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False Equivalence? Differences in the Post-16 Qualifications Market and Outcomes in Higher Education

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Abstract

This paper investigates differences in higher education outcomes according to the qualifications with which students enter university. The study is situated in the context of increasing marketization, competition and privatization in post-16 qualifications, combined with an increase in students entering higher education with either vocational qualifications (e.g. the BTEC) or a mix of academic and vocational qualifications. It draws upon literature on markets in education as well as studies on educational choice and pathways to examine whether different entry qualifications offer equal chances of success in higher education. Using multilevel logistic regression, the analysis examines the relationship between types of entry qualifications (academic, vocational and mixed) and the probability of achieving a first or upper-second class degree at university, which are associated with increased opportunities in the labour market and postgraduate study. Controlling for a range of demographic and institutional characteristics, the analysis identifies a strong decrease in the probability of a first or upper-second class degree for students who enter higher education with vocational qualifications. These results are discussed in relation to theories of markets in education and social class and education.

Keywords: vocational education, higher education, qualifications, educational policy, social class, outcomes of education

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This paper investigates the relationship between degree outcomes in higher education and students' entry qualifications. The study takes place in the context of multiple initiatives to marketize education in the United Kingdom. Higher education has been marketized through a long series of policies stemming from neoliberal reforms of the 1980s (Olssen and Peters, 2005). Recent initiatives include raising tuition fees, publication of key information on institutions that aims to empower students as consumers, and loans that position higher education as an individual human capital investment (BIS, 2011). The goal of these reforms is to create an efficient higher education system that simultaneously serves the interests of students and the labour market with minimal state intervention.

Additionally, post-secondary qualifications have been marketized by the introduction of non-state actors, including for-profit companies (e.g. Pearson) and non-profit organizations (e.g. Cambridge Assessment, the International Baccalaureate Organization). The diversity of qualifications available to students is intended to cater to a range of academic interests and abilities, while offering the flexibility to move between academic and vocational pathways. For example, Pearson's BTECs - which were acquired from the nonprofit EdExcel in 2003 - are described as "vocational qualifications designed to give students the skills they need to either move on to higher education or go straight into employment" (Pearson, 2015a). Thus,

the vocational qualifications are presented as a parallel stream for entry into higher education, as well as a qualification oriented to direct labour market entry.

We use a multilevel logistic regression analysis to investigate how outcomes differ across post-16 qualifications, according to a range of student and institutional variables. Our primary aim is to determine the extent to which outcomes differ by entry qualifications when controlling for students' background. Additionally, we seek to establish how this difference in outcomes by qualifications is related to characteristics of the higher education institutions (HEIs) students attend. We begin by situating the study in literature on markets in education and choice in educational qualifications, and then present the methods and data used in the study. Our findings comprise an overview of key relationships in the data and a set of statistical models that examine how outcomes vary by entry qualifications when controlling for demographic and institutional factors. We conclude by discussing the contribution of the analysis to the literature on markets and educational choice and identifying areas for future research.

1. Literature Review

In order to appropriately contextualize and frame our enquiry, we draw upon two interrelated bodies of literature. The first concerns the political economy of market mechanisms in education, particularly those that facilitate the involvement of the private sector. This work contextualizes both higher education and the post-16 qualifications sector, which now involves a combination of both nonprofit and for-profit actors. The second body of literature discusses the issue of choice, qualifications and pathways, examining how choice in post-16 education is associated with access to future studies and educational outcomes.

1.1 Markets and Privatization in Education

A widely observed trend in education policy - both globally and in the United Kingdom - has been the sustained shift towards competitive market systems. As an educational "policyscape," neoliberalism has left virtually no aspect of education untouched; from an increased emphasis on school choice to private funding of higher education (Carney, 2009; Jongbloed, 2003; Marginson, 2013). Drawing upon their foundations in neoclassical political economy, neoliberal discourses emphasize the increases in efficiency and innovation facilitated by competitive markets (Peck, 2010). However, some critical perspectives on political economy (e.g. Marx, 1865; Wallerstein, 2004; Jessop, 2002) point out that the competitive markets and the drive for efficiency also result in continued downward pressures on income, which in turn create an impetus for growth and expansion. In the context of education markets, these forces have resulted in the entry of private capital and third sector organizations into domains that were previously public. The result is what Ball (2007) terms privatization *in* education, (as opposed to privatization *of* education), or "hidden privatization" (Ball and Youdell, 2007), namely the involvement of the private sector through a variety of arrangements (including public-private partnerships, contracting services, and financing) that involve the private sector but fall short of outright privatized provision.

In vocational education, the trend towards marketization is documented by Souto-Otero

(2013), who contrasts Conservative policies in the 1980s that reduced state funding for and trade union participation in vocational education with the origins of vocational education in the welfare state. Privatization *in* vocational education is evident in the more recent entry of for-profit qualifications providers, for example Pearson's acquisition of the non-profit EdExcel between 2003 and 2005 (Pearson, 2015b).[1] Although privatization is not specific to vocational qualifications, its presence in this sector through the BTEC is particularly strong. Furthermore, the number of students with BTECs entering higher education has risen steadily in recent years, with estimate of annual growth ranging from 16% to 30% (Pearon, 2011; Grove, 2014). HEFCE (2015b) also notes that number of students holding a mix of BTEC and A-level qualifications grew tenfold between 2006 and 2013 (from 2,100 to 21,000). Thus, the presence of privatized qualifications is rising, although it is entwined with the larger non-profit qualifications sector.

The marketization of higher education - specifically the move towards self-funding through increased student fees - also introduces elements of risk and uncertainty into educational decision-making: because of larger loans, students are responsible for their choices regarding higher education for many years after they complete their studies, and they must therefore give increasing consideration to risk in their decision-making (Cigno and Luporini, 2009, Wilkins et al, 2013). These risks include uncertainty about the labour market value of their qualification as well as risks pertaining to their own performance in higher education. While they are equipped with more information about employment outcomes from institutions and courses, students assume the risk associated with poor degree outcomes (i.e. lower overall marks which may hold less value in the labour market).

As research suggests that competitive market systems can be a poor mechanism for academic quality (Dill, 2007), the marketization of the vocational sector could undermine the value of vocational qualifications as a progression route to higher education. Simultaneously, the market system places the risk of such shortcomings onto students rather than qualification providers. Therefore, a key empirical question is the extent to which differences in qualifications obtained in a heterogeneous public/private sector relate to differences in outcomes in higher education.

1.2 Choice and Qualifications

The heterogeneous post-16 qualifications market creates a complex environment that emphasizes decision-making and consideration of future plans and aspirations. In their longitudinal study of students in post-16 education, Ball et al (2000) show how choice is often a mechanism for class reproduction, as students and families equipped with the appropriate habitus more successfully navigate the array of choices available to them. The link between choice and social reproduction is a common theme in educational literature from other countries (Azzolini and Vergolini, 2014), with evidence that the influence of parental background on outcomes is greater in countries with more choice (Checchi and

[1] Pearson acquired a 75% stake in EdExcel in 2003 and full ownership in 2005.

Flabbi, 2007).

Literature also highlights the complex interrelations between educational choices, aspirations, class, and educational outcomes. In their study of social class and widening participation in higher education, Crozier et al (2008) show how social class is linked to both students' qualifications and their decisions about university, with students from working class backgrounds more likely to "hold academic qualifications and achievements which are tenuous in relation to the demands of their degree courses" (Crozier et al, 2008:170). They emphasise how students' academic and social backgrounds are important in choosing from a diverse array of HEIs, and that these institutions themselves are oriented to different types of students. Despite the existence of formally designated pathways into university and nominal equivalence to academic qualifications, students choosing vocational qualifications often do not consider such options seriously or are not aware of their options, and even articulate social stigma associated with their qualifications (Leathwood and Hutchings, 2003:142,151). Furthermore, widespread "anti-vocational prejudice" in governments has relegated vocational qualifications to a low priority in policymaking and contributed to a "deep-seated prejudice and negative valuing of vocationalism" (Hyland, 2002:287-8).

These patterns of differentiation are substantiated by studies of the progression of students with vocational qualifications into university. For example, Hoelscher et al (2008) find that students with vocational qualifications are more likely to study at post-1992 institutions and are underrepresented in some subject areas (e.g. Languages, Law, Medicine,) and overrepresented in others (e.g. Computer Science and Agriculture). More recently, an analysis from the Universities and Colleges Admissions Service (UCAS) stated:

> Data suggests that vocational qualifications, such as BTECs, do not facilitate progression to HE in the same way as A-levels. For example, for every 100 A-level students accepted into high tariff institutions in 2013, 3 BTEC applicants were accepted. By comparison, 49 BTEC students were accepted for every 100 A-level students at lower tariff institutions. (UCAS 2014, p. 6)

Literature on social class, educational choice and pathways, shows how policies aimed at widening participation in higher education (i.e. massification) enables access for "non-traditional" or "new students" (Leathwood and O'Connell, 2003), but despite accounts of their experiences in universities there is little research on how "non-traditional" entry qualifications relate to outcomes in higher education. Recent literature on outcomes in higher education (HEFCE, 2015a) focuses on differences in previous performance (i.e. entry tariff) rather than the heterogeneous qualifications themselves. Furthermore, students' own backgrounds intersect with the characteristics and identities of institutions in complex ways (Crozier et al, 2013); thus students' backgrounds, pathways into university, and institutional types should ideally be studied together. In combination with the literature on markets - which highlights the increasing risk in higher education decision-making (Wilkins et al, 2013) - our analysis of the literature thus indicates the need to study outcomes in higher education rather than access.

The positioning of the vocational qualifications as a route for progression into higher education hints at the possibility of ambiguous or informal hierarchies, raising the question of whether "alternative" or "nontraditional" pathways can ever truly be "separate but equal." Thus, literature on choice and qualifications points to many interrelationships between students' social backgrounds and their choices regarding higher education. Hence, there is a need to disaggregate qualifications themselves from social background, as far as it is possible, through a controlled analysis.

1.3 Synopsis of the Literature

In summary, our analysis of the literature identifies the following key points:

- The field of post-16 qualifications is heterogeneous, with a mixture of for-profit and nonprofit qualifications providers.
- Marketization of higher education and a move towards self-funding and increased debt creates substantial risk and uncertainty for students.
- There are complex interactions between social class and pathways into higher education, although the relationship between pathways into higher education and outcomes is less studied.
- A need for studies of outcomes in higher education by types of qualification, rather than access to or participation in higher education.

Based upon this review of the literature, we undertake an analysis of how degree outcomes in higher education relate to pathways into higher education (i.e. the qualifications with which students entered). We also investigate how these factors relate to social class and other demographic variables, as well characteristics of higher education institutions themselves.

2. Methods and Data

In order to investigate outcomes for students who enter higher education with vocational qualifications, we analyze data from the Higher Education Statistics Authority (HESA) in the United Kingdom. This dataset comprises records of all students who graduated from UK HEIs between the years 2009 to 2013 (five years total), and comprise the following variables:

Degree Outcome: A binary variable indicating whether students received a first or upper-second class degree, which is a common criterion in job selection and postgraduate admission (Crozier et al, 2008; Dolton and Vignoles, 2000; Tomlinson, 2008; Vasagar, 2012). We hereafter use the term "upper degree" to describe a positive value for this variable.

Entry Qualifications: Qualifications on entry are coded into three categories: "academic", "vocational" and "other," consistent with the approach of Hoelscher et al, (2008). We also create a code for students holding a mix of academic and vocational qualifications.

University Entry Tariff: A score measuring academic performance prior to higher education. The score is calculated according to criteria set by UCAS, which aims to

provide some comparability across different qualification types.

Gender: self-reported gender identity (coded as Male, Female, or other).

Low Participation Neighborhood (LPN): A binary variable indicating whether students' home address falls within a neighborhood with low participation rates in higher education. This variable is used as a proxy measure of social class.

Age on Entry: The age at which the student commenced study. We centre this variable on 18 as it is the most frequent value in the dataset. Values therefore correspond to the number of years above 18 at entry to higher education.

Part-Time Study: A binary variable indicating part-time study.

Year of Degree Award: The year in which the student graduated.

At the institutional level, we also analyze the following three variables:

Research intensity: measured as the percentage of institutional funding received from research assessment (often called quality-related or QR funding). The most research-intensive universities receive 57% of their funding from QR, while many institutions receive less than 1% of their budget from this source.

Graduate employment: the percentage of graduates employed or in further study six months after graduation.

We analyse these variables in two ways. First, we present a descriptive analysis of the data: this component of the analysis establishes the distributions of variables and the key relationships (i.e. how degree outcomes vary between students). The difficulty with this descriptive analysis is that most of the variables are related to one another, which makes testing causal hypotheses challenging. For example, while degree outcomes may be associated with entry qualifications, these entry qualifications differ according to demographic groups (age, gender, low participation neighborhood), which could be the underlying cause for the observed differences in outcomes.

To address this issue, we also perform a controlled analysis of the relationship between higher education outcomes and entry qualifications using multilevel logistic regression. These statistical models express the probability of an upper degree as an outcome of a set of predictor variables, which include entry qualifications and the demographic variables identified above. The results indicate the marginal change in the probability of an upper degree outcome associated with each variable in the model, controlling for the influence of all other variables. This approach disaggregates the effect of entry qualifications from underlying demographic variables. Additionally, the multilevel approach incorporates predictors at both the individual and institutional level, presenting an accurate balance of group-level effects (i.e. institutional differences) and individual characteristics (i.e. student qualifications and background).

The full specification of the models is provided in Equation 1; the outcome (Y_{ij}) represents

the probability of student *i* in institution *j* receiving a first or upper-second class degree, expressed as log-odds. This outcome is modeled as a function of the student's entry qualification, which is coded through two dummy variables (vocational and mixed) which represent the differences in outcomes between students with vocational qualifications and mixed qualifications relative to those with academic qualifications. The "academic qualifications" category is thus the reference against which other outcomes are compared, as indicated in the results below. β_0 represents the intercept (i.e. the baseline probability for a student with academic qualifications, a mean entry tariff, and a zero value on all other control variables). The parameters μj and εi represent the group (i.e. institution) and individual level residuals. By grouping residuals at the institutional level, the model accounts for differences in the number of upper degrees awarded between institutions. The effects for vocational and mixed qualifications (β_1 and β_2) are fixed across all institutions in Models 1 and 2. All other parameters in Model 1 (β_3-β_7) are the effects of control variables (i.e. LPN, entry tariff, gender, age on entry, part-time study and year of graduation, indicated as $X_{1\text{-}7}$) that are fixed across institutions. Model 2 adds interaction terms between vocational qualification outcomes and social class, and vocational qualifications and time. These terms test for specific relationships between outcomes for students with vocational qualifications from low participation neighborhoods, in addition to whether outcomes for students with vocational qualifications are changing over time. Model 3 estimates the terms for vocational and mixed qualifications as random effects – estimated independently for each institution (i.e β_1 and β_2 become β_{1j} and β_{2j}). This addition allows for investigation of how differences in outcomes vary across institutions, as for each institution differences in outcomes will be larger or smaller than the mean difference. Model 4 extends this analysis by relating differences across institutions to characteristics of the institutions themselves; β_{1j} and β_{2j} are regressed on quality-related research funding (QR) and employment outcomes (Emp), with a set of parameters γ and residuals μ.

MODEL 1

$$Y_{ij} = \beta_0 + \beta_1 VQ + \beta_2 MQ + \beta_{3\text{-}9} X_{1\text{-}7} + \mu_j + \varepsilon_i$$

MODEL 2

$$Y_{ij} = \beta_0 + \beta_1 VQ + \beta_2 MQ + \beta_{3\text{-}9} X_{1\text{-}7} + \beta_{10} VQ \times LPN + \beta_{11} MQ \times LPN + \beta_{12} VQ \times T + \beta_{13} MQ \times T + \mu_j + \varepsilon_i$$

MODEL 3

$$Y_{ij} = \beta_0 + \beta_{1j} \times VQ + \beta_{2j} MQ + \beta_{3\text{-}9} X_{1\text{-}7} + \mu_{0j} + \varepsilon_i$$

MODEL 4

$$Y_{ij} = \beta_{0j} + \beta_{1j} VQ + \beta_{2j} MQ + \beta_{3\text{-}9} X_{1\text{-}7} + \varepsilon_i$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} QR_j + \gamma_{12} Emp_j + \mu_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} QR_j + \gamma_{22} Emp_j + \mu_{2j}$$

Equation 1: Statistical model specification, in which VQ and MQ are dummy variables for vocational and mixed qualifications. LPN is a dummy variable for students from a low-participation neighborhood, which is used as a proxy for social class. T is the year of graduation, QR is the institutional funding from research quality assessment, and Emp is the graduate employment rate. $X_{1\text{-}6}$ is the full set of demographic control variables. All other statistical parameters estimated from the data and reported in Tables 3 and 4.

Parameters in logistic regression are expressed as changes in the log-odds of the outcome, which can be converted to a probability (see results below). Results for all model parameters were fit using maximum likelihood estimation in the R language for statistical computing with the "lme4" library (R Core Team, 2014; Bates et al, 2015).

Although our data represent the complete population of university graduates for the five years studied, we include standard errors and significance levels in our analysis, which are commonly used to draw inferences about a population from a sample. Our reasons for this approach are twofold. First, we are interested in drawing inferences from the five years studied to other points in time that are subject to the same policy environment and macroscopic contexts. Results for level 2 parameters (i.e. variables related to higher education institutions) can also be used to draw inferences about alternative approaches to institutional policy and management. Second, all effects in the regression will be non-zero; the ratio of the effect to the standard error (i.e. the significance level) provides an appropriate way to determine which relationships are more salient than others. As some relationships are non-significant, this approach is useful in determining those relationships in the data that are

more likely to be reliable. Because of the large sample size, we set our significance level (α) at 0.01 rather than 0.05 to avoid spurious results.

3. Analysis

3.1 Descriptive Statistics

Table 1 shows differences in degree outcomes across all types of qualifications; any qualification comprising more than 1% of the dataset is listed separately, while less common qualifications are grouped together into "other" categories. While privatization in educational qualifications is not specific to vocational qualifications, these results suggest its presence is strongest in this sector. The majority of students pursuing a vocational qualification are doing so through a private provider, while a strong majority of academic qualifications are through non-profit providers.

Table 1 also indicates that degree outcomes are lower for students with vocational and mixed qualifications than those with academic qualifications. However, this evidence is deceptively simple. The table also shows that degree outcomes differ across demographic groups, with males, mature students, part-time students and students from low participation areas likely to have lower degree outcomes. One plausible explanation for the observed differences in degree outcomes between entry qualifications is that they merely reflect underlying differences between demographic groups. In other words, if vocational qualifications are unevenly distributed in the student population, differences in degree outcomes may be caused by demographic factors rather than by the type of entry qualification obtained.

[INSERT TABLE 1 HERE]

Table 2 indicates how entry qualifications are distributed among demographic groups. In particular, the table shows that vocational qualifications are more common in some groups of students (i.e. mature students and those from areas with low participation in higher education). Thus, it is possible that some of the differences observed in outcomes for qualifications in Table 1 is not attributable to the qualifications, but rather to the demographic composition of students who undertake the qualifications.

[INSERT TABLE 2 HERE]

Figure 1 shows changes in the percentage of graduates who entered higher education with vocational qualifications in the dataset. While the range of years is limited, most years in the dataset show increasing levels of vocational qualifications (apart from 2008/09 to 2009/10).

[FIGURE 1]

FIGURE 1: The percentage of students with vocational qualifications for each year in the dataset.

The descriptive analysis therefore establishes three key pieces of information. First, vocational qualifications are unevenly distributed in the student population: students with vocational qualification are predominantly male, enter higher education later, and are more likely to come from areas with low participation in higher education. Second, students with vocational qualifications have decreased degree outcomes, measured by the percentage

achieving a first or upper-second class degree. Third, the demographic groups most likely to enter university with vocational qualifications also have decreased chances of an upper degree (across all types of qualification). Therefore, the key question for statistical analysis is whether the relationship between qualifications and degree outcomes persists when controlling for relevant demographic variables. In other words, considering two hypothetical students with the same set of demographic characteristics but different types of qualifications, how would their probabilities of obtaining an upper degree differ? This question is addressed through the results of our statistical models.

3.2 Statistical Modeling

Results from statistical modeling are presented in Tables 3 and 4. The first two models use random intercepts to compensate for differences in the proportion of upper degrees awarded at different institutions and thereby to obtain a reliable estimate of the effects of qualification types across institutions. The second two models use random slopes for the effects of vocational and mixed qualifications, examining how the differential outcomes for entry qualifications varies among institutions and how these differences are related to institution-level variables.

3.2.1 Model 1

Model 1 estimates the probability of a first or upper-second class degree based on entry qualifications, controlling for demographic characteristics. The parameters for vocational and mixed qualifications are considered constant across institutions, but a random intercept term accounts for differences in the proportion of upper degrees that exist between institutions, as some institutions award more first and upper-second degrees than others. The percentage of upper-degrees awarded ranges from 50.6% to 91.4% across the dataset, and thus it is necessary to compensate for this variation between institutions.

[INSERT TABLE 3 HERE]

Results show that differences in degree outcomes are significantly lower for students with vocational qualifications and for those with a mix of vocational and academic qualifications, with a larger differential associated with the former. Results also indicate differences in demographic groups: low participation neighborhoods and part-time study are associated with decreased probabilities, while a higher than average entry tariff raises the probability of an upper degree. The intercept (0.562) represents the probability of an upper degree outcome with a student with academic qualifications, a mean entry tariff, and zero values for all demographic characteristics (i.e. full-time, male, not a mature student, not from a low participation neighbourhood). Predicted values of Y (given the Equation 1) can be transformed into a probability (P) given the formulas in Equation 2 (a-c). Thus, a comparison between the probabilities of an upper degree by qualification type is given in equations 2 (a-c).

$$P = \frac{e^Y}{1 + e^Y}$$

(a) Academic qualifications: $Y = 0.562$, $P = 0.637 = 63.7\%$

(b) Vocational qualifications: $Y = 0.562 - 0.682 = -0.012$, $P = 0.470 = 47.0\%$

(c) Mixed qualifications: $Y = 0.562 - 0.463 = 0.099$, $P = 0.525 = 52.5\%$

(d) Variation between institutions: $Y = 0.562 \pm 0.197 = 0.365$ to 0.759

$P = 0.681$ to 0.590 ($\pm$ 9.1%)

Equation 2: The transformation of the dependent variable *Y* into a probability *P* for different models and scenarios. Scenarios (a), (b) and (c) show the value of *Y* and corresponding probabilities of an upper degree for students with academic, vocational and mixed qualifications based on the parameters from Model 1. Scenario (d) shows how variation between institutions is related to changes in the probability of an upper degree using parameters from Model 3.

The results in Table 3 and calculations in Equation 2(a) and (b) show that vocational qualifications are associated with decreases of 16.7% in the probability of a first or upper-second degree qualification (0.637 - 0.470 = 0.167 = 16.7%), controlling for demographic variables. Comparison with other model parameters in Table 3 shows that this differential is larger than that associated with low participation neighborhoods or gender.

3.2.2 Model 2

Model 2 adds two sets of interaction terms to Model 1. The first of these examines an interaction between entry qualifications and social class. These two terms (VQ×LPN and MQ×LPN) test whether there is an effect of vocational and mixed qualifications for students from low participation neighborhoods, over and above that which is observed for vocational and mixed qualifications across the populations. The second set of interactions (VQ×T and MQ×T) examines the change in the vocational and mixed qualifications effects over time, to determine whether the differential outcomes observed in Model 1 are holding constant or changing. A change could be in two directions: the differential could close over time such that outcomes become more similar, or conversely the differences in outcomes could become larger.

Results (Table 3) show that the interaction terms with social class are non-significant. These results indicate that the effects of vocational and mixed qualifications are constant across the low-participation neighborhood students; in other words, there is no effect of vocational qualifications specific to this group. These findings somewhat contrast with literature that highlights the intersection of social class and vocational qualifications (Crozier et al 2008; Leathwood and O'Connell, 2003), as they indicate that the relationships between outcomes, social class and entry pathways tend to operate independently rather than through combination. One possible explanation for this difference in finding is the use of students' residence (i.e. low-participation neighborhood) as a proxy for social class; a broader measure of social class (e.g. including parents' occupation) may well yield different results

However, the interaction terms that examine change over time are significant and negative. These results indicate that the differences in outcomes for students with vocational and mixed qualifications are growing larger over time. These results are contrary to the expectations of neoliberal perspectives, which would generally expect that competitive markets would provide incentives for quality and efficiency, which would diminish differences in outcomes over time.

3.2.3 Model 3

Model 3 adds random effects for the vocational and mixed qualifications parameters, estimating these separately for each institution in the dataset. This approach allows investigation of differences between institutions in outcomes for students with vocational qualifications, which may provide some insight into the support for students with different qualification types (e.g. types of assessment). Other results are essentially unchanged from Model 1.

The variation of the random effects (indicated by σ-VQ and σ-MQ in Table 4), shows that institutions vary quite considerably in differential outcomes. In other words, in some institutions differences in degree outcomes are quite minimal, while in others they are larger. Using the formulas from Equation 2(d), the typical range of variation (i.e. one standard deviation above or below the mean), changes the probability of an upper degree for a student with vocational qualifications by ± 9%. It is important to note that the maximum institutional differential (0.366) is still less than the effect associated with vocational qualifications (-0.700), which means that at all institutions the probabilities of an upper degree are lower for students with vocational qualifications.

[INSERT TABLE 4]

3.2.4 Model 4

Model 4 adds level 2 variables (i.e. variables measured at the institutional level rather than the individual level), examining whether institutional variation is related to characteristics of HEIs. Specifically, the model tests whether outcomes for students with vocational or mixed qualifications are related to institutions' research intensity (measured through QR funding) and employment rates six months after graduation. This test is motivated by research highlighting intersections between social class and different types of university (Crozier et al; 2008; Reay et al, 2010).

Results show that research-intensity of the institution is significantly related to outcomes for students with vocational qualifications, as chances for a first or upper-second class decrease as research intensity increases. While the size of the effect (0.008) is quite small, across the full range of QR Funding (0, to 57.6%) the effect is quite large (i.e. 57.6 × -0.008 = -0.461, an effect size similar to that observed for vocational and mixed qualifications). However, it is important to note that enrolment of students with vocational qualifications is lower at these institutions (percentage of students with vocational qualifications and QR funding correlate at r = -0.430. Thus, although the changes in outcomes associated with research intensity is large, the number of students affected is somewhat smaller.

However, there is no evidence of institutional differences for students with mixed qualifications, or for differences associated with institutions' graduate employment rates. On the one hand, the significant effects of research funding suggest that difference in outcomes are associated with institutional prestige, with more prestigious institutions likely to have greater differentials for students with vocational qualifications. On the other hand, the non-significance of employment rates mitigates some of the concerns around the risk assumed by students, as differences in outcomes for students with vocational qualifications is not related to employment prospects at the institutional level.

3.2.5 Model Fit

Determining the amount of variance explained in a logistic regression is challenging, as the model computes probabilities of the observed outcome (i.e. a numerical logit score), while the outcome variable itself is dichotomous (Menard, 2002). To assess the validity of model fit, we use the method of separation plots proposed by Greenhill et al (2002). Separation plots (Figure 2) arrange observations in the dataset from the lowest to highest probability (i.e. the predicted value of Y_{ij}. The predicted values are plotted on the horizontal curve from left to right; thus where the curved line is higher, the predicted probability of a first or upper-second degree is higher. Vertical lines indicate cases where the observed value of Y_{ij} was one, i.e. where the student received a first or upper-second class degree. One would expect, as the predicted value of Y_{ij} increases, the density of vertical lines increase, which indicates that observed outcomes correspond to probabilities predicted by the model.

[INSERT FIGURE 2]

FIGURE 2: Separation plots for all four models using the technique proposed by Greenhill et al (2002). These plots arrange observations from lowest to highest predicted probability, and plot the predicted probability of Y_{ij} as a continuous horizontal line and observed values of Y_{ij} as vertical lines (where $Y_{ij} = 1$). Results show that as predicted probability increases, the density of observed values of $Y_{ij} = 1$ also increases, although there are also many observations that do not conform to the expectations of the model.

4. Discussion

The findings above show that outcomes in higher education are highly differentiated by students' entry qualifications. Even when controlling for demographic factors, students who enter higher education with vocational qualifications are unlikely to receive the same degree outcomes as students who enter with academic qualifications. However, these findings do not indicate that students are unable to perform well in higher education, but rather that the combination of choices in the post-16 qualifications market and the range of teaching and assessment in higher education systematically produce differentiated outcomes, which are likely to reproduce existing social inequalities. It is therefore important to avoid an elitist interpretation of the results, one that would advocate the restriction of access to higher education on the basis that it is appropriate only for a small and select group who can perform well at university. Instead, findings provide evidence of how the combination of increased choice and marketization in post-16 qualifications with patterns of teaching and assessment in higher education provide a complex process through which social advantage is reproduced.

Our analysis does not identify the ultimate cause of these differences: one potential explanation is that students with vocational qualifications have equal academic abilities to other students, but that these do not contribute to degree outcomes. Another possibility is that academic abilities have considerable non-academic ability but less academic ability than those with academic qualifications. Thus, further research is needed on vocational qualifications, academic ability and outcomes in higher education

These findings add to a body of research indicating that the many complex choices and pathways available to students can form a set of mechanisms and processes through which social class is reproduced (Ball et al, 2000; Ball 2003; Reay, 2004). Although vocational qualifications such as BTEC allow entry to higher education (and this possibility is promoted in marketing), findings show that nominal equality in terms of progression pathways is quite different from actual equality in outcomes. The extent to which students and their families are able to understand these complexities and decode hidden hierarchies in types of qualifications (Shields and Masardo, 2015) will have a large bearing on their success in higher education.

However, results also show that qualifications and pathways have a specific relationship to outcomes, independent from that of social class more generally. While recognizing the importance of research that examines the nexus of social class, vocational qualifications and the experiences of "non-traditional" students in university (Reay et al; 2010), our results suggest that when qualifications and social class are disaggregated through controlled analysis, the relationship between vocational qualifications and degree outcomes is very important independently of other factors.

Our findings also indicate that the difference in outcomes associated with entry qualifications is increasing over time, as indicated in the interaction effects in Model 2. The divergence of outcomes in higher education indicates that when combined, the current "quasi-markets" of post-16 qualifications and higher education do not optimize outcomes for many important stakeholders (i.e. students), and that the information available to them may not be sufficient to allow them to use choice effectively in this environment (Jongbloed, 2003).

These findings are inevitably subject to certain limitations. First, the data analysed were the outcomes of graduating cohorts, rather than entering cohorts. Thus, completion rates were not included in our analysis, although completion is a key higher education outcome. The reasons for focusing on degree classification are that (a) our analysis that the risk introduced by increased student fees places increased importance on degree classification and (b) non-completion is a less common outcome and thus harder to estimate as an outcome of our predictors. Additionally, the set of control variables is necessarily limited, and further controls (e.g. for parent's occupation) may explain some of the differences in outcomes for qualification types. However, the analysis does indicate convincingly a large differential in these outcomes, even when a substantial number of factors are controlled in the analysis. Finally, we do not analyze differences in outcomes across degree subjects, although previous research has shown that subject choice is linked to both students' social backgrounds and labour market outcomes (Chevalier, 2011; Elsworth et al, 1999). Given the focused nature of some vocational qualifications, it is quite possible that wide variation between subject groups

exists. However, it is important to counterbalance this omission by emphasizing that the analysis identifies the average relationships across all subjects. In other words, if there are subjects in which students with vocational qualifications have higher outcomes than the average reported here, there must by necessity also be subjects for which outcomes are lower.

Our results also indicate areas for further research. For example, our necessarily limited evidence on degree outcomes would carry more weight if it were linked to further analysis of employment outcomes: whether or not students with different types of entry qualifications are able to secure the same employment opportunities from their degrees is an open question, and one worthy of investigation. Another issue that we have not explored is that of institutional responses and support: our analysis does not suggest that the differential outcomes observed are necessary or inevitable. It is quite possible that the types of teaching and assessment may themselves be undergoing change, and empirical studies of such ongoing initiatives and their outcomes would provide greater insight into the dynamics of the intersection between institutions and individual students.

The rising number of students with vocational qualifications such as the BTEC means that the issues identified in the paper are likely to become more important in British higher education (UCAS, 2015). On a broader level, our findings are evidence of a seeming paradox in educational policy: those initiatives that aim to promote individual choice and plurality of outcomes can result in polarization of outcomes along a single axis. If the allure of choice, competition and markets continue to capture the imagination of educational policymakers, these mechanisms will likely constitute an important strategic field for social and economic mobility (and *vice versa*).

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TABLE 1

Qualification Groups	% of Graduates	% 2:1 and 1st	Demographic Groups	% of Graduates	% 2:1 and 1st
All Academic Qualifications	92.3%	69.8%	Gender-Male	44.0%	65.8%
A-Level	70.6%	83.9%	Gender-Female	56.0%	70.9%
SQA	6.3%	56.5%	Gender-Other	<0.1%	72.7%
International Baccalaureate	1.5%	78.8%	Full-Time	99.4%	69.0%
Other Academic	0.5%	59.1%	Part-Time	0.6%	19.0%
All Vocational Qualifications	4.3%	51.3%	Entry Age > 21	7.5%	60.3%
BTEC	3.3%	50.5%	LPN	8.2%	63.8%
Other Vocational	1.0%	54.1%	High Entry Tariff	50.4%	80.1%
Mixed Academic/Vocational	3.4%	60.2%	Low Entry Tariff	49.6%	59.1%
All Graduates	100%	68.7%			

Table 1: Entry qualifications and demographic groups. For each qualification and demographic group, the table indicates prevalence (i.e. the percentage of all graduates in the category) and the percentage who received first or upper-second class degrees. Across all graduates, 68.7% received 2:1 or above and 16.2% received a first-class degree classification. The high and low tariff groups are created by splitting at the mean tariff (339.1).

TABLE 2

	Academic	Vocational	Other
All Students	92.3%	4.3%	3.4%
Gender-Male	91.4%	4.9%	3.7%
Gender-Female	93.0%	3.8%	3.2%
Gender-Other	73.5%	14.7%	11.8%
LPN	86.2%	8.6%	5.2%
Entry Age > 21	75.5%	18.3%	6.2%
Part-Time	95.1%	2.8%	2.0%

Table 2: Distribution of qualifications in the population.

TABLE 3

Models 1 and 2

	Dependent variable:	
	Upper-Second or First Degree (logit)	
	(1)	(2)
Intercept (β_0)	0.562** (0.035)	0.546** (0.035)
Qualifications		
Academic	0.00$^+$	0.00$^+$
Vocational (β_1)	-0.682** (0.015)	-0.365** (0.047)
Mixed (β_2)	-0.463** (0.015)	-0.254** (0.033)
LPN (β_3)	-0.074** (0.009)	-0.070** (0.010)
Entry Tariff (β_4)	0.005** (0.001)	0.005** (0.001)
Gender		
Male	0.00$^+$	0.00$^+$
Female (β_5)	0.243** (0.005)	0.243** (0.005)
Other (β_6)	0.674 (0.783)	0.686 (0.375)
Part-Time (β_7)	-3.038** (0.041)	-3.046** (0.041)
Entry Age (β_8)	0.069** (0.002)	0.075** (0.002)
Year (β_9)	0.084** (0.002)	0.084** (0.002)
Interactions		
VQ×LPN (β_{10})		-0.059 (0.038)
MQ×LPN (β_{11})		0.023 (0.043)
VQ×T (β_{12})		-0.097** (0.014)
MQ×T (β_{13})		-0.080** (0.011)
Residual Std. Dev		
Group (μ)	0.408	0.409
Individual (ε)	1.055	1.055
Observations	764,496	764,496
Bayesian Inf. Crit.	862,615	862,571
Note:	*p<0.01; **p<0.001 $^+$Reference Category	

Table 3: Parameter estimates for Models 1 and 2. Standard errors are shown in parentheses. For categorical variables (qualifications type and gender), the reference category is indicated as an effect of 0 and indicated with (+), all other categories are relevant to the reference.

TABLE 4

Models 3 and 4

	Dependent variable:	
	Upper-Second or First Degree (logit)	
	(3)	(4)
Individual Level		
Intercept (β_0)	0.563** (0.035)	0.562** (0.035)
Qualifications		
Academic	0.00$^+$	0.00$^+$
Vocational (β_1)	-0.700** (0.033)	-0.810** (0.041)
Mixed (β_2)	-0.409** (0.030)	-0.423** (0.032)
Entry Tariff (β_3)	0.005** (0.00003)	0.005** (0.00003)
LPN (β_4)	-0.074** (0.009)	-0.074** (0.009)
Gender		
Male	0.00$^+$	0.00$^+$
Female (β_5)	0.240** (0.005)	0.240** (0.005)
Other (β_6)	0.674 (0.497)	0.673 (0.322)
Entry Age (β_7)	0.083** (0.002)	0.083** (0.002)
Part-Time (β_8)	-3.048** (0.041)	-3.048** (0.041)
Year (β_9)	0.069** (0.002)	0.069** (0.002)
Institution Level		
QR×VQ (γ_{11})		-0.008* (0.003)
QR×MQ (γ_{21})		-0.003 (0.002)
Emp×VQ (γ_{12})		-0.011 (0.009)
Emp×MQ (γ_{22})		-0.006 (0.010)
Residual Std. Dev.		
Group (μ_0)	0.405	0.404
Individual (ε)	0.155	0.155
VQ (μ_1)	0.197	0.183
MQ (μ_2)	0.193	0.187
Observations	764,496	764,496
Bayesian Inf. Crit.	862,193	862,229
Note:	*p<0.01; **p<0.001; +Reference Category	

Table 4: Parameter estimates for Models 3 and 4. Standard errors are shown in parentheses. For categorical variables (qualifications type and gender), the reference category is indicated as an effect of 0 and indicated with (+), all other categories are relevant to the reference.

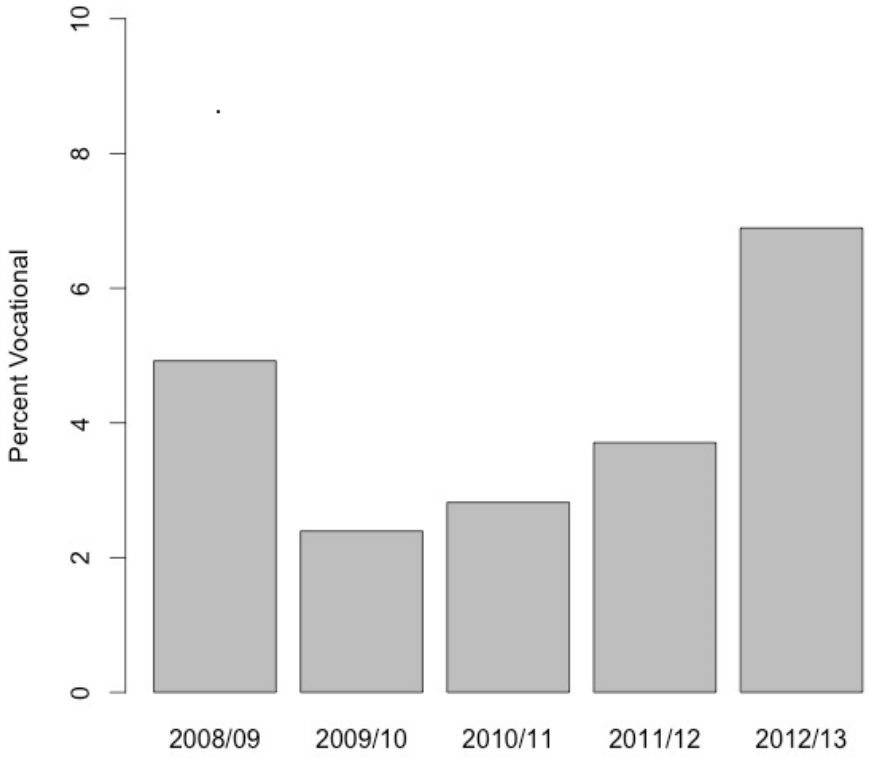

FIGURE 1: The percentage of students with vocational qualifications for each year in the dataset.

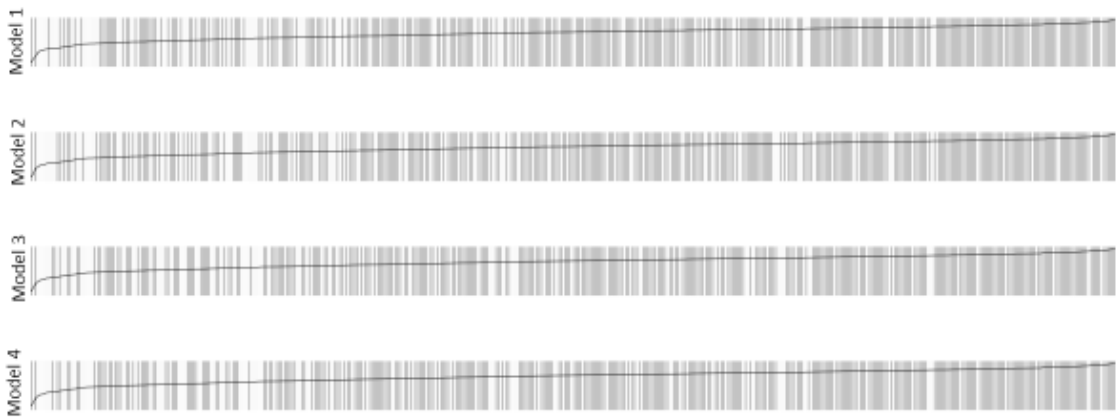

FIGURE 2: Separation plots for all four models using the technique proposed by Greenhill et al (2002). These plots arrange observations from lowest to highest predicted probability, and plot the predicted probability of Y_{ij} as a continuous horizontal line and observed values of Y_{ij} as vertical lines (where $Y_{ij} = 1$). Results show that as predicted probability increases, the density of observed values of $Y_{ij} = 1$ also increases, although there are also many observations that do not conform to the expectations of the model.