & Jackson, 2013) and also keeping dated versions of the template, annotated to reflect changes made. Crabtree and Miller (1999, p. 171) suggest, recording the iterative process of template development provides a “clear and evident trail of analysis and interpretation, an audit trail that can be reviewed”. Whilst not feasible to engage an external reviewer to verify dependability, this trail was audited by the supervisory team and found sufficiently rigorous.

Finally, the codebook (see appendix F) with its structure and definitions provide a degree of transparency to the interpretation (DiCicco-Bloom & Crabtree, 2006).

6.6.1.4 Confirmability

This criteria aims to ensure that the findings have not been unduly influenced by the perspectives of the researcher (Lincoln & Guba, 1985). Bryman (2016) suggests, evaluating the confirmability of qualitative findings, parallels assessing the objectivity of quantitative results.

This study used a pre-prepared interview guide containing questions grounded in research, this helps to minimise the study being influenced by the perceptions and assumptions of the interviewer (Brinkmann & Kvale, 2015). For example, the factors found to be non-significant were considered surprising to the researcher, in seeking potential explanation,

participants were simply asked which on the list surprised them. This was seen as the most objective way of drawing out any potential concerns with the qualitative findings.

Researcher bias was further minimised through reflexivity (Guba, 1990), which was achieved through a) gaining an understanding the concepts of reflexivity and b) the use of a research notebook to capture thoughts during the data collection and analysis process. Appendix G presents a brief reflexive account of the data collection and analysis process.

Finally, it is worth noting, to support the overall validity and reliability of this mixed methods study, the qualitative phase provided an opportunity for feedback on the quantitative results. Participants welcomed the calculations and correlations that had been performed and bar a couple of queries noted previously, did not challenge the methodology nor the results.

6.7 Chapter conclusion

This chapter presented the qualitative phase in its entirety in terms of sample selection, data collection, analysis and findings. It suggests explanations for how and why a university's resources influence the level of income diversification achieved. Some of the theoretical assumptions arising from the literature on which this study is predicated are also confirmed.

In the following chapter, the explanatory sequential mixed method design advances to the final stage; integration of the data in the discussion chapter, where the qualitative findings are used to help explain the quantitative results.

Chapter 7: Discussion of Key Findings

7.1 Chapter introduction

To recap, the context for the study has been presented and the available literature reviewed. The resource-based view has been positioned as the theoretical framework to drive the inquiry. An explanatory sequential mixed method design has been employed; firstly, to test the statistical significance of a number of antecedent factors in explaining variation in levels income diversification, and secondly, to explore the underlying mechanisms behind the relationships established to provide a richer explanation of any causal effect. The results of these two phases come together in this discussion chapter where the qualitative findings help to explain the quantitative results (Creswell, 2014).

The outcome of the research offers a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio. This outcome is presented in the final conclusion chapter following this discussion of the key findings.

The purpose of this chapter is to synthesise the overall findings of this study with the extant research reviewed in chapter two and the theoretical framework presented in chapter three. Before discussing the resource-based findings, this chapter considers the theoretical assumptions in the literature with reference to the tangential qualitative findings, thus providing relevant context to the main findings of the study.

Each of the following section headings are statements of the key findings.

7.2 Publicly-funded universities are actively pursuing a strategy of income diversification

The qualitative findings confirm that universities are “absolutely” mindful of the need to diversify their income portfolios. This is consistent with the available research that highlights the need for a diversified income portfolio, particularly in the face of continuing external challenges (Zhao, 2001; Stewart, 2008; Shattock, 2009; De Dominicis et al., 2011; Estermann & Pruvot, 2011; Webb, 2015). The quantitative results also confirm the income portfolios of publicly-funded universities in England show a mix of income from a) tuition fees, b) government funding body grants, c) funding from research councils, d) other income

such as student accommodation and catering, e) investment and donative income, and f) income from third-stream activity such as private contract research, consultancy, continuing professional development and income from intellectual property rights, facilities and equipment. This is reflected in the national income diversification index presented in appendix A.

The qualitative findings show income diversification strategies range from being a general strategic intent, to being a high priority, formally structured and monitored directive. Moreover, that there are a number of considerations to be observed within these strategic approaches.

Firstly, the importance of margin and likely return on the income, this contention is echoed in the available literature (Hearn, 2003; Shattock, 2010; Estermann & Pruvot, 2011; Taylor, 2013). Secondly, allied to the considerations of margin, the qualitative findings also emphasise the concept of cross-subsidisation within the portfolio, for example the role of higher margin international fees, subsidising loss-making research projects. This supports the findings of Jenkins and Wolf (2016) and is discussed more fully later.

Thirdly, universities demonstrate consideration of whether the income stream is exposed to the same external challenges, for example, 14% of income coming from third-stream activity is recognised as better than 14% of income coming from student accommodation and catering that is tied to student numbers. This is consistent with the concepts of the risk reduction strategies of modern portfolio theory, specifically the need to consider the nature of the income in the portfolio (Markowitz, 1952; Mayer et al., 2014; Hung & Hager, 2019). In the higher education literature, Stachowiak-Kudła and Kudła (2017) and Webb (2015) similarly highlight that not all income should be considered equal in terms of risk.

Finally, the qualitative findings highlight an additional strategy of *within* source diversification. In other words, seeking to be diversified within each individual income category. This finding confirms the propositions made by Zhao and Lu (2019). For example, within tuition fees income, aiming for a balance between undergraduate and postgraduate, domestic and international. Even within those categories, diversification can be pursued. This was found to be particularly pertinent when considering fees from international students and a recognition of an overdependence on the fee income from a single country such as China and the potential risk that presents.

The prior discussion suggests that universities in England are actively seeking to diversify their income, the drivers for this strategic response are discussed in the following section.

7.3 Publicly-funded universities are diversifying their income base to reduce exposure to risk

Although not an objective for this study, the qualitative phase afforded an opportunity to explore the motivations behind a university implementing a strategy of income diversification.

The qualitative findings confirm that the key driver is to reduce exposure to risk. This is highly consistent with the findings of Estermann and Pruvot (2011) in their study of 100 universities across 27 countries. It also reinforces the principles of modern portfolio theory and the importance of evaluating the risk-return of the individual components in a portfolio (Markowitz, 1952) as touched on previously. The qualitative findings show universities perceive a diversified income portfolio is needed to mitigate the risks created by the current competitive environment plus uncertainties about the UK's withdrawal from the European Union and the policy outcomes from the recent funding review. These findings support the existing sector narrative (HEFCE, 2017a; Bolton, 2019). The qualitative phase also establishes that these pressures are felt more acutely by the newer Post '92 universities, where consistent with the available research, the dominant motivation was to reduce the risks associated with an overdependence on any one source of income (De Zilwa, 2005; De Dominicis et al., 2011; Webb, 2015).

However, the point of departure for this study from the literature is the income source of concern. By virtue of the age of the studies and/or the focal countries, the available literature has a somewhat myopic view that the primary driver for income diversification is to diversify away from dependence on declining public funding (Albrecht & Ziderman, 1992; Johnstone, 2002; Liu, 2007; McCaffery, 2010; Shattock, 2010; Rozmus & Cyran, 2012; Teixeira et al., 2014; Feleke, 2015; Chirica & Puscas, 2018; Koryakina, 2018). The available literature appears out of step with the current higher education funding system in England i.e. that tuition fees are now the responsibility of the student (albeit funded initially by loans from the government). The quantitative results show tuition fees as being the main source of income for publicly-funded universities in England; direct public funding making up only a small proportion of the overall income. As the qualitative findings confirm, the risk for universities in England, is an overdependence on student fee income in a highly competitive

market place and not an overdependence on declining public funding as proposed by the available research. The quantitative findings of this study also highlight that it is the newer, Post '92 universities that are the most dependent on income from tuition fees. This is consistent with the findings of Baker (2017). As the available literature and resource dependence theory suggests, this dependence makes them more vulnerable to changes in the external environment (Marginson & Considine, 2000; Pfeffer & Salancik, 2003; Martin & Samels, 2013). The quantitative results demonstrate, income from core tuition fees in 2016/17 (excluding third-stream continuing professional development programmes etc), made up between 80% and 85% of total income for nine of the Post '92 universities in England.

The qualitative findings confirm Post '92 institutions are highly motivated to reduce exposure to the risks associated with overdependence on student fees, particularly in the context of an increasingly competitive market. Some institutions even agreeing and monitoring targets for reducing the proportion of overall income derived from tuition fees and thus creating more balance in the portfolio. However, consistent with Boxall and Woodgates (2018), the qualitative findings show *both* Pre and Post '92 universities see income diversification as a strategic priority to protect the financial viability of their institutions.

The prior discussion suggests that universities in England are diversifying their income to reduce exposure to the risks associated with dependence on any one source of income. The income source of concern is that derived from tuition fees in a highly competitive market place also influenced by uncertainties in the external environment.

The extent to which institutions perceive the strategy to be working is discussed in the following section.

7.4 The strategy of income diversification is working for publicly-funded universities

While outside the main focus of this study, the qualitative phase presented an opportunity to explore whether universities perceived that having a diversified income portfolio made their institutions less vulnerable to changes in the external environment.

The qualitative findings suggest that although not without their financial challenges, universities with a diversified income portfolio perceive themselves to be less exposed to the

financial risks related to the challenging external environment and consequently feel less vulnerable.

This finding is consistent with the narrative in the higher education literature (Cheslock, 2006; Stewart, 2008; Estermann & Pruvot, 2011; Besana & Esposito, 2015; Feleke, 2015; Webb, 2015; Stachowiak-Kudła & Kudła, 2017; Chirica & Puscas, 2018; Irvine & Ryan, 2019), yet it is only in the non-profit literature the concept is empirically tested. Accordingly, these qualitative findings confirm previous non-profit studies that suggest income diversification can reduce the vulnerability caused by an overdependence on any one source of income and more generally improve the financial health of an organisation (Chang et al., 2018; Hung & Hager, 2019).

As noted previously, this finding appears counter to the results of the financial security index published by HESA. The quantitative results in this study showed that the most financially diversified institutions are the older established Pre '92 universities, yet these are the ones toward the lower end of the HESA financial security index. Qualitative findings offer a potential explanation for this contradiction; the Pre '92s with their higher research overheads, lower surpluses, lower liquidity and confidence to borrow do not fare as well on the types of measures in the index, but are none the less, financially secure. Consistent with Wellington (2007) the qualitative findings of this study suggest a broader range of indicators are needed for this index to reflect a truer picture of financial health, including the degree of income concentration/diversification.

The previous discussion suggests that by virtue of having a more balanced income portfolio, universities in England perceive themselves to be less exposed to changes in their external environment and thus less financially vulnerable. However, as the quantitative results demonstrate, some universities are more successful in achieving a diversified income portfolio, this variation is discussed in the following section.

7.5 Some universities are more successful than others in achieving a diversified income portfolio

Whilst the qualitative findings confirm the financial benefits of a diversified income portfolio, the national income diversification index created by the quantitative analysis highlights that some universities are more successful than others in achieving it. This is consistent with findings in the available research (De Zilwa, 2005; Pilbeam, 2006; Liu, 2007;

Prince, 2007; Shattock, 2009; Ali et al., 2010; Estermann & Pruvot, 2011; Teixeira et al., 2014). This variation is discussed after the overall view is considered.

The quantitative results show, overall, publicly-funded universities in England err toward being more diversified than not i.e. the average index score is just over a half-way position. Although the six income sources in the measure all contain income, on average, nearly two-thirds of total income for universities in England is from core tuition fees. As pointed out previously, this is not consistent with the higher education literature. In their 2009-2010 study of 100 universities across 27 European countries including the UK, Estermann and Pruvot (2011) find over two-thirds of total income is from public funding. This inconsistency is likely due to the fact it is a comparative study where the majority of jurisdictions publicly fund tuition fees and also it pre-dates the more significant tuition fee reforms that have taken place in the UK. Nonetheless, the results of this study are highly consistent with UK sector reports (Bolton, 2019; Office for Students, 2019). For all universities over the 5-year period of study, the quantitative results show the proportion of income from tuition fees has been rising as the proportion from public funding has been diminishing, this is simply due to the effects of the funding reforms i.e. gradually moving each cohort from direct public funding to student loans.

These averages however, mask considerable variation on the sector. The quantitative findings suggest that there is an apparent binary divide in the level of income diversification achieved. Notwithstanding a small number of exceptions, the Pre '92 institutions are the most financially diversified and the Post '92 universities, the least. Whilst Post '92 universities are traditionally viewed as having a higher proportion of income from teaching, it was not anticipated that the levels of overall diversification would be so clearly delineated. The tentative assumption prior to data collection and analysis was that the potentially agile, entrepreneurial cultures of the Post '92 universities might weigh some advantage in diversifying income compared to the potentially, staid and bureaucratic cultures of the Pre '92 institutions, this is clearly not the case.

The prior discussions suggest that with a few exceptions, by virtue of their diversified income portfolio, the older, more established universities are less financially vulnerable than their post-1992 counterparts. Taking a resource-based view, the following sections discuss the antecedent factors that may explain the variation in levels of income diversification in publicly funded universities in England. The narrative reflects the outcome of the hypothesis testing.

7.6 A university's unique bundle of resources explains the variation in levels of income diversification for publicly-funded universities

The quantitative results support the hypothesis that a university's unique bundle of tangible and intangible resources have a positive influence on its ability to successfully diversify its income portfolio and thus its score on the national income diversification index. This is consistent with the resource-based view, that an organisation's resources confer a competitive advantage in a number of contexts (Wernerfelt, 1984; Barney, 1991; Barney & Hesterly, 2010). The qualitative findings offer an explanation for the competitive advantage in the context of additional income generation in the higher education sector. The findings suggest it is because a university's resources can create more capacity to take a risk and be more flexible in exploring new opportunities. A greater level of resources gives an institution something to build upon whereas conversely, universities can be constrained in diversifying income by their lack of resources. The role of these internal factors in developing a diversified income portfolio, supports the findings in the available research (Shattock, 2009; Estermann & Pruvot, 2011; Teixeira et al., 2014).

7.7 It is a university's capabilities that explain the majority of the variation in levels of income diversification in publicly-funded universities

The quantitative results support the hypothesis that within a university's unique bundle of resources it is the capabilities of the institution that have the greatest influence on success in diversifying income. This result confirms the findings and theoretical developments of Hall (1992, 1993) and Galbreath (2005) who suggest that it is the intangible assets termed as capabilities that are the most important source of advantage.

The narrative turns to consideration of specifically which resources of an institution have the most influence on level of income diversification. The quantitative phase of this study statistically tested hypotheses that reflected the antecedent factors suggested by the available literature to have an influence on levels of income diversification in higher education. The results are discussed in the following sections, the interpretation enhanced by reference to the findings of the qualitative phase to provide a richer explanation of any causal effect.

7.8 Within a publicly-funded university's capabilities, it is a focus on research that provides the dominant explanation for the variation

The quantitative results suggest it is the level of research intensity of a university that has the strongest influence on its ability to successfully diversify its income portfolio. Whether analysing the individual or combined effects, the relationship is highly significant. This finding is consistent with the narratives in the available research albeit not very frequently cited (Slaughter & Leslie, 1997; Estermann & Pruvot, 2011; Teixeira et al., 2014). The relationship between research intensity and income diversification has not previously been empirically tested.

The dominant contribution of research intensity explains the binary divide in levels of income diversification achieved. The quantitative analysis confirms that with a few exceptions, the Pre '92 universities are much more research-intense than their teaching-focused Post '92 counterparts (consequently their income portfolios are more diversified).

The underlying mechanisms behind the relationship between research intensity and income diversification are complex, however, they can be considered from two perspectives. Firstly, the direct financial effects and secondly the indirect reputational effects.

7.8.1 Financial effects of a focus on research

The quantitative analysis of the individual income portfolios alongside the qualitative perspectives gathered, confirm that research has the capacity to generate sufficient income to counter-balance teaching income to a meaningful degree and thus create more balance in the income portfolio. Moreover, research income can contribute to a number of different income categories for an even greater balancing effect. Income related to research can be found within the government funding body grant category (QR funding), funding from research councils, and finally third-stream income such as private contract research, consultancy, and income from intellectual property rights and facilities and equipment (that are present due to research). Research income can also fall within the donative income category. In 'touching' so many categories and with amounts that can be significant, income from research is able to improve an institution's income diversification index score more than any third-stream teaching-related income could ever hope to. It is not possible to comment if this is consistent with the literature as income diversification in higher education has not to date been evaluated in this way.

The qualitative findings suggest that a focus on research creates opportunities to generate income. Succinctly put by one participant “research develops knowledge that people will pay for”. Alongside opportunities for collaboration with industry, a focus on research creates intellectual property that can be commercially leveraged. A focus on research is also a vehicle for building relationships with businesses that can drive income not only for research, but also degree apprenticeships and continuing professional development, thus adding further to the third-stream income category.

The role of research in diversifying income underlines its ability to reduce vulnerability to challenges in the external environment. The qualitative findings posit that having a research economy alongside your teaching economy means a university is less exposed if there is a sudden downturn in student demand and recruitment targets are not met. This is consistent with modern portfolio theory considerations of risk-return of different income types (Markowitz, 1952).

7.8.2 Reputational effects of a focus on research

To further explain the quantitative results, the importance of research intensity can be summarised by the qualitative findings under the theme of “interconnectedness” and the role of research in building reputation. Then in turn, the influence of reputation in generating all forms of income. As one participant reflected “if you are more research intensive, you are more attractive to everything, everything goes up, everything gets better if your research is good”. This is consistent with the available research although to date only tentative links have been made (Teixeira et al., 2014).

The qualitative findings emphasise that the reputational effects of a focus on research is even more pertinent internationally and has a significant impact on ability to diversify into global markets. Moreover, linking back to the cross-subsidisation point earlier; research intensity builds reputation, which attracts international students, which help fund more research, that builds reputation, which attracts international students, and so on. This is consistent with the findings in Jenkins and Wolf (2016) who confirm the more research intense, prestigious universities are able to attract international students paying much higher fees than their less prestigious counterparts and that the fungible margins can cross-subsidise reputation-building research.

These findings confirm the resource-based view tenet that a resource needs to be valuable, rare and inimitable for a sustained competitive advantage (Barney, 1991). A university's research intensity often reflects a long history of research and is difficult for competitors to emulate. The quantitative results evidence that a meaningful level of research intensity *can* be achieved by the newer Post '92 universities, although as the qualitative findings reflect, it takes time and investment before the benefits of income diversification can be realised.

The previous discussion suggests that research intensive universities are able to generate income for a variety of income categories and this creates a more diversified income portfolio. Research intensity also builds reputation that has a 'halo' effect on all other areas of income generation.

However, statistical analysis of the combined effects of a university's resources show that other factors contribute to bringing the advantage of research intensity to bear.

7.9 A publicly-funded university needs to be organised to leverage its research capabilities to achieve a more diversified income portfolio

In considering both the individual and combined effects of an institution's unique bundle of resources, a focus on research is statistically shown to be the most influential factor explaining why some universities are more successful than others in achieving a diversified income portfolio. The quantitative results also confirm Barney's (1995) VRIO theory; that not only does an organisation need to have valuable, rare and inimitable resources, it also needs to be organised to exploit them. Thus, the resource-based view is able to suggest the underlying mechanism behind the significance of intangible organisational assets such as policies and structures in explaining why some universities are more successful in diversifying their income. Moreover, resource dependence theory supports the importance of developing organisational policies and structures to respond to external challenges and secure income from diverse sources (Slaughter & Leslie, 1997).

Within the quantitative results, there is a difference between Pre and Post '92 institutions as to the specific intangible organisational asset that is shown to be the most significant in combination with research intensity. For Pre '92 universities it is their policies around staff incentivisation, whereas for Post '92 institutions, it is their organisational structures in having staff dedicated to business engagement. A potential explanation for the difference

may be that the more research-intensive Pre '92 universities have more research-focused staff with the capacity do the engagement (if they are incentivised to do so).

7.9.1 Provide incentives for staff to engage with income diversification

The quantitative results show that together, the level of research intensity and the degree to which staff are incentivised for business engagement, help explain the variation in levels of income diversification within Pre '92 universities. This relationship between staff incentives and income diversification is consistent with the available research and is frequently cited in the literature as fostering income diversification (Hearn, 2003; Shattock, 2009; Estermann & Pruvot, 2011; Teixeira & Koryakina, 2013; Koryakina, 2018). The relationship between staff incentives and income diversification has not previously been empirically tested.

The qualitative findings suggest the underlying mechanisms behind the relationship between staff incentives and income diversification are quite straightforward. Incentives motivate academic staff to seek out income generating opportunities which may contribute to the various income categories outlined earlier. Findings suggest that income generation may not be what academic staff conceive themselves as being responsible for and so providing incentivisation is an important institutional policy.

Although incentives are often described in monetary terms, the qualitative findings provide examples of the success of formal career development and promotion pathways built around the more commercial and enterprise aspects of research. This finding lends support to the studies of (Shattock, 2009; Teixeira & Koryakina, 2013) who find advancement initiatives tied to third-stream activities encouraged research commercialisation and income generation. This discussion suggests that universities with monetary and/or career development opportunities tied to third-stream activities are better able to exploit their research and diversify their income portfolio.

As noted, this organisational *policy* finding relates to the more research intense Pre '92 institutions, for Post '92 universities it is their organisational *structure* that has more effect in exploiting their research capabilities.

7.9.2 Have staff dedicated to business engagement

The quantitative results show that together, the level of research intensity and the number of staff dedicated to business engagement, help explain the variation in levels of income diversification within Post '92 universities. This relationship between dedicated staff and income diversification is consistent with the available research and is oft-cited in the literature as supporting third-stream income generation and income diversification (Rothaermel et al., 2007; Shattock, 2009; Nelles & Vorley, 2010; Estermann & Pruvot, 2011). The relationship between staff dedicated to business engagement and income diversification has not previously been empirically tested.

The qualitative findings suggest the underlying mechanisms behind the relationship between having staff dedicated to business engagement and income diversification relate to the importance of having specialists with the right skills to be effective and the capacity to maximise income generating opportunities. This discussion suggests that universities with greater numbers of staff dedicated to business engagement are better able to exploit their research to diversify their income portfolio.

Note, while staff incentives and dedicated resources may not appear particularly valuable, rare and inimitable, they become so in combination with a focus on research. This is consistent with Barney and Hesterly (2010) who term these organisational assets as 'complementary' because they have limited potential in isolation to create an advantage, but in combination with the other resources and capabilities, may help an organisation leverage its potential. Similarly, Wade and Hulland (2004) conclude that a resource may not appear to have a direct value, but in combination the interactions can make it so.

Finally, in the Post '92 combined effect analysis, there was a third antecedent factor significant in the model. The role of location is discussed in the following section.

7.10 The location of a university may contribute to the variation in levels of income diversification

Whilst the quantitative results show that the level of research intensity and the level staff dedicated to business engagement together explain most of the variation in levels of income diversification within Post '92 institutions; location is also statistically significant when considering the combined effect of a Post '92 university's resources. This is supported by

the qualitative findings that suggest Pre '92 universities are viewed as operating on a more global stage and so their immediate region may have less importance to them. However, additional themes in the qualitative findings also suggest that location is important to *both* Pre and Post '92 institutions, particularly those based in major cities where it is perceived there are greater opportunities for income generation.

The importance of location to success in achieving a diversified income portfolio is similarly mixed in the available research. According to Prince (2007) and Shattock (2009) the level of commercial third-stream income in a university is a reflection of the client organisations in the region. Although Teixeira et al. (2014) find that regional location is not a significant factor in generating non-public revenues for higher education institutions. A potential explanation, as the qualitative findings highlight, is that location is a multi-faceted concept and therefore it may depend on the facet being examined.

The qualitative findings suggest the underlying mechanisms behind the relationship between regional location and income diversification are reminiscent of the 'interconnected' argument for research intensity. An appealing location can be a draw to both domestic and international students, and to academics with an excellent reputation for research (who are maybe more capable of stimulating revenue generating opportunities). An appealing location can also present a significant opportunity for income as a result of hiring out teaching and accommodation facilities to summer-schools and conferences. Thus, helping to balance the portfolio with greater proportions of 'other' income.

The qualitative findings largely supported the importance of location to income diversification. The slight disconnect between the literature, the quantitative results and the qualitative findings may be due to the fact that much of the existing research (and therefore the quantitative measure in this study) is focused on commercial contracts with business and therefore concerned with the wider region and whether the university is located in a growing centre of economic activity.

From the perspective of the resource-based view, location is considered a tangible resource and can confer a competitive advantage (Barney, 2007). However, this study contends, in the context of this research, whilst it may appear a valuable, rare and inimitable resource, a new provider could reasonably easily set up in the same location. Although granted, if the location and buildings are of historical significance and therefore appeal, the advantage would be maintained.

Synthesising the available literature, the quantitative results and the qualitative findings, the prior discussion suggests that a university's location can be leveraged for income generation as well as enabling an institution to attract high-profile staff with capacity to generate additional income.

The resources and capabilities as antecedent factors discussed thus far, are those that make the most contribution to explaining variation in levels of income diversification when a university's unique bundle of resources is analysed for their combined effects. The next section considers those factors that make a lesser contribution to explaining why some universities are more successful than others in achieving a diversified income portfolio.

The following discussion centres on those resources and capabilities that are positively correlated with income diversification when considered individually but their significance does not endure when resources are considered in combination. While consistent with the literature (Hung & Hager, 2019), it is the combined interactions that are of the most interest, individual associations are still worthy of consideration. The resources are discussed in descending order of their statistical significance.

7.11 An orientation toward the STEMM subjects is associated with increased levels of income diversification

The quantitative results show that the STEMM (science, technology, engineering, maths and medicine) orientation of a university, is positively correlated with its level of income diversification.

This association is consistent with the available literature but the narrative is mixed. Pilbeam (2006), Teixeira and Koryakina (2013) and Rossi and Rosli (2015) find that universities with an orientation toward the STEM subjects have the greatest opportunities to earn third-stream income. Moreover, those with medical schools secure more additional income including donative income (Powers, 2003; Liu, 2006). However, Estermann and Pruvot (2011) find that although this is a common perception, the "comprehensive" universities are just as able as their STEM focused counterparts to secure income from private sources. The relationship between STEMM orientation and income diversification has not previously been empirically tested.

This varied view is also reflected in this study, whilst an orientation toward STEMM subjects has a statistically significant relationship with income diversification, the strength of the association varies i.e. it is a strong association in the Pre '92 universities but a weak association Post '92s. This is perhaps expected given the number of Pre '92 institutions with medical schools and overall their greater propensity toward STEMM subjects. That said, the qualitative findings challenged its apparent lack of importance to Post '92 universities but the universities being interviewed were the more STEMM orientated, moreover one had a medical school, and another was planning one, so the weaker correlation is likely still supported for Post '92s in general.

It is interesting to note that when a university's unique bundle of resources is analysed in combination *without* research intensity in the model, STEMM orientation becomes a significant factor in Pre '92s alongside staff incentives (and the size of the university also becomes significant).

The qualitative findings suggest the underlying mechanisms behind the association between an orientation toward the STEMM subjects and level of income diversification relate to three factors. Firstly, it is easier to engage commercially on these disciplines and more substantial opportunities were available particularly with the National Health Service (NHS). Secondly, STEMM subjects are particularly strong at attracting funding. Finally, they also attract higher proportions of international students than other disciplines, this is particularly true of engineering where the qualitative findings noted several universities investing heavily in this area.

The previous discussion suggests that an orientation toward STEMM subjects can generate additional income and funding, but also attract higher fee-paying international students, the margins in which can cross-subsidise research, which builds reputation and attracts international students (and so the cycle continues).

7.12 The strength of a university's reputational assets is associated with increased levels of income diversification

The quantitative results show that the reputational assets of a university, are positively correlated with its level of income diversification. However, whilst the relationship is statistically significant, the strength of the association is not particularly strong. There is a moderate association for Pre '92 institutions and only a weak association for Post '92s.

These lower levels of association are not consistent with the available literature where reputation and prestige are the intangible assets most frequently cited for their ability to influence income diversification by attracting income from additional sources (De Zilwa, 2005; Pilbeam, 2006; Prince, 2007; Estermann & Pruvot, 2011; Teixeira & Koryakina, 2013). That said, the relationship between a universities reputational assets and income diversification has not previously been empirically tested.

A possible explanation for this inconsistency is that the available research does not appear to highlight the relationship between reputation and research intensity as discussed previously. In other words, it emphasises the importance of reputation but does not argue that it is research that creates that reputation. Moreover, in reference to research intensity only tentative links to reputation are made.

The literature does however, touch upon the ‘halo effect’, a good reputation in one area will engender a good reputation in another (Pilbeam, 2006; Shattock, 2009; Teixeira et al., 2014). It is potentially the pervasiveness of reputation that makes it hard to evaluate and may explain the low strength of the correlation in this study.

The qualitative findings, do pick up on this relationship, once again highlighting the “interconnectedness” between research and reputation. Participants noted a history of research builds reputation, and a reputation attracts higher levels of international and postgraduate students, research grants, core funding and third-stream income.

Note the reputational assets under analysis in this study deliberately did not include any measure of research reputation as this was likely to create multicollinearity issues with research intensity. The qualitative findings (and to some extent the broader quantitative results), suggest, that it is likely a reputation *for research* that has a stronger role to play in the model. In addition, the qualitative findings confirm, a reputation for research creates a global presence meaning broader opportunities to generate income from overseas.

More generally, the qualitative findings show, universities with the longer histories and more established reputations were deemed to simply have more assets from which to generate income from, as one participant put it, “a more historical basis for diversifying income”.

The prior discussion, combined with the prior considerations under research intensity, suggests that universities with a strong reputation for research are better able to generate

additional income and therefore diversify their income portfolio through the 'halo' effect it likely creates.

7.13 The size of the university is associated with increased levels of income diversification

Despite being a control variable, the quantitative results show that the size of a university (as measured by its total staff), is positively correlated with its level of income diversification. However, whilst the relationship is statistically significant, the strength of the association varies. There is a strong association for Pre '92 institutions but only a weak association for Post '92s. This is perhaps to be expected given that with one exception, the top 20 largest universities in England were established pre-1992.

The size of a university was selected as a potential alternative explanation for variation in levels of income diversification as it was not suggested as an antecedent factor in the available literature on income diversification. Moreover, commonly used as a control variable in studies adopting a resource-based view. Thus, its significance in this study contributes to the available research. A possible explanation is the lack of statistical testing of these concepts means little need for the consideration of the potential influence of the size of a university in its success in achieving a diversified income portfolio.

It is interesting to note that when a university's unique bundle of resources are analysed in combination *without* research intensity in the model, size becomes the most statistically significant factor in Pre '92 universities (alongside staff incentives and STEMM orientation).

The qualitative findings suggest a number of explanations for this association. Larger institutions tend to have a greater disciplinary breadth which brings more opportunities for income generation. In addition, a broader offering means more staff and more staff means an inherent diversity of income and inter-disciplinary research. Size also brings with it greater capacity to generate additional income both in terms of staff and income from facilities and equipment.

The previous discussion suggests that larger universities are more able to diversify their income as they have a greater capacity for income generation and their disciplinary breadth brings more commercial opportunities.

7.14 Having a large endowment helps balance the portfolio and is associated with increased levels of income diversification

The quantitative results show that the size of a universities endowment, is moderately correlated with its level of income diversification in Pre '92 universities (but not in Post '92). This difference is likely due to Post '92s having shorter histories and thus less time to build endowments to meaningful levels, as an extreme example, the University of Oxford established in 1096 had 8% of its total income attributable to investment and endowment income in 2016/17. Income from investments is not mentioned in the higher education income diversification literature therefore this finding contributes to the available research.

The underlying mechanism behind the association between the size of a university's endowment and its level of income diversification is simply that investment income from a sizable endowment is able to have a balancing effect on the income portfolio.

The prior discussion suggests that universities with large endowments receive greater amounts of annual investment income which helps to create more balance in their income portfolio.

7.15 An entrepreneurial outlook may be a factor associated with increased levels of income diversification

The quantitative results show that the degree to which a university has an entrepreneurial outlook, is weakly correlated with its level of income diversification in Post '92 universities (but not in Pre '92s).

This low level of association is not consistent with the available literature which suggests an entrepreneurial outlook is propitious to income diversification (De Zilwa, 2005; Prince, 2007; Shattock, 2009; Koryakina et al., 2015; Koryakina, 2018). That said, no studies were statistically testing its influence. However, the qualitative findings also challenge the apparent lack of importance of an entrepreneurial outlook. A possible explanation for the disparity lies in the inherent difficulty in objectively assessing an aspect of an institution's culture and the measure that was used. Although commonly used in prior studies, the number of patents, licences and spin-outs as a proxy for entrepreneurial outlook was not considered a relevant measure amongst qualitative participants.

To offer a counter-challenge, the researcher observed during the participant interviews that the discourse around research income generation seemed to be predominantly about securing public funding, not the more entrepreneurial self-generated income. With two exceptions, despite the protestations that having an entrepreneurial outlook should be a significant factor in diversifying income, entrepreneurial activity seemed lacking (moreover, there was scant reference to patents, licences and spin-offs). Consistent with Estermann and Pruvot (2014), the regulatory environment and funding formulas appear to be driving institutional strategic and academic decision-making.

The previous discussion suggests further research is needed to empirically test the influence of an entrepreneurial outlook on levels of income diversification.

Whilst the significance of certain antecedent factors has varied between Pre and Post '92 universities as discussed, the following resources and capabilities were not found to have a statistically significant association with level of income diversification for either group.

7.16 The degree to which the strategic plan for business engagement is embedded does not appear to influence levels of income diversification

Although there is a positive correlation between the degree to which the plan for business engagement is embedded in the university and its level of income diversification, it is weak and not statistically significant. The findings failed to provide empirical support for the hypothesis. This is not consistent with the findings in Estermann and Pruvot (2011) however their study was more subjective and did not statistically test any suggested relationships.

The qualitative findings suggest a potential explanation for the quantitative result, namely; even if a plan is very embedded, it may not be an effective plan; conversely a plan may not be embedded but highly effective.

The prior discussion suggests that whether a plan for business engagement has an influence on the level of income diversification achieved is likely to be unique to each institution i.e. it will depend on how effective the plan is, as well as the degree to which is it embedded.

7.17 The level of experience in the technology transfer office or development and alumni relations office does not appear to influence income diversification

Whilst there are positive correlations between the level income diversification and level of experience in both the dedicated technology transfer office, and development and alumni relations office; they are weak and not statistically significant. The findings failed to provide empirical support for the hypothesis. This is not consistent with the available literature, albeit only referred to in one study (Estermann & Pruvot, 2011) and not statistically tested.

The qualitative findings on the matter were varied i.e. the level of experience not being significant was challenged by some and confirmed by others. However, a potential explanation is posited by the qualitative findings, and that is, how experienced staff are in generating income does not necessarily reflect how effective they are at it. Alternatively, the measure was drawn from prior studies (Lockett & Wright, 2005; Caldera & Debande, 2010; Vinig & Van Rijsbergen, 2010; Rossi, 2018); potentially using the age of the technology transfer (knowledge exchange) as a proxy for experience is not an effective measure. The same approach was used in this study for assessing the level of experience in the development and alumni relations office.

The previous discussion suggests further research is needed to empirically test the relationship between staff experience and levels of additional income generated and thus balanced in the income portfolio.

7.18 The number of staff dedicated to development and alumni relations does not appear to influence levels of income diversification

Although there is a positive correlation between the number of staff dedicated to development and alumni relations and level of income diversification, it is weak and not statistically significant. The findings failed to provide empirical support for the hypothesis. This is not consistent with the available literature which suggests that a resourced, dedicated development and alumni relations office may improve fundraising capability (Liu, 2006; Stewart, 2008; Shattock, 2010; Estermann & Pruvot, 2011; Motion & Beney, 2011). However, any effect was not statistically tested in these prior studies.

The qualitative findings did not challenge this quantitative result. A potential explanation is, the ability of donative income to balance the portfolio is low, so even if the dedicated staff

are being highly effective, the impact of funds raised is not sufficient to create any meaningful balance.

7.19 Chapter conclusion

This chapter used the qualitative findings to help explain the quantitative results and synthesised the overall findings in the context of the available research and the study's theoretical framework. In doing so, this research is able to provide deeper insight into the underlying mechanisms behind the statistical relationships established.

The following and final chapter describes how the aim of the research is met and offers a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio. The contribution of this research is also considered, along with the strengths and limitations of the study.

Chapter 8: In Conclusion

8.1 Chapter introduction

As discussed in the opening chapter of this thesis, the complex and challenging environment in which publicly-funded universities operate has created an unsustainable level of financial pressure for some. The realisation that the sector is keenly sensitive to external factors has led institutions to seek to diversify their funding base and reduce their dependence on any one source of income. And yet some universities appear more successful than others in achieving a diversified income portfolio. This research is focused on understanding the antecedent factors underpinning this variance. Whilst the literature suggests income diversification in higher education is of importance to theory and practice, there appears to be a lack of explicit measurement of it, and a nomothetic explanation of the antecedent factors to achieving it.

This study develops and applies a model for measuring income diversification and then taking a resource-based view, tests a range of hypotheses for their relationship to the outcome of a diversified income portfolio. Adopting a mixed method design enables the underlying mechanisms behind these statistical relationships to be explored thus providing a richer explanation of any causal effects.

The purpose of this chapter is to offer a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio. This final chapter also considers the contributions made by this study to theory, knowledge, methodology, policy and practice. As this is a piece of applied research, recommendations to university leaders and policymakers are given. Finally, the strengths and limitations of the study are considered and suggestions for future research proposed. However, firstly, this chapter considers how the research objectives were met to address the research questions and achieve the aim of the research.

8.2 Meeting the objectives, addressing the questions and achieving the aim

The research problem identified by this study is the lack of an established approach to measuring income diversification in publicly-funded universities and the absence of a nomothetic explanation to explain the variance.

Therefore, to confront this problem, the aim of this study is to offer a more nomothetic explanation than currently exists to suggest why some universities are more successful than others in achieving a diversified income portfolio. In doing so, a model for measuring income diversification is developed and a national index established. To achieve the aim, the following three research questions are addressed by meeting the objectives that are subsequently discussed.

Research question 1: How diversified are the income portfolios of publicly-funded, non-specialist universities in England?

This question is addressed through meeting the first and second research objectives. The National Income Diversification Index 2018 is presented in appendix A.

Research question 2: Which resources and capabilities of a university have the greatest influence on achieving a diversified income portfolio?

This question is addressed through meeting the third objective. The outcomes of the hypothesis testing are presented in the quantitative chapter five, where those resources having the greatest influence are indicated.

Research question 3: How and why do the resources and capabilities of a university have an influence on the level of income diversification achieved?

This question is addressed through meeting the fourth objective described below. The underlying mechanisms are suggested in the summary of the key themes presented in the qualitative chapter six.

As described, in addressing these research questions, the following four objectives are met.

Objective 1: To develop a model for obtaining a more accurate measure of income diversification that takes into account third-stream income.

By disaggregating a university's third-stream income recorded on the HESA HE-BCI survey from the appropriate income categories in the HESA Finance Report, this study obtained a more accurate view of the income portfolio and proportions derived from any one source. The six-income category model is presented in figure 5.1. This model was applied to data 2012/13 to 2016/17 for all 102 publicly-funded, non-specialist universities in England. Five-year averages are used as there is a likely time lag between the influence of an antecedent

resource and the income diversification outcome (also to take account of the transition from direct public funding to student loans over the period).

Objective 2: To establish a national income diversification index for publicly-funded universities in England.

By applying the Hirschman-Herfindahl Index measure to the income portfolio, an income diversification score was obtained for each university. This created a national income diversification index where a university's relative position is shown and a dependent variable for empirical testing derived.

Objective 3: To identify the resources of a university that have a statistically significant influence on a university's level of income diversification.

By using established measures applied to five years of secondary and archival data for 13 internal factors for all 102 publicly-funded, non-specialist universities in England, this study is able to test a number of hypotheses to establish their individual and combined effects on levels of income diversification.

Objective 4: To explore the underlying mechanisms behind any statistical relationships established, thus developing a richer explanation of any causal effect.

By conducting 16 semi-structured interviews with vice-chancellors, pro-vice-chancellors and directors of finance from universities within the focal population, this study is able to explore the underlying mechanisms behind why the statistically significant factors are having the effect they are on a university's level of income diversification.

The outcomes of the three research questions, addressed by meeting the four objectives, are integrated to achieve the research aim. A more nomothetic explanation than currently exists as to why some universities are more successful than others in achieving a diversified income portfolio is offered in the following section.

8.3 Why are some universities more successful than others in achieving a diversified income portfolio?

It is the levels of tangible and intangible resources an institution possesses that helps explain its success in achieving a more diversified income portfolio. Within that it is the capabilities of the university that confer the greatest advantage. Specifically, it is a university's

capabilities around research. Research intensity provides the most significant explanation as to why a university is more able to succeed in diversifying its income. There are a number of underlying mechanisms that explain the relationship. Firstly, research creates knowledge people will pay for, hence it creates income generating opportunities. The scale of the income it can generate can be large enough to have a meaningful impact on creating more balance in the portfolio. Moreover, income from research can register against a number of income categories e.g., core public funding, research council funding and third-stream activities such as contract research and income from intellectual property, therefore increasing its balancing effect. A focus on research also builds reputation that has a ‘halo’ effect on all other areas of income generation.

Universities, however, do need to be organised to exploit their research. Research intensive institutions that implement monetary incentives and/or career development opportunities tied to third-stream activities are better able to exploit their research to diversify their income portfolio. For the newer universities, those with greater numbers of staff dedicated to business engagement are more successful in securing research income and achieving a diversified income portfolio.

A university’s location may be leveraged for income generation as well as enabling an institution to attract high-profile staff with capacity to generate additional income.

An orientation toward STEMM subjects can not only generate additional income and funding, but also attract higher fee-paying international students, the margins of which can cross-subsidise research, which builds reputation and attracts international students (and so the cycle continues). Universities with a strong reputation for research are better able to generate additional income and thus diversify their income portfolio through the ‘halo’ effect a reputation for research likely creates.

Larger universities are more able to diversify their income as they have a greater capacity for income generation and their disciplinary breadth brings more commercial opportunities.

Finally, universities with large endowments receive greater amounts of annual investment income which helps to create more balance in their income portfolio.

8.4 Additional findings

The qualitative phase of this mixed method study also enables the following additional insight to be tentatively offered. Universities are actively seeking to diversify their income. They are doing so to reduce exposure to the risks associated with dependence on any one source of income. The income source of concern is that derived from tuition fees in a highly competitive market place also influenced by uncertainties in the external environment. Those universities that have achieved a more balanced income portfolio, perceive themselves to be less exposed to changes in their external environment and therefore less financially vulnerable.

In addressing the research questions and achieving the aim of this research, a number of contributions to theory, knowledge, research methodology, policy and practice are made.

8.5 Contribution

In this section, the contributions of this study to knowledge, research methodology, policy and practice are presented. However, firstly the contribution of this study to theory is discussed.

8.5.1 Contribution to theory

In using the resource-based view as a theoretical base to drive the inquiry, this study tests the theory in a new context thus extending its relevance. An institution's resources and capabilities are highly significant in explaining why some universities are more successful than others in achieving a diversified income portfolio (Galbreath, 2005). Furthermore, as predicted by the findings of prior studies, it is the university's capabilities that explain the majority of its competitive advantage. Similarly, Barney's (1995) contention that organisations need to be organised to exploit their valuable, rare and inimitable resources was also tested and proven valid in this new context.

In positioning its findings, this study also draws from modern portfolio theory and resource dependence theory and finds them highly relevant in the context of higher education income diversification. It is hoped the application of established theories to applied research will encourage other studies on income diversification in higher education to do like-wise to achieve more grounded outcomes (their use is prevalent in the non-profit literature).

This study also advances the debate regarding the methodological concerns with research adopting the resource-based view as raised in the literature. Namely, it used an unbiased measure of an organisation's capabilities, the capabilities were assessed relative to competing institutions, the study was conducted in a regulated, more homogenous environment and it used established measures to operationalise intangible resource variables.

8.5.2 Contribution to knowledge

This study makes a number of contributions to the higher education literature on income diversification as outlined in this section. By contributing to the debate, this study reinforces the importance of the topic of income diversification in higher education. The findings are relevant to researchers who would like to continue the debate on income diversification in higher education, suggestions for future research are outlined in a subsequent section.

8.5.2.1 Advancing the debate

This study contributes to updating the narrative in the available literature on income diversification in higher education.

Firstly, it challenges the existing definition of *core* income. In the available research, an institution's core income is defined as the main government allocation and comprises the majority of an institution's income (Estermann & Pruvot, 2011; Teixeira et al., 2014), therefore everything else (including tuition fees) are seen as non-core income. In England direct public funding can no longer be considered a university's *core* income (although technically student loans are serviced by the government). Rather it is the income it receives for tuition fees that usually comprise its core income so the current definition lacks relevance in some jurisdictions.

Secondly, this study challenges the existing definition of income diversification as used in the higher education literature. Whereas the non-profit literature defines income diversification as striving for a relatively equal reliance on each source of income and considerations of the nature of the income (Chang & Tuckman, 1991; Carroll & Stater, 2009; Mayer et al., 2014), it is notable that in the higher education literature, where it is defined, the focus seems solely on the generation of 'additional' income, and where additional is defined as income beyond government grants and student fees (Ziderman & Albrecht, 1995; Estermann & Pruvot, 2011; Koryakina, 2018). As Teixeira et al. (2014) confirm "revenue

diversification has been defined as the generation of revenue beyond government appropriation” (p. 399). Consequently, the higher education discourse is dominated by the need to diversify away from dependence on direct public funding. Whilst income from teaching and research will always dominate the income portfolio (Taylor, 2013), more consideration of the need to equalise dependence would be constructive (as well as consideration of the nature of the income in the portfolio). This study contributes a more balanced perspective.

Finally, this study highlights the benefit of an interdisciplinary perspective in bringing the non-profit and the higher education literatures closer together. The income diversification arguments are more developed in the former and should be used to inform future higher education research.

8.5.2.2 Measuring income diversification

Although much has been written about the importance of income diversification in higher education, seldom have the levels of income diversification been measured. Commonplace in the non-profit literature (Chikoto et al., 2016), only two higher education studies have adopted the Hirschman-Herfindahl Index measure (one was using a derivation known as the Simpson Index). Webb (2015) was measuring in private institutions and De Dominicis et al. (2011) was measuring only research-intensive universities. Therefore, the contribution of this study is to set a precedent for the adoption of the Hirschman-Herfindahl Index in the empirical assessment of income diversification in publicly-funded, generalist universities. This model delivers a more accurate measure of income diversification for comparative research and provides a robust dependent variable with which to test the effects of explanatory variables.

8.5.2.3 Developing a measure for a university’s reputational assets

In operationalising the ‘reputational assets’ variable, this study also contributes a composite measure that is grounded in the literature and can be adopted by future studies.

8.5.2.4 Statistically testing antecedent factors

Whilst identifying the antecedent factors that influence levels of income diversification in higher education has prominence in the literature, the majority of it on the basis of basic

analysis of secondary data and case study approaches. To the best of this researcher's knowledge, this is the first study to statistically test the factors against an established measure of income diversification. Thus, this research is contributing to the debate as to the significance of the various factors identified in the available research. Most notably, this study highlights the importance of research intensity that is far from prominent in the available research to date.

8.5.2.5 Theoretically grounded explanation

Prior studies suggesting factors that may influence income diversification are largely atheoretical in their positioning. In adopting the resource-based view, this study contributes a more grounded explanation as to why some universities are more successful than others in achieving a diversified income portfolio. Moreover, it addresses the perceived lack of theoretically-informed research within the broader higher education domain (Schmidt & Günther, 2016).

8.5.2.6 Explaining the underlying mechanisms

Much of the existing research relies on analysis of secondary and archival data, that is interpreted by the researcher(s). Adopting an explanatory sequential design, this study is not only able to statistically test relationships, but also able to offer explanations for the quantitative results by drawing on the qualitative findings. Consequently, the underlying mechanisms behind the statistical relationships are explained on a more empirical basis to provide a richer explanation of any causal effect.

8.5.2.7 Contemporary relevance

This study also contributes to bringing the available empirical research on income diversification more up to date. In a global context, the most recent paper published in 2017, analysed data relating to 2012-2015. In a European context, the most recent paper published in 2017, analysed data relating to 2010/11. In a UK context, the most recent paper published in 2007, analysed data relating to 2006/07. Much has changed in the intervening years in regard to the funding of higher education, thus this study contributes perspectives on data relating to the 5-year period to 2016/17.

8.5.2.8 Challenge to existing knowledge

Whilst the nomothetic explanation offered provides objective confirmation of some of the existing knowledge in a more contemporary context. The following findings and observations are not consistent and so make a contribution in challenging the available literature.

As the discussion on reputation and research intensity in the preceding chapter highlights, the available literature should consider repositioning the importance of reputation to be the importance of *research* reputation as an influential factor in income diversification.

This study finds the size of the university and also the size of its endowment to be correlated with the level of income diversification, this had not been identified by the extant research.

While it is commonplace to use the numbers of patents, licences and spin-outs produced by a university as a proxy for entrepreneurial outlook, the quantitative and qualitative findings of this study query its relevance.

Although the age of an office dedicated to a particular activity is a common a proxy for its level of experience, this study queries the lack of assessment as to their effectiveness i.e. the staff may have been ineffective for a prolonged period of time. Similarly, whether a plan for business engagement has an influence on the level of income diversification ideally needs to assess whether it is an effective plan as well as the degree to which it is embedded.

8.5.3 Contribution to research methodology

The available research shows a prevalence of quantitative analysis of secondary and archival data and also the use of case study designs. Case study approaches to research do by their nature include the use of quantitative data, often in conjunction with qualitative interviews. However, to the authors knowledge this is the first study to adopt a formal mixed method research design to empirically investigate income diversification in higher education. Thus, this study adds to the body of research utilising a mixed method design and presents it in a new context.

Applying the explanatory sequential mixed method design necessitates the analysis of qualitative data that is gathered on the basis of the quantitative results. Template analysis is selected as the most appropriate style of thematic analysis for the qualitative data because

its use of *a priori* themes being perfectly suited to exploring the known quantitative results. It appears that template analysis has not been used in this context previously and therefore this study took an original approach. This contribution was confirmed by a prominent author on template analysis (King, personal communication, 18th November 2018).

Finally, in this section, the contribution to higher education policy and practice are discussed, before detailed recommendations are given.

8.5.4 Contributions to policy and practice

This research offers a number of contributions to policy and practice.

8.5.4.1 A more accurate measurement

In contrast to the non-profit literature, there is an apparent lack of measurement of levels of income diversification in higher education. This study contributes to both knowledge and practice by applying an established measure of income diversification to publicly-funded universities in England. The measurement model developed in this study, takes into account not only income related to teaching and research, but also third-stream income derived from a variety of income-generating activities. By disaggregating third-stream income, university leaders are able to get a clearer view of their income portfolio and so better evaluate and monitor their dependencies and exposure to financial risk.

8.5.4.2 Antecedent factors identified

In identifying the key antecedent factors to achieving a diversified income portfolio, the contribution of this study means that university leaders are better equipped to develop strategies to reduce vulnerability and improve financial stability. They can prioritise strategic focus on those factors that will most influence their success in achieving a diversified income portfolio.

Several participants in the qualitative phase expressed their gratitude for the insight provided by the quantitative findings in regard to their level of income diversification and their resources and capabilities that influence it.

8.5.4.3 A national index

The application of this income diversification measure at scale has produced for the first time, a national income diversification index. With a consistency of approach to measurement, the results enable university leaders and policymakers to make inter-institutional comparisons which can further guide university decision-making and more importantly, inform national policy. If the same approach to measurement is adopted by other jurisdictions, it could also facilitate international comparisons to be made. Finally, the national index provides evidence that a more balanced income portfolio can be achieved even by those who historically were considered teaching-focused. The qualitative findings explain the underlying mechanisms behind that success, enabling best practice to be shared.

8.5.4.4 Adding to the debate

More generally this insight from England hopes to contribute to the debate on higher education funding as many countries move toward more market-like approaches. It aims to provide insight as to the challenges and consequences and the importance of not being overly dependent on anyone source of income, whether public or private.

8.6 Implications of the findings

The findings of this research imply that the less research-intense universities will continue to be financially vulnerable unless they can reduce their dependence on tuition fees by building up research-related income to create more balance in their portfolio.

The findings also suggest that those universities without staff incentives for the commercialisation of research, or without staff dedicated to leveraging their research capabilities, may not be maximising the commercial potential that resides in their research.

The qualitative phase afforded an opportunity to ask participants for their perspectives on the implications of the quantitative results. The key theme that emerged was the perception that the situation appears hard to alter, and that this has serious implications for the sector. It will take a significant amount of time and investment for the newer universities to build up to a meaningful level of research intensity, however the quantitative analysis shows it can be achieved (but policy support is likely necessary for this achievement to be more widespread). As one Post '92 university participant in the qualitative phase commented “if

this university had known this implication five years ago, we might have invested £25m in research [earlier]”.

As a final contribution to practice, the following section outlines a series of recommendations for university leaders and policymakers.

8.7 Recommendations for practice

The contributions made to theory, knowledge and practice offered by this research, create a platform for a number of recommendations that may help guide higher education strategy and policy. The audience for these recommendations includes university leaders and those contributing to higher education policy. This study is focused on the unitary higher education system in England as it adopts an evolving approach to funding the increasing demand for higher education, namely that the cost of their education is the responsibility of the student. With a policy to engender market competition for the tuition fees on which they are so dependent, the government has put universities under increasing financial pressure. Whilst still not without their financial concerns, those institutions with a more diversified income portfolio find themselves less vulnerable to the challenges a dependence on tuition fees creates. Although focused on England, these recommendations are relevant for any institution that is overly dependent on any one source of income, whether that be publicly or privately funded tuition fees. The recommendations for policymakers may also provide useful insight for those jurisdictions who have, or who are, considering similar approaches to higher education funding.

This study performed detailed analysis on the finances and resources of 102 publicly-funded, generalist universities in England and conducted 16 in-depth interviews with pro-vice chancellors for research, pro-vice chancellors for strategy and directors of finance from Russell Group, pre-1992 and post-1992 universities. Building on extant research and the findings of this study, the following section offers recommendations grounded in modern portfolio theory, resource dependence theory and the resource-based view.

8.7.1 Recommendations to university leaders

The teaching and research remit of higher education will always mean these income sources dominate over third-stream and investment income. However, many Pre and Post '92

universities have managed to improve the balance across their income portfolios and achieve a reasonable level of income diversification.

These recommendations are positioned toward those university leaders that recognise more needs to be done to reduce dependence on any one source of income and to strive for more balance in the portfolio. However, a strategy of income diversification is not a quick-fix solution, and at time of writing this study is conscious may be too late for some.

8.7.1.1 Agree and monitor targets for income diversification

To realise the benefits of a diversified income portfolio, it is necessary to first accurately assess the current state. This can be achieved by ensuring that all sources of income are clearly delineated as different sources are open to different challenges and have different levels of risk associated with them. For example, if all tuition fee income is considered as one source, it cannot take into account income from continuing professional development, executive education programmes etc. that are not subject to the same market forces as undergraduate and postgraduate tuition fee income. Similarly, funding for research from research councils, is not the same as research income secured through commercial contracts with industry. By disaggregating what can collectively be termed third-stream income, a much truer picture of an institution's income portfolio emerges.

To further assess current state, this study recommends applying an established measure of income diversification to the portfolio (the Hirschman-Herfindahl Index) to calculate an index score.

The next recommendation is to review the portfolio balance and agree as a university, what are the desired proportions of overall income to be in each category (tuition, research, public funding, other, investments, third-stream). Within-source diversification should also be considered i.e. strive for an agreed of balance between undergraduate and postgraduate students, international and domestic students etc. Consider the reliance on particular countries, on particular research councils, on particular commercial partners etc. When reviewing 'other income' consider which income is self-generated from hosting conferences, and which is dependent on student numbers e.g. student accommodation.

The final recommendation under measurement, is for the institution to agree targets and performance indicators for these concepts which should be monitored and regularly reviewed.

8.7.1.2 Focus on margin

A diversified income portfolio will only reduce exposure to financial risk if the income generates a return. Thus, the strategy should not be income at all costs. Recognising that it is common practice for research to be loss-making, a degree of cross-subsidisation is to be expected, however there is an argument to work to improve the returns achieved. For example, more accurate costing of proposals, but this is somewhat outside the scope of this discussion. Suffice to say, any new income generating initiatives should be priced on a commercial basis with an accurate understanding of costs.

8.7.1.3 Build up research capacity

The key finding of this research is a more balanced income portfolio can only be achieved by having an increased focus on research. Investing in building up research capability not only brings in research-related income from core government grants, funding council grants, commercial contracts and income from intellectual property; it has a 'halo' effect on all other income sources due to its reputational effects.

Becoming more research-intense takes time and costs money, the recommendations to policymakers in the next section, centre on seeking to support this strategy. Meanwhile, institutions need to focus on attracting higher margin international and postgraduate students (which this study appreciates is easier for those institutions with a reputation for research, catch-22).

Other recommendations to consider include developing partnerships to open a medical school, this study found an increasing trend for this and a way of accelerating the research intensity of a university. Similarly, a focus on science, technology and engineering subjects was shown to attract more research funding and be easier to engage on commercially, therefore universities should seek to build up their offerings around these subjects (which are also attractive to high-margin international students).

Building up research capacity needs to be viewed as a long-term investment for long-term sustainability. For some of the newer, teaching-focused universities, this may appear a significant challenge, but as the findings from this study show – it can be achieved, and the institutions feel less vulnerable as a result of it.

8.7.1.4 Be organised to exploit research

Another key finding of this research is that a university needs to be organised to exploit its research capabilities. The approach to this varies between the research-intense institutions and the more teaching-focused institutions.

The recommendation to the research-intense universities is to implement organisational policies around staff incentives for business engagement and enterprise. These should not only be monetary incentives such as direct revenue share of income generated, but also include formal career development pathways linked to third-stream activity. A Professorial Fellow: Enterprise should have equal status, respect and remuneration to a Professorial Fellow: Research, or a Professorial Fellow: Education. These policies motivate academic staff to seek out income-generating opportunities.

The recommendation to the less research-intense universities, is to implement organisational structures which see more staff dedicated to business engagement, this creates specialists with the right skills to be effective and the capacity to maximise income generating opportunities.

Finally, in this section, there is a recommendation to ensure research capabilities are publicised, as noted previously, reputation for research has a ‘halo’ effect on all income generating areas of the university. To quote one of the most research-intense, newer universities “we hide our light under a bushel, and then we hide the bushel”.

8.7.1.5 Leverage location and facilities

As a final recommendation for university leaders (whilst building up research capability), universities could do more to leverage their location and facilities. For one of the newer universities in England, their higher level of income diversification was due in fact to their substantial (high-margin) income attributed to hiring out their student accommodation and

teaching facilities to English language summer schools. This of course is predicated on the university being in a location attractive to overseas visitors.

8.7.2 Recommendations to policymakers

This section outlines some recommendations for consideration when developing national policy relating to higher education. Some are England-specific, but some are more broadly useful to other jurisdictions.

8.7.2.1 Support the development of research capacity and capability

The key finding of this study is that the more research-intense a university is, the more diversified its income portfolio is. With a lower dependence on any one source of income, the institution is less exposed to changes in its external environment. In contrast, there is evidence to suggest that the less diversified a university's income portfolio is, with a higher dependence on tuition fee income, the more vulnerable it is to competitive market forces and changes in funding policy.

This study also finds (with some exceptions) it is the newer, post-1992 universities that are the least financially diversified and thus more exposed to risk due to being overly dependent on a single source of income. It is therefore in the interests of policymakers to support these newer universities in building up their research capacity and introduce an element of balance to their income portfolios.

As mentioned in the introduction, policymakers in England are concerned with student loans not being repaid as they now count toward the national deficit. As noted, the Institute for Fiscal Studies (2019) projects it is students from the newer universities that are more likely to not fully repay their loan. If these newer universities had more balance between income from research and income from teaching, then they would potentially have less negative impact on the national deficit.

8.7.2.2 Improve measures of financial security

As covered in the introduction, currently, public higher education agencies assess an institution's financial sustainability with a limited range of indicators. An organisation's level of income diversification has long been associated with measures of financial health

(Irvine & Ryan, 2019). The findings of this study highlight the counter-intuitive rankings in the current HESA security index when compared with the income diversification index (as also noted by (Wellington, 2007)). The recommendation is to add the level of income diversification/concentration as an indicator to any national measure of financial security.

In the final sections of this thesis, the strengths and limitations of the study are considered, along with suggestions for future research.

8.8 Strengths of the study

This section briefly highlights some of the strengths of this study before considering its limitations.

Utilising objective measures applied to secondary and archival data enables the study to be conducted at a national scale where the sample is effectively the total population. Adopting statistical methods of analysis results in a more generalisable outcome than is found in subjective, interpretivist approaches. Although focused on England, there is little to indicate the findings would not apply to publicly-funded, generalist universities in other jurisdictions operating a unitary higher education system (whether overdependent on direct public funding or private tuition fees).

Whilst predominantly a post-positivistic study, in adopting an explanatory sequential mixed method design, this research is able to offer a richer explanation of any causal effects. The qualitative findings are used to explain the quantitative results, so do not just rely on the researcher's interpretation of the underlying mechanisms of the relationships established.

With the exception of Webb (2015), this study appears to be one of the few on income diversification in higher education to make explicit use of a theoretical base to drive the inquiry. Thus, the findings of this study are grounded in established theory and may be considered more robust as a result.

Another strength of this research is its comparative nature, objectively comparing the performance of universities against each other. Peteraf and Barney assert that "competitive advantage is per definition a relative term and therefore requires an exogenous basis for comparison" (2003, p. 320).

Finally, a perceived strength of the qualitative phase is the seniority and profile of the interview participants acting as key informants for their institution and the sector as a whole.

8.9 Limitations of the study

This section considers what this study could potentially have done better, and the implications of its limitations.

While the use of objective measures is a strength of this study, it also raises a number of limitations. This research could only evaluate the antecedent factors it could objectively measure through secondary and archival data. Fortunately, the majority of the resource-based factors harvested from the extant research were able to be operationalised using established measures from the available literature. However, the qualitative findings suggested some performed better than others.

Although the existing research frequently uses the number of patents, licences and spin-offs as a proxy for a university's entrepreneurial outlook, the qualitative phase suggested these factors lacked relevance as an effective measure. Therefore, the statistical relationship between an entrepreneurial outlook and level of income diversification may require further investigation.

With regional location, the measure operationalised well, but in the qualitative phase the question was raised as to whether the competitiveness of a region (as suggested by the available research) was the most relevant measure for location. Thus, the statistical relationship between regional location and level of income diversification may require further investigation.

The level of experience of dedicated business engagement and development and alumni relations staff was operationalised as the years elapsed since the dedicated offices were established. While this measure is drawn from the extant research, some participants in the qualitative phase challenged its lack of statistical significance in the model, the office may not have been long established, but be staffed with highly effective, experienced people. Therefore, the statistical relationship between the level of experience in the dedicated staff and level of income diversification may require further investigation.

The implications of these limitations are that, based on the qualitative findings, entrepreneurial outlook, regional location and level of staff experience may have a greater or lesser significance than statistically suggested by this study.

The available research noted the role of leadership and management in driving income diversification. These were considered too subjective to be operationalised into objective measures and so were not particularly well represented in the study. However, the degree to which the strategy is embedded in the institution is considered a tentative proxy for leadership commitment, but the lack of a fuller consideration is acknowledged as one of the limitations of an objective study relying on secondary and archival data.

In analysing the interview transcripts, it became apparent there were a number of resource-based factors that were not identified in the available literature and hence not included in this study. Firstly, the presence of a medical school appears to have a relationship to the institution's research intensity (and thus its level of income diversification). This could have been quite easily included as a dummy variable in the model. There is little implication to its omission, as the medical disciplines were captured by the STEMM measurement.

Participants also often referred to the contribution their estates, housing and facilities made to generating additional income to diversify the portfolio, however it is not apparent what consistent measure could have been applied to evaluate this for all 102 universities. Related to this is a frustration of this study that in the statutory financial reporting, the 'core other' income category covers all accommodation and catering income – much of which may be due to third-stream activities such as letting out to summer schools or acting as a conference venue. Moreover, *core other* is the only category where there is a risk that income is exposed to the same risks as tuition fee income i.e. undergraduate student accommodation. The implication of this is that any third-stream income within this category is unable to be disaggregated and therefore the portfolio may not look quite as balanced as it is.

During the qualitative phase, the participants were asked if there were any antecedent factors not considered by this study, but that they perceive contribute to their success in achieving a more diversified income portfolio. Consistent with the available research touched on previously, this gave rise to some broad themes around university leadership, strategy and vision. As this is an objective piece of research with the aim of a nomothetic explanation, the absence of these more subjective factors is not considered a particular limitation as they

require more inductive, interpretivist approaches to their investigation with the outcome less generalisable.

A final limitation to note is that any potential endogeneity issues were not explored beyond testing for omitted variable bias and the use of control variables (Kline, 2015). The discussion chapter highlights the 'halo' effect of research and thus there could be some element of reverse causality to be explored in a future study.

8.10 Suggestions for future research

This section highlights suggested areas for future research, these are largely based on addressing the limitations of this study, but also include some general observations made during the course of the research. Firstly, solutions to the limitations are considered.

Future research could take an exploratory sequential design approach with the qualitative phase coming first to determine measures, or set of measures for entrepreneurial outlook, regional location and level of staff experience. These could then be objectively tested for their influence on levels of income diversification to confirm or reject the relationships queried in this study.

For the more subjective and interpretivist researcher, some opportunities for future research are suggested by the findings of this study. Namely to explore the role of leadership, strategy and vision in achieving a diversified income portfolio. To build on this study, the research would need to be evaluating in the context of relative levels of income diversification. In other words, what is it about the leadership, strategy and vision of a university that explains why it is more financially diversified than another?

Examining the role of a university's estate, housing and facilities in third-stream income generation and thus income diversification would also address a gap in this and the existing research. This should include the disaggregation of any third-stream, summer-school or conference income from core undergraduate student accommodation and catering income.

As this was not an international comparative study, this research did not consider the national differences in institutional autonomy derived from the national frameworks in which they are situated. As mentioned, the qualitative findings did highlight the influence of the regulatory environment and funding formulas on institutional behaviour when it comes to income generation. This is consistent with prior research (Estermann & Pruvot, 2014) and

worthy of further investigation. To what extent are universities financially diversified through pursuing what they perceive they can secure funding for, or are they genuinely being entrepreneurial in self-generating income?

Whilst the qualitative findings highlighted a strong perception that research builds reputation, which attracts higher-margin international students, which subsidises research, which builds reputation cycle, it would be interesting for future research to test this assumption.

Considering the extant research focus, an international comparison study of levels of income diversification using the approach to measurement presented by this research would advance to the international debate in the literature and give additional insight to university leaders and policymakers.

Finally, given the sector's ongoing uncertainty and challenge in England, a number of interview participants suggested reproducing this study in five years' time would develop further valuable insights. Meanwhile the national diversification index for England can be updated annually in line with the latest data releases from HESA each April.

8.11 Chapter conclusion

This research confirms that each university, as a function of its history, has different resources and capabilities available to it, and that these unique bundles of resources are a significant factor in explaining inter-university variation in levels of income diversification.

Although the contributions of this research have been detailed in this chapter, the key contributions of this study are summarised in this conclusion.

Firstly, in developing a model for measurement of income diversification in publicly-funded higher education institutions, this study presents a consistent measure for comparative research and a robust dependent variable with which to test the effects of explanatory variables, both of which have been sorely lacking in the available research.

Secondly, the income diversification measure developed enables the antecedent factors from prior research to be statistically tested to offer a more nomothetic explanation than currently exists.

Thirdly, the antecedent factors identified by this explanation means that university leaders can prioritise strategic focus on those factors that will have the greatest influence in achieving a diversified income portfolio and thus reducing vulnerability and improving financial stability.

Finally, understanding the antecedents and outcomes of income diversification helps guide policymakers to consider how they can support universities to be more financially sustainable.

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Appendix A: The National Income Diversification Index 2018

University	Index score	Core tuition	Core funding	Core resrch.	Core other	Invest. Donat.	Third-stream
The University of Oxford	0.19	18%	15%	27%	18%	5%	17%
Imperial College London	0.20	24%	17%	24%	15%	3%	18%
King's College London	0.21	31%	18%	16%	15%	2%	17%
University College London	0.22	30%	17%	25%	14%	1%	14%
The University of Bristol	0.23	35%	19%	18%	16%	1%	11%
The University of Liverpool	0.24	38%	16%	19%	12%	2%	12%
The University of Manchester	0.24	39%	17%	15%	13%	2%	13%
The University of Southampton	0.25	39%	16%	12%	13%	1%	20%
The University of Birmingham	0.26	41%	17%	11%	12%	1%	18%
The University of Leeds	0.26	42%	17%	9%	16%	1%	15%
The University of Sheffield	0.26	42%	17%	14%	12%	1%	14%
The University of York	0.26	42%	14%	10%	19%	1%	14%
Newcastle University	0.27	42%	17%	6%	14%	1%	19%
Queen Mary University of London	0.27	41%	21%	17%	8%	0%	13%
The University of Cambridge	0.27	13%	11%	18%	44%	3%	11%
The University of Leicester	0.27	44%	15%	12%	11%	1%	17%
The University of Reading	0.28	45%	13%	8%	16%	8%	10%
University of Nottingham	0.28	44%	17%	8%	14%	1%	15%
The University of Warwick	0.28	44%	12%	10%	20%	1%	13%
The University of Surrey	0.28	46%	14%	6%	15%	5%	15%
Loughborough University	0.29	43%	17%	3%	16%	1%	21%
University of Durham	0.29	47%	15%	13%	16%	2%	7%
Keele University	0.30	46%	15%	7%	20%	1%	10%
The University of Bath	0.30	47%	16%	8%	17%	1%	10%
The University of Lancaster	0.30	46%	15%	5%	15%	0%	19%
London School of Economics	0.31	49%	8%	5%	20%	4%	13%
The University of Exeter	0.31	49%	14%	8%	16%	1%	13%
The University of East Anglia	0.32	50%	15%	8%	13%	1%	12%
The University of Essex	0.33	49%	11%	5%	24%	0%	11%
Brunel University London	0.33	50%	16%	8%	21%	0%	5%
The University of Sussex	0.34	52%	15%	8%	17%	1%	7%
Royal Holloway University	0.36	53%	16%	6%	18%	1%	5%
The University of Kent	0.36	54%	16%	5%	18%	0%	7%
University of Hertfordshire	0.37	54%	12%	1%	19%	1%	13%
Aston University	0.39	58%	15%	3%	12%	1%	12%
The University of Hull	0.41	59%	17%	1%	11%	2%	9%
University of Plymouth	0.41	59%	20%	4%	11%	0%	6%
SOAS University of London	0.42	61%	14%	6%	6%	3%	9%
Oxford Brookes University	0.43	60%	11%	1%	21%	0%	6%
The University of Bradford	0.43	61%	17%	2%	10%	1%	8%
University College Birmingham	0.44	57%	30%	0%	12%	1%	0%

University	Index score	Core tuition	Core funding	Core resrch.	Core other	Invest. Donat.	Third-stream
The University of Central Lancashire	0.44	61%	17%	1%	7%	0%	13%
The University of Lincoln	0.44	62%	15%	0%	10%	1%	12%
The University of Brighton	0.44	62%	15%	2%	13%	1%	7%
Anglia Ruskin University	0.45	63%	12%	1%	6%	0%	19%
University of Derby	0.45	62%	19%	0%	9%	0%	9%
Southampton Solent University	0.45	63%	14%	0%	14%	0%	9%
University of the West of England	0.45	63%	13%	2%	15%	1%	7%
Teesside University	0.46	63%	17%	0%	7%	1%	12%
Goldsmiths College	0.46	64%	15%	2%	13%	0%	6%
The University of Wolverhampton	0.46	63%	15%	0%	9%	0%	13%
The University of Greenwich	0.46	64%	15%	2%	10%	1%	8%
Staffordshire University	0.46	63%	21%	0%	6%	0%	10%
University for the Creative Arts	0.47	61%	24%	0%	13%	0%	1%
The University of Chichester	0.47	64%	13%	0%	18%	0%	4%
Roehampton University	0.48	64%	15%	1%	18%	0%	1%
University of Northumbria	0.48	66%	13%	1%	14%	0%	5%
Buckinghamshire New University	0.48	66%	13%	0%	14%	0%	7%
London South Bank University	0.49	66%	16%	0%	11%	0%	6%
The University of Portsmouth	0.49	67%	14%	2%	8%	0%	8%
University of the Arts, London	0.49	67%	15%	0%	11%	1%	6%
Kingston University	0.49	66%	16%	1%	14%	1%	3%
University of St Mark and St John	0.49	65%	11%	0%	21%	1%	1%
University of Gloucestershire	0.50	67%	14%	0%	14%	0%	4%
Falmouth University	0.50	63%	15%	0%	16%	0%	5%
Leeds Beckett University	0.50	67%	13%	0%	11%	0%	8%
Middlesex University	0.50	68%	14%	1%	12%	0%	6%
University of Chester	0.50	67%	14%	0%	10%	0%	8%
The University of Westminster	0.50	68%	15%	1%	10%	1%	6%
Coventry University	0.50	68%	12%	1%	5%	1%	14%
University of Cumbria	0.51	68%	13%	0%	12%	0%	7%
London Metropolitan University	0.51	66%	23%	0%	5%	1%	6%
The University of Salford	0.51	68%	16%	1%	7%	0%	8%
The University of Northampton	0.51	69%	14%	0%	12%	1%	4%
The University of Huddersfield	0.52	69%	16%	2%	5%	1%	7%
Edge Hill University	0.52	67%	11%	0%	18%	0%	4%
The University of West London	0.52	69%	15%	0%	12%	0%	4%
The University of Winchester	0.52	68%	10%	0%	19%	0%	2%
St Mary's University, Twickenham	0.52	69%	13%	0%	14%	0%	4%
Bournemouth University	0.53	70%	14%	1%	10%	0%	5%
Manchester Metropolitan University	0.53	69%	16%	0%	9%	0%	6%
The Arts University Bournemouth	0.53	68%	16%	0%	12%	0%	3%
The University of East London	0.53	70%	15%	1%	12%	0%	1%
Canterbury Christ Church University	0.54	70%	12%	0%	13%	0%	4%
York St John University	0.54	70%	9%	0%	19%	0%	2%
Liverpool Hope University	0.54	70%	14%	0%	12%	0%	3%

University	Index score	Core tuition	Core funding	Core resrch.	Core other	Invest. Donat.	Third-stream
University of Bedfordshire	0.55	72%	12%	0%	7%	0%	8%
University of Worcester	0.56	72%	11%	0%	13%	0%	4%
Leeds Arts University	0.56	64%	33%	0%	1%	1%	0%
City, University of London	0.56	73%	12%	3%	4%	1%	7%
The Nottingham Trent University	0.56	72%	14%	1%	7%	0%	6%
Leeds Trinity University	0.56	72%	12%	0%	15%	0%	1%
Bath Spa University	0.57	72%	13%	1%	12%	1%	1%
Birmingham City University	0.58	74%	13%	1%	7%	0%	5%
Liverpool John Moores University	0.58	73%	18%	1%	2%	0%	6%
Sheffield Hallam University	0.58	74%	14%	0%	5%	0%	7%
Bishop Grosseteste University	0.58	74%	11%	0%	13%	0%	1%
De Montfort University	0.59	74%	15%	0%	5%	1%	5%
The University of Bolton	0.59	74%	17%	1%	6%	0%	2%
The University of Sunderland	0.60	75%	14%	1%	7%	0%	4%
Newman University	0.61	75%	14%	0%	9%	0%	2%
Norwich University of the Arts	0.62	76%	14%	0%	7%	2%	1%

Note. Figures reflect 5-year averages 2012/13 to 2016/17. Pre '92 universities are shaded grey

Appendix B: Mapping HESA tables to reflect changes to SORP

Mapping the old FSR tables, to the new Finance table

Date 2015-08-07 Version 1.0

Old FSR table number	Old FSR table name	New Finance table number	New Finance table name	Notes of change
Title_Page		Title_Page		Many changes to the quality rules – more are now included. Material items question added.
Table_1	Consolidated income and expenditure account	Table_1_UK	Consolidated statement of comprehensive income and expenditure	Considerable change with new SORP
Table_2	Consolidated statement of recognised gains and losses	Table_2_UK	Consolidated statement of changes in reserves	Considerable change with new SORP
Table_3	Consolidated balance sheet	Table_3_UK	Consolidated balance sheet	Considerable change with new SORP
		Table_3_Scotland	Consolidated balance sheet - Scotland	New table
Table_4	Consolidated cash flow statement	Table_4_UK	Consolidated statement of cash flows	Considerable change with new SORP
Table_5a	Research grants and contracts – breakdown of income by BIS Research Councils, The Royal Society, British Academy and The Royal Society of Edinburgh and cost centre	Table_5_UK	Research grants and contracts – breakdown by source of income and HESA cost centre	Now combined Tables 5a and 5b into one table: Table_5_UK

Table_5b	Research grants and contracts – breakdown of income by cost centre	Table_5_UK	Research grants and contracts – breakdown by source of income and HESA cost centre	Minimal change from tables 5a and 5b
Table_6a	Tuition fees and education contracts analysed by domicile, mode, level and source	Table_6_UK	Tuition fees and education contracts analysed by domicile, mode, level and source	Minimal change to the table
Table_6b	Income analysed by source	Table_7_UK	Income analysed by source	Minimal change
		Table_7_England	Funding body grants - England	New table
		Table_7_N_Ireland	Funding body grants – Northern Ireland	New table
		Table_7_Scotland	Funding body grants - Scotland	New table
		Table_7_Wales	Funding body grants - Wales	New table
Table_7	Expenditure by activity	Table_8_UK	Expenditure – breakdown by activity and HESA cost centre	Minimal change
Table_8	Capital expenditure	Table_9_UK	Capital expenditure	Minimal change
		Table_10_UK	Separately disclosed material items	New table
KFIs	KFI Calculations	KFIs	KFI Calculations	Major rewrite due to other template changes

Source: HESA Finance tables mapping document retrieved from <https://www.hesa.ac.uk/collection/c15031>

Appendix C: Introductory email to secure interviews

Example introductory email to obtain interview Post '92 institution Director of Finance

Subject line: My doctoral higher education finance quant results and the University of Hertfordshire

Dear [finance director]

I am a mature doctoral student at the University of Gloucestershire, investigating why some universities are more successful than others in generating income from a range of sources and thus diversifying their income portfolio. My many years board-level experience of product and market diversification in partnership with higher education institutions has sparked the inquiry!

I have just completed extensive analysis of secondary and archival data for all the publicly-funded universities in England (financial years 2012/13 -2016/17). The purpose; to identify the most significant resources and capabilities of an institution that are associated with high levels of income diversification. The University of [place] has emerged as the most financially diverse Post'92 institution (applying the Herfindahl measure of concentration/diversification to all income sources including third-stream). I am keen to get your perspective on the resource-based findings that are suggested to have had an influence on this.

The request is for one hour of your time, during which I will present the quantitative findings (including individual analysis on [place]). Your views are an invaluable source of information to support this research, so I hope you see this as a mutually interesting opportunity. You are welcome to request sight of the interview questions in advance.

Please let me know some suitable dates I could visit, or the person best to liaise with to finalise arrangements.

Kindest regards

Martine Garland

University of Gloucestershire

Appendix D: Interview guide

Institution:		
Interviewee:		
Job title:		
Interviewer:		
Date:	Time:	Duration:

Introduction:

- Interviewer to introduce self
- Introduce the purpose of the research
- Ask the interviewee to provide a bit of background on themselves and their role at the university (also has their experience largely been in Pre or Post '92 institutions, or indeed industry).

Describe the format and the duration of the interview:

- Quantitative results presented during which, a range of questions will be asked
- Results presented by way of printed slides in an A4 display folio
- A follow-up meeting can always be arranged to discuss their individual results in more detail if desired
- Request option to name their role and institution in participant summary
- Reassure all responses anonymised if request to name the institution is denied
- Outline data storage and protection
- Explain the use of recording devices
- Ask interviewee to sign consent form or would they prefer to wait until the end of the interview to evaluate option to name institution (when they know what they have said).

Pose the following questions in context of presenting the findings in graphs and charts:

- Present context and principle of income diversification and pose question if income diversification is something that [institution] is mindful of and actively pursuing? What are the main drivers for it?
- Present quantitative phase approach; the sample, the HHI calculation. Show the top 10 and bottom 10 to illustrate balanced portfolio. Present national picture and illustrate the binary divide, show league table top 40. Pose question if the divide is a surprise in this context?
- Present [institution's] 5-year income portfolio balance across the 6 categories and discuss. Pose question as to whether their balanced portfolio means they perceive to be less vulnerable?
- If appropriate considering the participants likely knowledge, show the results of the HESA security index and pose question regarding the apparent contradiction?
- Explain basic principles of the resource-based view of competitive advantage and pose question as to its relevance in this context?

- Present the factors found to have statistical significance (delineated by Pre and Post 92 universities) and post the question how and why do they think [each factor appropriate to their Pre or Post status] may influence level of income diversification?
- Present the statistical results on the significant factors for their institution and discuss.
- Present the non-significant factors (delineated by Pre and Post 92 universities) and asked if any surprise them as not being significant?
- The closing question ask if there is anything else that should have been considered when evaluating why some universities appear more successful than others in achieving a diversified income portfolio.

If needed, prompt questions could be:

- Why do you think that is so?
- Please tell me a bit more about ...
- You said x, please describe what you mean by that?
- Could you give me an example?

If needed, clarification/interpretation questions could be:

- Do you mean that...?
- Would it be correct to say...?

To close:

- Thank for time and do they have any questions they would like to ask.
- Check the recording devices have worked.
- If they have consented to institution being named, confirm they will be sent a copy of the transcript.
- Potentially consent form signed at this stage (ensure they have a copy to keep, point out interviewer contact details are on the bottom of form)
- Do they wish to be kept informed of outcome?

Appendix E: Interview consent form



Name of Researcher: Martine Garland

Title of study: Antecedents and outcomes of income diversification in higher education: Insights from England

Date of interview:

Please circle YES or NO

I confirm that I have had the purpose of the study explained to me and the researcher has answered any queries to my satisfaction. YES/NO

I understand that my participation is voluntary and that I am free to withdraw at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed. YES/NO

I understand that I can withdraw from the study, any data which identifies me or my institution at any time. YES/NO

I understand that anonymised data (i.e. data which do not identify me personally or my institution) cannot be withdrawn once they have been included in the study. YES/NO

I understand that any information recorded in the study will remain confidential and no information that identifies me or my institution will be made publicly available. YES/NO

I consent to the interview being audio recorded for the purposes of an accurate account of my responses and for data analysis purposes. YES/NO

I agree to take part in the above study. YES/NO

I offer the option for my job title and institution to be named and therefore understand this overrides statements 3 and 5. YES/NO

I understand if I offer this option, I will be sent a transcript of the interview extracts for review before any statements are used in the study. YES/Not applicable

Name of participant: _____

Signature of participant: _____ Date: _____

Contact:

Martine Garland, School of Business and Technology, University of Gloucestershire, Oxstalls Campus, Gloucester GL2 9HW. Email: [redacted]

Appendix F: Codebook for thematic analysis

Note the numerical values against the top-level thematic categories are an aggregate of the sub-themes below them.

Name	Description	Sources	References
1. Why the binary divide Pre and Post '92	A priori top-level thematic category that captures perspectives on the apparent binary divide between Pre and Post '92 universities in terms of ability to diversify income.	16	79
1.1 The Pre '92 focus on research	Themes related to an institution's research focus that are seen to be contributing to the binary divide in ability to diversify. This will mirror somewhat the 'how and why does research intensity' influence ability to diversify thematic category, but these perspectives were offered in a different context.	12	18
1.1.1 Drives income and balances the portfolio	A theme that captures perspectives on a research focus meaning Pre '92s have greater levels of research income which balance the portfolio against income from teaching.	10	11
1.1.2 Reputation for and history of research	A theme that captures perspectives on a research focus meaning Pre '92s have greater reputation for, and history of research.	5	5
1.1.3 Disciplinary breadth and scale	A theme that captures perspectives on Pre '92 research focus with disciplinary breadth and scale creates greater opportunities.	2	2
1.2 Pre '92 overall history and reputation	Themes related to an institution's overall history and reputation that are seen to be contributing to the binary divide. This will mirror somewhat the 'how and why does	3	8

Name	Description	Sources	References
	reputation influence ability to diversify thematic category, but these perspectives were offered in a different context.		
1.2.1 Access to funds and fundraising	A theme that captures perspectives on history and reputation meaning Pre '92s have greater access to funds and success in fundraising.	3	6
1.2.2 International reputation	A theme that captures perspectives on history and reputation meaning Pre '92s have a greater international reputation.	2	2
1.3 Pre '92 scale and scope	A theme that captures perspectives on the scale and scope of Pre '92 institutions contributing to the apparent binary divide.	2	2
1.4 The Post '92 focus on teaching	A theme that captures perspectives on Post '92s focus on teaching and dependence on tuition fees contributing to the apparent binary divide.	11	24
1.4.1 Lack of research	A theme that captures perspectives on a lack of research due to Post '92 focus on teaching.	6	7
1.4.2 Limited opportunity for income generation	A theme that captures perspectives on limited opportunities to generate other income due to Post '92s focus on teaching and lack of research to leverage.	7	7

Name	Description	Sources	References
1.4.3 Income concentrated in tuition fees	A theme that captures perspectives on Post '92s income being concentrated in tuition fees as a result of their focus on teaching.	4	5
1.4.5 Lack of capacity	A theme that captures perspectives on Post '92s having a lack of capacity to diversify their income due to their focus on teaching.	3	5
1.5 Time lag for research	A theme that captures perspectives on the time lag for the benefits of research to be realised contributing to the apparent binary divide as Pre '92s had a head start.	2	2
1.6 Implications and challenges	Themes related to the challenges presented by, and implications of this apparent binary divide in ability to diversify income.	9	25
1.6.1 Hard to alter situation	A theme that captures perspectives on the challenges of removing the apparent binary divide in institutions' ability to diversify their income sources.	7	12
1.6.2 Resentment	A theme that captures feelings of resentment toward Pre '92s in this apparent binary divide in institutions' ability to diversify their income sources.	3	5
1.6.3 Strong get stronger	A theme that captures perspectives that the strong get stronger in this apparent binary divide.	3	4

Name	Description	Sources	References
1.6.4 Bankruptcy	A theme that captures perspectives on the potential implication of Post '92 institutions going bankrupt if they cannot overcome the binary divide in ability to diversify income i.e. be less dependent on tuition fees.	3	3
2. Overall competitive advantage	A priori top-level thematic category that captures perspectives on how and why a university's overall resources and capabilities may give it an advantage in ability to diversify income.	7	15
2.1 Capacity to take a risk and be flexible	A theme that captures perspectives on competitive advantage through capacity to take risks and be more flexible.	3	8
2.2 Resilience and financial sustainability	A theme that captures perspectives on competitive advantage through resilience and financial sustainability.	2	3
2.3 Some constrained by resources	A theme that captures perspectives on the lack of resources and capabilities constraining an institution in terms of competitive advantage.	2	2
2.4 Something to build on	A theme that captures perspectives on competitive advantage through having something to build on in diversifying income.	2	2
3. How and why research intensity	A priori top-level thematic category that captures perspectives on how and why a focus on research may influence ability to diversify income.	13	41

Name	Description	Sources	References
3.1 Balances the portfolio	A theme that captures perspectives on a research focus generating more research income to balance the portfolio against teaching income.	7	10
3.2 Creates opportunities to generate income	A theme that captures perspectives on a research focus creating more opportunities to generate income from diverse sources.	8	9
3.3 Enables applied and collaborative	A theme that captures perspectives on a research focus enabling more applied and collaborative research which generates income.	5	7
3.4 Research interconnectedness	A theme that captures perspectives on the interconnectedness between research, reputation and recruitment i.e. influences other income streams.	5	7
3.5 Creates IP	A theme that captures perspectives on a research focus creating more income generating IP.	2	4
3.6 Can leverage it	A theme that captures perspectives on a research focus providing something that can be leveraged to generate more income.	3	4
4. How and why size of institution	A priori top-level thematic category that captures perspectives on how and why the size of an institution may influence its ability to diversify income.	7	10

Name	Description	Sources	References
4.1 Breadth brings opportunity	A theme that captures perspectives on the increased size of an institution creating more breadth that brings opportunity to diversify income.	4	5
4.2 More resources available to exploit	A theme that captures perspectives on the increased size of an institution meaning there are more resources available to exploit to generate diversified income.	3	5
5. How and why STEMM orientation	A priori top-level thematic category that captures perspectives on how and why a STEMM orientation may influence ability to diversify income.	8	13
5.1 Easier to engage on commercially	A theme that captures perspectives on it being easier to engage commercially around STEMM subjects that generate third-stream income.	4	5
5.2 Attracts funding	A theme that captures perspectives on STEMM subjects attracting more funding and therefore more opportunities for core and third-stream income.	3	3
5.5 Attracts international students	A theme that captures perspectives on STEMM subjects attracting international students that then diversifies an institution's tuition fee income and reduces dependence on home/EU students.	2	3
5.6 It's not about patents, licences etc	A theme that captures perspectives on STEMM not necessarily providing any greater opportunity for patents, licences etc. than other disciplines.	2	2

Name	Description	Sources	References
6. How and why staff incentives	A priori top-level thematic category that captures perspectives on how and why having staff incentives for business engagement influence ability to diversify income.	6	10
6.1 Engaging or motivating academics	A theme that captures perspectives on staff incentives for business engagement having a positive influence by engaging or motivating academics toward income generating activities.	3	5
6.2 Examples of approaches	A theme that captures examples of various approaches to incentivisation adopted by institutions.	4	5
7. How and why reputation	A priori top-level thematic category that captures perspectives on how and why reputation may influence ability to diversify income.	7	10
7.1 Reputation interconnectedness	A theme that captures perspectives on how connected everything is to reputation i.e. research builds reputation, reputation attracts students and all of it generates income.	4	5
7.2 Creates international opportunities	A theme that captures perspectives on international income generating opportunities being influenced by reputation.	3	3
7.3 Provides a historical basis	A theme that captures perspectives on reputation providing a historical basis for income diversification.	2	2

Name	Description	Sources	References
8. How and why dedicated staff	A priori top-level thematic category that captures perspectives on how and why having staff dedicated to business engagement may influence ability to diversify income.	3	7
8.1 Dedicated specialists	A theme that captures perspectives that staff dedicated to business engagement are likely to be specialists and therefore more effective in supporting income diversification.	2	4
8.2 More responsive and flexible	A theme that captures perspectives that staff dedicated to business engagement are likely to be more responsive and flexible in supporting income diversification.	2	3
9. How and why location	A priori top-level thematic category that captures perspectives on how and why location may influence ability to diversify income.	13	33
9.1 Attraction	Themes related the attractiveness of a location as having an influence on ability to diversify income.	6	12
9.1.1 Attracts staff and students	A theme that captures perspectives on location being attractive to income generating staff and students.	3	5
9.1.2 Attracts funding	A theme that captures perspectives on location attracting particular funding.	2	4

Name	Description	Sources	References
9.1.3 Attracts summer schools	A theme that captures perspectives on location being attractive to income generating summer schools.	1	3
9.2 Big city offers more opportunities	A theme that captures perspectives on the nature of a big city offering more opportunities to generate income from a variety of sources.	5	8
9.3 Proximity to market opportunities	Themes related to proximity as having an influence on ability to diversify income.	5	7
9.3.1 Proximity to business sector	A theme that captures perspectives on the proximity of the business sector having a positive influence on ability to generate income.	4	4
9.3.2 Proximity to public sector	A theme that captures perspectives on the proximity of public sector organisations having a positive influence on ability to generate income.	2	3
9.4 Quirks creating opportunities	A theme that captures perspectives on particular quirks of the location or region that create opportunities for income generation.	3	4
9.5 Less local competition from institutions	A theme that captures perspectives on how being in a region with less universities can support income diversification.	2	2

Name	Description	Sources	References
10. Non-significant resources query	A priori top-level thematic category that captures perspectives on any resources the participants were surprised to learn did not have a statistically significant influence on ability to diversify.	7	9
10.1 Entrepreneurial outlook	A theme that captures perspectives on surprise that entrepreneurial outlook was not significant in both Pre and Post '92 universities.	3	4
10.2 Post '92 STEMM orientation	A theme that captures perspectives on surprise that a STEMM orientation was not significant in Post '92 universities.	3	3
10.3 Level of experience in business engagement	A theme that captures perspectives on surprise that entrepreneurial outlook was not significant in both Pre and Post '92 universities.	2	2
11. Other factors not considered in quantitative phase	A priori top-level thematic category that captures perspectives on potential limitations to the research in terms of factors not studied in the quantitative phase that may have an influence on ability to diversify income.	14	55
11.1 Leadership	A theme that captures perspectives on the importance of leadership in diversifying income.	8	17
11.2 Estate, housing and facilities	A theme that captures perspectives on the importance of the university estate, housing and/or facilities in diversifying income.	10	16

Name	Description	Sources	References
11.3 Strategy and vision	A theme that captures perspectives on the importance of strategy and vision in diversifying income.	4	8
11.4 Disciplinary mix	A theme that captures perspectives on the importance of disciplinary mix in diversifying income.	5	7
11.5 Culture, confidence and flexibility	A theme that captures perspectives on the importance of culture, confidence and flexibility in diversifying income.	4	7
12. HESA security index contradiction	A priori top-level thematic category that captures perspectives on the apparent contradiction in the HESA financial security index that shows Post '92 institutions being in a stronger financial position than Pre '92s.	8	19
12.1 Post '92 lower overheads thus higher surplus	A theme that captures perspectives on Post '92s having lower overheads and therefore higher surpluses which puts them higher up the security index.	4	7
12.2 Doesn't show whole picture	A theme that captures perspectives on the HESA security index not showing the whole picture which may explain why Post '92 institutions appear to be in a stronger position.	5	5
12.3 Pre '92s lower liquidity thus tend borrow more	A theme that captures perspectives on Pre '92s having lower liquidity and thus tend to borrow more which puts them lower down the HESA security index.	4	4

Name	Description	Sources	References
12.4 Pre '92 lower surpluses	A theme that captures perspectives on Pre '92s having lower surpluses which puts them lower down the HESA security index.	2	3
13. Mindful of the need to diversify income	A priori top-level thematic category that captures perspectives on whether the financially diversified institutions are mindful of the need to diversify income and the key considerations in their approach.	15	89
13.1 Agreement	A theme that captures agreement that the institution is mindful of the need to diversify its income sources.	14	24
13.2 Diversified as a side-effect of strategy	A theme that captures perspectives that whilst mindful of the need to, a diversified income base is a side-effect of the overall institutional strategy.	4	8
13.3 Key considerations	Themes related to the key participant considerations on income diversification	14	51
13.3.1 Diversified margin	A theme that captures perspectives on the importance of margin and profit considerations when diversifying income.	7	14
13.3.2 Cross-subsidies	A theme that captures perspectives on the complex cross-subsidies within university finances that need to be considered when diversifying income.	7	14

Name	Description	Sources	References
13.3.3 Diversifying within the sources	A theme that captures perspectives on the importance of diversifying within each of the sources of income to ensure minimum dependence on any one source of income.	8	15
13.3.3.1 Overexposure to students from China	A theme that captures perspectives confirming the driver being to reduce exposure to the Chinese student market.	3	3
13.4 Strategic issues	A theme that captures perspectives on the strategic issues that arise when diversifying income.	7	14
14. Drivers for income diversification	A priori top-level thematic category that captures perspectives on the drivers for income diversification.	14	38
14.1 Reducing exposure financial risk	A theme that captures perspectives confirming the driver being to reduce exposure to financial risk.	12	22
14.1.1 Overdependence on tuition fee income	A theme that captures perspectives confirming the driver being to reduce dependence on tuition fee income.	4	6
14.2 Autonomy and freedom	A theme that captures perspectives confirming the driver being to increase institutional autonomy and financial freedom.	7	10

Name	Description	Sources	References
15. Outcome means less vulnerable	A priori top-level thematic category that captures perspectives on whether the institution perceive themselves to be less financially vulnerable having a more balanced income portfolio (as a result of diversification efforts).	11	16

Appendix G: Reflexive account of the data collection and analysis process

With its greater degree of researcher involvement and subjectivity, qualitative research needs the researcher to acknowledge the assumptions, experience and views they bring to the research and the influence they may have on the data (Braun & Clarke, 2006). Awareness of this serves to minimise researcher bias and aids confirmability (Lincoln & Guba, 1985). As Creswell suggests “researchers need to be reflexive and disclose what they bring to the narrative” Creswell and Miller (2000, p. 126).

Bolton defines reflexivity as “reflection upon one’s own perspective, values and assumptions” (Bolton, 2014, p. xxiii). As Bassot notes, “Reflective writing is more personal than other forms of academic writing” (2013, p. 14), thus this reflexive account is written in the first person.

In understanding the concept of reflexivity, I found Argyris (1982) ‘Ladder of Inference’ particularly helpful in appreciating the recursive way assumptions are built and therefore the need to question the assumptions I make, and the conclusions I draw.

As noted in the qualitative chapter, to aid this process a research notebook was kept during the data collection and analysis process. The research notebook also became a research journal to capture thoughts about my own experiences with these concepts and how my assumptions may be influencing my views on a particular question or thematic interpretation. As Bridges describes, his journal became a “kind of phenomenological description of [his] own experience” (1999, p. 222). The dated notes also provided me with a clear map of the journey to be referred back to and reflected upon (Brockbank, 2006, pp. 282-283). Working in chronological order, a few examples are given here that reflect consideration of my worldview, values and assumptions in the process.

Researcher influence can begin in the development of the interview guide, why did I ask the questions that I asked? The nature of the explanatory sequential design actually meant this was reasonably objective i.e. the questions asked were simply in response to the results of the quantitative phase. However, the inclusion of additional questions to evaluate the theoretical assumptions in the literature, reflected the value I placed on wanting reassurance the literature applied in this context.

The decision to use a visual summary of the quantitative results as a platform for the interview questions reflected my perspective that a participant should see evidence there is

a relationship before being asked why that relationship might exist (and that visual representations aid understanding).

When asking the questions during the interview, I was mindful to ensure my own views on the quantitative results were not made clear. That said, in consideration of any potential power imbalance, the participants would have recognised their own seniority and thus any views I may have had would have been unlikely to influence their responses. The only quantitative result that had really surprised me was the Pre '92s being so much more financially diversified. This stemmed from perceiving Post '92 institutions as being more agile, commercial and entrepreneurial in their outlook (what I hadn't factored because I did not know it at that initial stage, was the hugely dominant role research intensity was to play).

It was also important I not indicate agreement or disagreement with the participant responses, this was made easier by the participants all largely having similar views on the concepts under discussion.

It was clear the topics participants had a particular interest in, my involvement could be seen by the use of probes if a participant was not discussing the established area of interest in sufficient detail.

As King (2012) suggests, coding data to themes is an interpretive act, fortunately the use of the *a priori* themes grounded in the quantitative results helped to reduce researcher bias in the development of the high-level themes. Within the sub-themes, my post-positivist perspective became apparent in that themes were very grounded in the data rather than abstract conceptualisations. When samples of coded data were peer reviewed, the feedback was that the logic of the allocations was easy to see i.e. it was clear why data had been coded to the theme as labelled.

The decision was made to transcribe the interview responses verbatim so there was no potential for researcher influence on what was or was not, deemed important to the study.

It was important the themes developed related only to the research question (Crabtree & Miller, 1999), however, it was a source of some frustration to realise quite a lot of what I'd painstakingly transcribed having driven hours to get it, was simply not relevant to the research question. This was more a reflection of participant's tendency to talk on what was important to them, than a failure of the interview guide. Moreover, some participants grasped

the concepts under discussion more readily than others (or were better at sticking to the point) and thus provided a richer, more relevant narrative.

I noticed that I seemed to steer away from coding data to multiple themes, it happened with some of the more 'reputation' oriented narratives, but generally my post-positive nature wanted cut and dried clarity as to what the text was saying. Unlike some other forms of thematic analysis, template analysis encourages this anyway (perhaps one of the reasons I was drawn to it).

One of the themes I wrestled with was that of 'Resentment' among the Post '92s, it felt controversial to include it, but reading through the transcripts, it felt clear to me that, that is what was coming through. Similarly, it felt like some Pre '92s had a real indifference toward the Post '92s but it was less explicit, or at least less easy to code. I would not say either of these were preconceived ideas I may have had and therefore it was not that I was more sensitive to it.

When selecting themes to analyse in the final interpretation, NVivo helped minimise researcher bias by making it easy to see the dominant themes in the data and thus focus on what was important to the sample.

In reviewing the final interpretation section, I reflected on whether there was a risk I may have placed more emphasis on the perspectives of the senior figures in the high-profile institutions as in some areas they were quoted more frequently. I went through the narrative compiling a tally of the source of the quotations used, and overall they were reasonably balanced between Pre and Post '92 universities. There were slightly more quotes from Pre '92s but this was inevitable as there were more questions directed at those participants (as a result of them having more significant factors in the quantitative phase).

