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ABSTRACT

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The Further and Higher Education Act of 1992 changed the Higher Education system in the UK by giving all polytechnics university status. Using the British Household Panel Survey and accounting for different sources of selection bias, we show that wage differentials between university and polytechnic graduates can be explained by a glass ceiling preventing polytechnic graduates from reaching professional occupations. After the reform, the glass ceiling disappeared and average wages of post-reform polytechnic graduates are not statistically different from average wages of post-reform graduates of traditional universities any more. This implies that the abolition of the 'two-tier' education system has reduced inequality among Higher Education graduates – a result that may be desirable in other systems of a 'two-tier' nature.

JEL Classification: I23, J31, J64

Keywords: higher education, education reform, wage differentials, occupational sorting, United Kingdom

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1 Introduction

Participation in Higher Education (HE) is permanently subject to political discussion because of rapidly changing labour market demands. In the UK, a policy goal since the publication of the Dearing Report in 1997[1] was to raise participation in HE to 50% by 2010 – a goal clearly met. A high share of HE graduates serves both a societal as well as an individual interest: it sustains and enhances the competitiveness of an economy, and, at the individual level, obtaining an HE degree pays off in the labour market through relatively better jobs and higher wages (Harmon and Walker, 1999; Lange and Topel, 2006; Walker and Zhu, 2008; O'Leary and Sloane, 2011). At the same time, however, a high participation rate in HE may incorporate higher competition among graduates for well-paid jobs, if the supply increases faster than the demand for high-skilled individuals. It has already been shown that a rising number of participants has led to an oversupply of high-skilled workers and thereby worsened the labour market situation of graduates on average.[2]

Besides the distinction between HE graduates and non-graduates, the UK's educational system was also 'two-tiered' within the HE system until the 1990s. In that system both research-oriented universities and more applied polytechnics coexisted. This 'two-tier' system was abolished by the Further and Higher Education Act (FHEA) of 1992, which granted polytechnics university status. The particular changes refer to (1) an assimilation of funding schemes between the two types of institutions, (2) the introduced right for polytechnics to award their own Higher Education degrees and (3) the renaming of polytechnics to universities – now commonly referred to as 'new universities'.

Previous studies have found labour market disadvantages for polytechnic graduates compared to university graduates (Weale, 1992; Chevalier and Conlon, 2003). These studies use cohort survey data and matching methods to account for sorting into institutions, but do not take relative success in reaching 'high' occupations into account – a main explanation behind the disadvantages for polytechnic graduates. This paper re-estimates (and confirms) the pre-reform wage gap between graduates from the two types of HE institutions. Instead of cohort surveys, we use the British Household Panel Survey (BHPS) which allows us to control for various individual and job characteristics. It turns out that this is crucial; including industry characteristics reduces the wage gap between polytechnic and university graduates significantly. We further extend the existing literature by analysing the post-reform differences – is the labour market success of 'new university' graduates still worse than that of 'traditional university' graduates? We test whether the results differ when we control

[1] https://bei.leeds.ac.uk/Partners/NCIHE/

[2] See the literature on over-education such as Hartog (2000); Sloane et al. (1999).

for two typical sources of sample selection bias; selection into one or the other type of institution and selection into occupation. We see that the latter type of selection plays an important role; pre-reform polytechnic graduates faced a glass ceiling which prevented them from reaching 'high' occupations.[3]

We find that the FHEA of 1992, i.e. the abolition of the 'two-tier' HE system has reduced inequality in labour market success between the two types of graduates. Our results suggest that the pre-reform wage gap may partly be driven by a signalling effect and not by real productivity differences. In this respect, we can think of other contexts of 'two-tier' systems, such as two-tier health systems[4] or payroll and benefit systems, in which such a development, i.e. a reduction in inequality in the outcome, may be induced by a change of the system.

The structure of the paper is as follows: In the next section we briefly describe the HE system in the UK, highlighting the most important changes of the last two decades. A short review of the existing literature is also provided. In Section 3, the data are described. Section 4 contains the estimation methods and results. In Section 5 we conclude.

2 Background

In the UK, pupils usually enter the HE system at the age of 18 with adequate 'A levels' or equivalent college certificates. By 1960, about 400,000 students were enrolled in the HE system, which consisted almost entirely of universities. Since then, about 20 universities were created as well as a number of polytechnics and university colleges – polytechnics became an important alternative to traditional universities.

In the early 1990s, the composition of the HE system changed through the Further and Higher Education Act of 1992[5], which granted polytechnics university status. The reform was mainly conducted over three channels: Firstly, previously different funding schemes for universities and polytechnics were merged. Secondly, former polytechnics obtained the right to award higher degrees. Thirdly, and most prominently, a renaming process started. In the course of the reform, all former polytechnics changed their names to universities.

Commonly, it is stated that universities are more research-intensive and more academic than polytechnics, in which education is more vocational and oriented directly towards labour market demands. The difference in composition of subjects

[3] A glass ceiling effect is well-known from gender studies and defines a situation in which a certain group cannot reach positions in the labour market although being formally qualified (Fisman and O'Neill, 2009; Russo and Hassink, 2011).

[4] For example, the German health insurance system is a two-tier system, differentiating between private and statutory health insurance.

[5] http://www.legislation.gov.uk/ukpga/1992/13/contents

between the institutions is only minor; at both kinds of institutions, students can obtain natural science, engineering as well as arts and humanities degrees. A larger difference exists between the course structures; at 'new universities', students are more likely to attend 'sandwich-courses'[6] which lead to bachelor degrees while at traditional universities students are more likely to obtain additional postgraduate degrees. All institutions charge similar amounts of tuition fees.

So far, empirical evidence is based on cohort studies and suggests labour market disadvantages for polytechnic graduates compared to university graduates (e.g. Weale, 1992; Chevalier and Conlon, 2003). Weale (1992) uses data from the Survey of 1980 Graduates and Diplomats, carried out in 1986, i.e. before the FHEA of 1992 was passed. He compares unemployment experience and benefits from HE based on earnings and educational costs for graduates from both types of institutions by estimating separate equations for both groups. He finds that graduates from both types of institutions possess similar probabilities of unemployment and that university graduates benefit from good 'A levels' while polytechnic graduates' earnings are insensitive to 'A level' scores. With this approach, the author does not aim at identifying a wage differential between the two types, however.

Chevalier and Conlon (2003) distinguish three types of universities: (1) 'Modern universities' which are the pre-1992 polytechnics, (2) 'prestigious universities', also referred to as the Russell Group[7], and (3) other pre-1992 universities ('old universities'). They use OLS and propensity score matching to estimate the returns to HE based on data from three graduate cohort studies. In summary, they find no premium for attending an old university and a small premium (at most 6%) for graduating from a Russell Group university compared to a modern university.

To our best knowledge, previous studies neither use representative panel data of the UK graduate population, nor analyse the differences in occupational success between both types of graduates. The studies cited above have found significant differences between polytechnic graduates and university graduates at a certain point after graduation based on cohort surveys. Rather than estimating wage differentials for a specific cohort at a specific point in time, we are able to estimate the average wage rates of graduates of different cohorts in the overall working graduate population.

By controlling for occupational sorting in our analysis, we are able to show to what

[6]These courses are comprised of three years of formal education interrupted by one year of practical work, usually in the private sector.

[7]Universities belonging to the Russell Group are: University of Birmingham, University of Bristol, University of Cambridge, Cardiff University, University of Edinburgh, University of Glasgow, University of Leeds, University of Liverpool, University of Manchester, University of Newcastle upon Tyne, University of Nottingham, University of Oxford, University of Sheffield, University of Southampton, University of Warwick, Imperial College, King's College London, London School of Economics and University College London.

extend degrees from both kinds of institutions were treated as complements in the labour market before and after the reform. Thereby, we can show whether graduates from different institutions compete for the same positions in the labour market. In the labour economics literature, numerous studies look at the gender differences in job promotion between men and women and show that women commonly, but decreasingly, face a glass ceiling (e.g. Winter-Ebmer and Zweimüller, 1997; McDowell et al., 1999; Russo and Hassink, 2011). In this study, we do not look at gender differences in job promotion but borrow from their approaches to identify differences between the two types of graduates.

3 Data

We base our analysis on the English and Welsh samples[8] from the British Household Panel Survey (BHPS)[9] for the years 1991 to 2008. The BHPS consists of a large range of household and individual data, collected yearly since 1991. The data cover a variety of characteristics concerning income and labour market performance as well as family and schooling background.

We restrict the analysis to male graduates, as the female labour supply underwent important changes during the observation period. For instance, female labour market participation has risen significantly and career orientation has gained importance for women (Gutierrez-Domenech and Bell, 2004), and the probability to be in non-optimal employment situations is systematically different for women than for men (Robst, 2007; Rubb, 2010). Modelling this is beyond the scope of this study.

Our sample includes men aged 23 to 64 who obtained an HE degree in England or Wales.[10] The sample consists of 3,759 person-year-observations, of which 28.9% have obtained a degree from a polytechnic (pre- or post-reform). The last wave in the BHPS in which the question about type of university distinguished between former polytechnics and traditional universities is 2002. We do not include individuals who graduated after this wave. Due to the exclusion restriction in the econometric approach (explained in the next section), which is based on the place of birth within the UK, we have to drop all migrants (about 1,000 person-year observations).

[8] We exclude the data on Northern Ireland as we do not have enough observations for the pre-reform period and Scotland as its educational system differs from the rest of the UK's educational system.

[9] Data are extracted using the Stata add-on PanelWhiz written by John P. Haisken-DeNew (Haisken-DeNew and Hahn, 2006).

[10] We dropped the self-employed (9% of the sample) because their degree does not matter that strongly for their earnings. As a robustness check, we included the self-employed and find no qualitative difference in the results.

[Table 1 about here.]

Table 1 presents means and standard deviations of personal characteristics and job characteristics differentiated by graduate institution. It is visible that higher degrees, such as masters and PhDs, are more often obtained from universities (26%) than from polytechnics (11%) and students from universities are more likely to have previously attended private schools; 10% of university versus 2% of polytechnic graduates. Green et al. (2012) show that a wage differential exists between workers who attended a private school as compared to workers who attended a non-private school in the UK. Furthermore, it has been argued that selection into an HE institution is partly based on the type of school one has attended (Blanden and Machin, 2004). Due to data limitations we cannot account for this type of selection but we include private schooling as a control variable. Moreover, we include a variety of other controls reducing potential bias from selection based on private versus public schooling.

We include the individuals' age and its second polynomial as well year dummies. Thereby, we do also take up cohort effects, i.e. determinants of average wages which vary across cohorts but not within cohorts. About 34% of the polytechnic graduates have some vocational training, while only 19% of the university graduates have vocational training. We further include self-assessed health (values 1 = poor health to 5 = excellent health) which has been shown to be a significant predictor of labour market outcomes (Currie and Madrian, 1999). Apart from average hourly wages[11], job characteristics such as tenure, full-time vs. part-time are quite similar for both groups, whilst union membership and firm size differ between the groups. On average, graduates from universities receive average hourly wages of £12.45 and graduates from polytechnics receive hourly wages of on average £11.97. Furthermore, a significantly higher share of university graduates becomes a manager or has another professional occupation. Because of these significant differences, we claim that it is crucial to control for occupational sorting in the wage regressions to obtain unbiased coefficients.

4 Estimation Methods and Results

4.1 Baseline Method and Results

We estimate the wage differential between polytechnic and university graduates as one indicator for differences in labour market outcomes between the two types of

[11] Wages are deflated using the CPI from the Office of National Statics in the UK to the base year 1991.

graduates. In particular, we estimate three types of models. In model A, we include a binary regressor which is equal to 1 if an individual graduated from a polytechnic (or 'new university' after 1992) and 0 if an individual graduated from a university. This allows us to interpret the coefficient as the marginal effect of having obtained a degree from a polytechnic rather than a university, holding all other observable characteristics constant. We are able to control for a large number of job and socioeconomic characteristics as explained before, which former studies lack. The basic model (A) underlying the wage (hourly, w_{itj}) regressions can be written as

$$ln(w_{itj}) = \alpha_0 + Polytechnic_i\alpha_1 + Graduated\_after\_'92_i\alpha_2 + X_{itj}\beta + S_{itj}\delta + \nu_j + \mu_t + \epsilon_{1itj}, \quad (1)$$

where i, j and t are subscripts for individuals, regions and time, respectively, *Polytechnic* is the indicator for having attended a polytechnic rather than a university, *Graduated_ after_ '92* indicates whether someone graduated after the reform, X and S are vectors of regressors of individual and job characteristics, respectively, α, β and δ are vectors of coefficients to be estimated, ν_j are regional fixed effects (we can distinguish 18 different regions in England and Wales), μ_t are time fixed effects and ϵ_{1itj} is the error term.

We then estimate a second model, B, in which we explicitly distinguish individuals who graduated before the reform from individuals who graduated after the reform by type of institution. Therefore, we generate four variables – one for each group of graduates, as described in the following matrix:

	Graduated from university = 1	Graduated from polytechnic = 1
Graduated until '92 = 1	*Uni. until '92*	*Poly. until '92*
Graduated after '92 = 1	*Uni. after '92*	*Poly. after '92*

In model B, we include the coefficients of three of these groups excluding individuals who graduated before 1992 from a polytechnic as reference group. This allows us to identify the wage gap between university graduates and polytechnic graduates before the reform.

This model (B) writes:

$$ln(w_{itj}) = \alpha_0 + Uni.until92_i\alpha_{1a} + Uni.after92_i\alpha_{2a} + Poly.after92_i\alpha_3 + X_{itj}\beta + S_{itj}\delta + \nu_j + \mu_t + \epsilon_{1itj}. \quad (2)$$

This specification allows for a more straightforward interpretation of the coeffi-

cients than an interaction between type and timing of graduation, but leads, essentially, to qualitatively similar results. In model C, we change the reference group by excluding *Poly.after92* to identify the post-reform wage gap between university and polytechnic ('new university') graduates:

$$ln(w_{itj}) = \alpha_0 + Uni.until92_i\alpha_{1b} + Uni.after92_i\alpha_{2b} + Poly.until92_i\alpha_4 + X_{itj}\beta + S_{itj}\delta + \nu_j + \mu_t + \epsilon_{1itj}. \quad (3)$$

OLS wage regressions are the natural starting point when estimating wage differences and the results are reported in columns 1 to 3 in Table 2.

[Table 2 about here.]

In the first column (A 1), both the polytechnic dummy and the dummy for graduating after the FHEA have negative coefficients and are statistically significant. In this specification, we only control for year fixed effects. In the next column we include individual characteristics. This strongly reduces the magnitude of the coefficients, but not the direction or significance. The coefficient of the polytechnic dummy suggests that polytechnic graduates earn on average 3.6% less than university graduates. This is in line with Chevalier and Conlon (2003), who find a 6% wage gap between Russell Group graduates and 'new university' graduates. Through the addition of industry characteristics[12] (column A3), however, the coefficient is reduced by nearly half its size and rendered insignificant. This suggests that polytechnic graduates and university graduates work in fairly different industries. Not taking this into account seems to have flawed previous estimates on the wage gap between university and polytechnic graduates. However, we need to go into more detail before drawing a conclusion.

In all specifications of model A (1-3), we also find significantly lower wages for individuals who graduated after the FHEA of 1992 compared to those who graduated before. Even though we control for age and tenure, the results indicate that average wages are lower for post-reform graduates than for pre-reform graduates. Since the wages are deflated, we find this results, at first sight, quite surprising. We suggest that this finding is likely to be explained by the high share of graduates working in

[12]We include firm size and 9 dummies for industries defined by the Standard Industrial Classification on 1-digit level.

low-skill occupations after graduation and the long time which HE graduates spend searching for a job that matches their skills; the average duration of finding a job is 9 months.[13]

In columns B1 and B2, we are able to see the pre-reform wage gap between polytechnic and university graduates. Here, the coefficients of *Uni. until '92*, *Uni. after '92* and *Poly. after '92* have to be interpreted as the average wage gap between each of these groups of students and those who graduated from a polytechnic before 1992 (reference group). Whilst including individual and industry characteristics reduces the coefficients (B1 compared to B2), they are still significant at the 5%-level. The coefficients suggest that individuals who graduated from a university before the FHEA earn on average 3.1% more than workers who graduated from polytechnics before the reform. Furthermore, we find no wage gap between pre- and post-reform polytechnic graduates; the gap shown in the first three columns is solely driven by university graduates (not shown). In the last two columns we exchange the *Poly. after '92* variable with the *Poly. until '92* variable. This allows us to identify the wage difference between the two types of graduates who left HE since the FHEA of 1992 by looking at the coefficient of *Uni. after '92*. The coefficient is statistically insignificant, independent of whether we include controls or not. This suggests that average wages between the two types of graduates have assimilated and that the average wage discrepancies seen before have been eliminated. This is likely explained by the overall rising number of graduates through the HE expansion in the UK, which we will discuss in more detail at the end of this chapter.

In the following, we will deal with two potential sources of bias in our estimates; selection bias from sorting into one or the other type of institution and selection bias from sorting into (or being able to reach) 'high', i.e. managerial or alike, occupations.

4.2 Controlling for Selection into Polytechnics

By estimating wage equations for graduates using Ordinary Least Squares (OLS), we are concerned with potential sample selection bias through prior sorting of individuals into different HE institutions. It may be the case that individuals with certain unobservable characteristics decide to attend a polytechnic rather than a traditional university (Migali and Walker, 2011), which would lead to biased estimates. To avoid this potential bias, we apply a version of the Heckman sample selection model (Heckman, 1979). The original Heckman model is a two-step model in which the first

[13]This has led economists to investigate the phenomenon of over-education in the UK (Dolton and Vignoles, 2000; Chevalier and Lindley, 2009; O'Leary and Sloane, 2011).

step is a probit model which can be written as

$$p_{itj} \equiv \Pr(y_{itj} = 1|X_{itj}, Z_i) = X_{itj}\beta + Z_i\gamma + \epsilon_{2itj}. \quad (4)$$

where y is a type of institution (polytechnic versus university), Z serves as exclusion restriction necessary for the selection model and γ are vectors of coefficients to be estimated. From these equations, the inverse Mill's ratio (λ_{HE}) is obtained and included in the wage regressions as an additional regressor.

As we base our analysis on panel data, using the Heckman (1979) procedure leads to inconsistent estimates if the selection process is not constant over time. A pooled probit in the first step would then lead to inconsistent estimates due to correlation of the error terms of equations (1/2/3) and (4) over time:

$$(\epsilon_{1ijt}, \epsilon_{2ijt}) \sim N[(0, 0), (\sigma^2, 1, \rho\sigma)]. \quad (5)$$

Wooldridge (1995) suggests estimating single probit models for each period separately and including all calculated inverse Mill's ratios (λ_{HE_t}) interacted with time period dummies in the main equation.[14] This eliminates the possible sample selection bias in a panel context (also explained in Wooldridge, 2002). Basically, this procedure allows the estimation of the main equation regardless of the time series properties of the error terms and does not impose assumptions on the distribution of the error terms and the coefficients in the second step.[15] We bootstrap standard errors in the main equation because of the two-step nature of the model. Finally, conducting a Wald test on the joint significance of the period-specific inverse Mill's ratios offers a test of the presence of sample selection in the model.

The exclusion restriction applied here is the share of traditional universities in the overall number of HE institutions in a 100km radius around a respondent's place of birth at his age of 17.[16] To do this, we use information on the geographic coordinates of all UK universities and polytechnics and match this information with the place of birth of the respondents provided in the BHPS. For this exclusion restriction to be valid, we need to make the assumption that individuals did not move far between their birth and 17th year of age. We back this assumption with figures from the English Housing Survey Household Report (2008/9). It shows that among all couples with dependent children, more than 70% are own occupiers with own outright or mortgage. Furthermore, only 4% of these households moved in the year before the

[14] We use year-pairs rather than single years due to the small number of observations in our sample.

[15] See, e.g., Dustmann and Rochina-Barrachina (2007) for a discussion of this method and alternative approaches.

[16] We have also used differently-sized radii (50km and 150km) without qualitative differences of the results.

survey (English Housing Survey, 2009), indicating low mobility among families with children, and therefore a high likelihood that children still live at or at least close to their birthplace when aged 17.

[Table 3 about here.]

By calculating the share of HE institutions, we take into account the foundation year of an HE institution, its institutional change and the location of decentralised campuses of particular institutions. We then derive the share of traditional universities among all institutions for each year.

Table 3 shows descriptive statistics of the exclusion restrictions *Uni share 100km* and the *number of total HE institutions in a 100km radius* around a person's birthplace. It can be seen that for university graduates, the number of institutions was 10 of which 52% were universities, whereas polytechnic graduates were close to 11.5 institutions of which 54% were universities.

Choosing a 100 km radius has two advantages: First, this distance is large enough to rule out the possibility that a respondent's parents explicitly moved into this radius to be close to a certain institution.[17] Second, the radius is small enough to have a significant influence on the respondents' decision, as choosing a geographically close HE institution offers the possibility to stay within the parents' household and it is not necessary to leave the own social network. We expect a high share of universities in this radius decreases the likelihood of attending a polytechnic. This hypothesis is confirmed for most years in our data as can be seen in the appendix (Table A1).

[Table 4 about here.]

The coefficients obtained from using this method are very much the same both in terms of magnitude and significance as in the baseline regressions (see Table 2). This suggests that selection into type of institution does not bias the OLS estimates discussed above. While we cannot detect a bias due to the sorting into types of

[17] It is a well-known phenomenon that some individuals choose their residence to be located close to a certain school to give their children the possibility to attend it. This is very unlikely to be a problem in this application, as the university attendance is not attached to catchment areas. It is unlikely that parents choose a residence to influence their children's educational decision which takes place nearly 20 years in the future.

institutions, we have to keep in mind that we may be concerned with a power problem due to the small number of observations (between 300 and 550 per year-pair).

4.3 Selection into Occupation

In the final part of the analysis, we look at the possible glass ceiling effect, i.e. whether the possibility of reaching high occupational positions differs by type of graduate institution and time. We therefore estimate probit models in which the dependent variable is equal to 1 if an individual has a 'high occupation' for each year-pair. The two highest occupational one-digit categories which are used here include managerial and professional occupations (SOC 1 and SOC 2) based on the UK Standard Occupational Classification (SOC 2000). We re-estimate the wage equations additionally including the inverse Mill's ratios obtained from the probit model as in Equation 4 where y is now a variable for occupation, i.e. 'high occupation' equal to one and zero otherwise, and Z are different exclusion restrictions.

For the exclusion restriction, we lean on an approach used in an education-wage study for Germany by Riphahn et al. (2010), assuming that social background and the educational and occupational success of someone's parents affects the probability of reaching a high occupation but not the wage level directly. In our study, we use the information on parents' labour market status and occupational success at the interviewees' age of 14. At the age of 14, individuals are likely to be influenced by their parents regarding the optimal educational path to follow. Subsequently, the wages these adolescents earn after finishing their educational career is unlikely to be influenced by their parents' characteristics at age 14, over and above the occupational level they have reached. Hence, parents may influence the wages of their children, but only indirectly, by helping them, for example, to obtain a good job. However, they do not directly determine their wage level. We can therefore assume that the exclusion restriction is valid, although we are aware of the potential weakness of the exogeneity assumption using these variables, already pointed out by Harmon et al. (2003). They estimate wage regressions controlling for a non-random sorting process into self-employment using a Heckman approach on BHPS data. Their exclusion restriction is the parents' self-employment decision as it is likely to influence the child's self-employment decision but not income directly. The validity of the exclusion restriction is further supported by the findings of Delaney et al. (2011), who show that the intergenerational mobility of occupational success mainly works over the channel of children's educational success. As this discussion shows, there is considerable support for the validity of this approach. Nevertheless, we are aware of the possible shortcomings of this exclusion restriction as the validity assumption is very strong.

Summary statistics of parental background are provided in Table 3. We can see

that university graduates are more likely to have a mother who works – and works in a professional job – than polytechnic graduates. Fathers of university graduates are slightly more often unemployed (3% compared to 2%) than fathers of polytechnic graduates but have a higher likelihood of working in a professional job. This indicates that there are differences in background characteristics between polytechnic and university graduates. The regressions of the selection equations by year pair can be found in Appendix table A2.

[Table 5 about here.]

The results of the wage regressions controlling for occupational sorting are displayed in the first three columns of Table 5 (A (ii) - C (ii)). We also control for both types of selection simultaneously, and display these results in the last three columns (A (iii) - C (iii)). In Model A (ii), the coefficient of the Polytechnic dummy is rendered insignificant, suggesting that there is no overall wage difference between polytechnic and university graduates when controlling for occupational sorting (and also polytechnic sorting simultaneously). Hence, it looks like polytechnic graduates have more difficulties to get into well-paid occupations. In columns B (ii) and C (ii), we separate graduates by the time of graduation. The pre-reform wage gap is confirmed; even when controlling for occupational selection, university graduates earned on average 2.6% more than pre-reform polytechnic graduates. This coefficient is still significant at the 10% level, which – taking the relatively small sample into account – can be interpreted as a robust finding. This result remains robust also when we control additionally for selection into polytechnics. Columns C (ii) and C (iii) show that the wage gap between post-reform university graduates and post-reform polytechnic graduates does also not exist when controlling for occupational sorting; the coefficient of the *Uni. after '92*-variable is insignificant in both columns.

We check whether this finding is explained by a difference in wages at a certain part of the income distribution by estimating quantile regressions at the 25th and 75th quantile and the median. The coefficients do not vary by quantile, but they are also not significant. This can be traced back to the lower precision of quantile regressions and the size of our sample.[18]

Taken these results together, we conclude that pre-reform polytechnic graduates are not able to reach similarly 'high' positions as their university graduate counterparts. Post-reform graduates from 'new universities' do not face that disadvantage

[18]Tables are provided by the authors on request.

over their university graduate competitors any more. In other words, the FHEA of 1992 shattered the glass ceiling that prevented polytechnic graduates to get into high-ranked positions.

The question that is still to be answered is which mechanisms associated with the FHEA drive these results. We can think of three different explanations, which are not mutually exclusive. First, as mentioned earlier, the phenomenon of over-education may be responsible for equal wages of post-reform university graduates compared to post-reform polytechnic graduates. Post-reform university graduates may be unemployed longer, or remain in low-skill occupations after graduation for a longer time than post-reform polytechnic graduates, who may be well prepared for the labour market. Although we cannot find any evidence for (or against) this hypothesis, we think this may be likely due to the fact that many polytechnic graduates studied 'sandwich-courses' and therefore have practical experience and better connections to employers. Second, combining this argument with the common perception that the 'new universities' are still more vocational and market-oriented (Economist, 2012), it is likely that post-reform polytechnic graduates are, on average, better matches to labour market demands than post-reform university graduates. Third, referring to the literature on employer learning, (e.g. Altonji and Pierret, 2001; Bauer and Haisken-DeNew, 2001), a possible explanation of our finding may be that the employer's perception of the two types of graduates has changed towards the advantage of 'new university' graduates. This assumption can be explained by a signalling effect; before the reform, polytechnic graduates got a negative 'polytechnic-signal' attached to their degree. This does not necessarily reflect real productivity differences, as it is well known from studies on the effects of migration background or gender. We suggest that this negative signal was reduced by the FHEA. Therefore, former labour market rigidities could be overcome.

5 Conclusion

In the course of this study, we analyse the labour market outcomes of graduates from different types of HE institutions in England and Wales. The comparison is of special interest because the system of HE used to be 'two-tier' until 1992. Due to the Further and Higher Education Act of 1992, the system was changed and granted all polytechnics university status in terms of accreditation, funding and naming. We can therefore compare labour market outcomes of graduates from universities and pre- and post-reform polytechnics and thereby explicitly evaluate the effect of the reform. Evaluating a reform that was introduced 20 years ago allows us to identify changes that established over time and not instantaneously.

Using the large representative British Household Panel Survey over the period

1991 to 2008, we analyse whether wage differentials exist between pre- and post-reform polytechnic and university graduates. We control for possible bias from selection into polytechnics rather than universities and into professional/managerial occupations in a Heckman (1979) selection bias correction approach for panel data, proposed by Wooldridge (1995). We find wage differentials between polytechnic and university graduates in the baseline regressions, which is in line with previous studies (Weale, 1992; Chevalier and Conlon, 2003). However, our results suggest that post-reform polytechnic graduates earn equal average wages as post-reform traditional university graduates. Hence, the reform has changed relative wage rates between the types of graduates.

We augment this analysis and investigate, for the first time, whether both types of graduates are able to reach the same level on the occupational ladder. To accomplish this, we categorise occupations, based on the SOC 2000, into professional occupations and non-professional occupations. In a probit model, we identify a glass ceiling effect for polytechnic graduates compared to university graduates if they graduated before the reform. This glass ceiling is shattered (or slowly cracking) through the FHEA of 1992.

This analysis gives a picture of the effects the Further and Higher Education Act of 1992 has had on graduates in the UK. It shows that the success of graduates on the labour market has significantly changed. This can partly be explained by a change in the education offered at the different institutions. However, this cannot be the complete explanation behind the finding that polytechnic graduates overcome the wage disadvantage. While the harmonisation in terms of funding might give rise to the assumption that education at both types of institutions converges after the reform, a large-scale systematic change of the actual education at the different institutions did not take place. However, it may be the case that the market orientation of post-reform polytechnics' curricula pays off, and the supply of graduates from these institutions meets actual labour market demands more specifically. Furthermore, solely the renaming process is a likely explanation when taking into account the strand of literature that investigates employer learning (e.g. Altonji and Pierret, 2001; Bauer and Haisken-DeNew, 2001) and signalling (e.g. Weiss, 1995; Riley, 2001). Employers may have changed their perception of 'new university' graduates' productivity since the reform as the negative signal of having attended a polytechnic vanished. A former separation of labour market positions for polytechnic and for university graduates is not found any more. It is important to note that we compare average wage rates of graduates from the two types of institutions. While we find clear evidence that these have equalised for post-reform graduates, this does not show that it may not be beneficial to graduate from particular institutions. For

example, degrees from the very prestigious Russell Group universities are still likely prerequisites for outstanding careers and earnings potential. However, this is not true for traditional universities in general any more. We conclude that the abolition of 'two-tier' systems can generate positive outcomes; it can reduce stigma and unequal treatment of individuals and lead to more equal societies.

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Tables

Table 1: Descriptive Statistics by Institution

	University		Polytechnic		Difference	
	Mean	Std.Dev.	Mean	Std.Dev.	Diff	S.E.
Individual characteristics						
Higher degree	0.26	(0.44)	0.11	(0.32)	0.15***	(0.01)
First degree	0.74	(0.44)	0.89	(0.32)	-0.15***	(0.01)
Private school	0.10	(0.30)	0.02	(0.14)	0.08***	(0.01)
Vocational	0.19	(0.40)	0.34	(0.47)	-0.14***	(0.02)
Married	0.63	(0.48)	0.64	(0.48)	-0.02	(0.02)
Age	39.8	(9.47)	38.5	(8.39)	1.3***	(0.3)
Graduated after 1992	0.18	(0.39)	0.19	(0.39)	-0.01	(0.01)
Health status	1.81	(0.75)	1.86	(0.76)	-0.05*	(0.03)
Job characteristics						
Hourly wage	12.45	(5.12)	11.97	(4.46)	0.48***	(0.18)
Union member	0.29	(0.46)	0.39	(0.49)	-0.10***	(0.02)
Tenure	7.33	(9.28)	7.02	(7.86)	0.31	(0.32)
Full time job	0.95	(0.21)	0.96	(0.21)	-0.00	(0.01)
1-24 employees	0.20	(0.40)	0.20	(0.40)	-0.00	(0.01)
25-99 employees	0.2	(0.42)	0.3	(0.46)	-0.1***	(0.0)
100- employees	0.58	(0.49)	0.50	(0.50)	0.08***	(0.02)
Manager or professional	0.67	(0.47)	0.60	(0.49)	0.06***	(0.02)
N	2672		1087		3759	

Note: Authors' calculations based on BHPS. S.E.: Standard Errors. *,** and *** denote significance level of 10%, 5% and 1%, respectively.

Table 2: Baseline Wage Regressions

	A 1	A 2	A 3	B 1	B 2	C 1	C 2
Polytechnic	-0.043***	-0.036***	-0.020	–	–	–	–
	(0.014)	(0.013)	(0.013)				
Graduated after '92	-0.348***	-0.107***	-0.068***	–	–	–	–
	(0.017)	(0.020)	(0.020)				
Uni. until '92	–	–	–	0.063***	0.031**	0.337***	0.062**
				(0.015)	(0.015)	(0.024)	(0.026)
Uni. after '92	–	–	–	-0.317***	-0.057**	-0.043	-0.026
				(0.022)	(0.024)	(0.028)	(0.026)
Poly. until '92	–	–	–	–	–	0.273***	0.031
						(0.025)	(0.026)
Poly. after '92	–	–	–	-0.273***	-0.031	–	–
				(0.025)	(0.026)		
Individual charact.	No	Yes	Yes	No	Yes	No	Yes
Industry charact.	No	No	Yes	No	Yes	No	Yes
Regional dummies	No	Yes	Yes	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3759	3759	3759	3759	3759	3759	3759
R^2	0.134	0.286	0.379	0.136	0.379	0.136	0.379

Note: Standard errors in parentheses. *,** and *** denote significance level of 10%, 5% and 1% respectively. Robust standard errors in parentheses.

Table 3: Descriptive Statistics of Exclusion Restrictions by Institution

	University		Polytechnic		Difference	
	Mean	Std.Dev.	Mean	Std.Dev.	Diff	S.E.
Exclusion Restrictions						
Mother prof.	0.15	(0.36)	0.12	(0.33)	0.03**	(0.01)
Mother not working	0.43	(0.49)	0.36	(0.48)	0.07***	(0.02)
Father prof.	0.46	(0.50)	0.40	(0.49)	0.06***	(0.02)
Father not working	0.03	(0.17)	0.02	(0.13)	0.01**	(0.01)
Uni share 100km	0.52	(0.32)	0.54	(0.26)	-0.02	(0.01)
Total institutions 100km	10.00	(8.04)	11.50	(7.66)	-1.50***	(0.29)
N	2672		1087		3759	

Note: Authors' calculations based on BHPS. S.E.: Standard Errors. *,** and *** denote significance level of 10%, 5% and 1%, respectively.

Table 4: Wage Regressions Controlling for Sorting into Polytechnics

	A (i)	B (i)	C (i)
Polytechnic	-0.021*	–	–
	(0.013)		
Graduated after '92	-0.068***	–	–
	(0.020)		
Uni. until '92	–	0.032**	0.064**
		(0.015)	(0.027)
Uni. after '92	–	-0.057**	-0.026
		(0.024)	(0.028)
Poly. until '92	–	–	0.031
			(0.028)
Poly. after '92	–	-0.031	–
		(0.028)	
Individual charact.	Yes	Yes	Yes
Industry charact.	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Selection Poly	Yes	Yes	Yes
N	3759	3759	3759
R^2	0.381	0.382	0.382
Chi^2	3875	3766	3766
p	0.000	0.000	0.000

Note: Standard errors in parentheses. *,** and *** denote significance level of 10%, 5% and 1% respectively. Standard errors are bootstrapped with 400 replications.

Table 5: Wage Regressions Controlling for Sorting into Polytechnics & Occupations

	Occupational Selection			Polytechic and Occupational Selection		
	A (ii)	B (ii)	C (ii)	A (iii)	B (iii)	C (iii)
Polytechnic	-0.015	–	–	-0.016	–	–
	(0.013)			(0.014)		
Graduated after '92	-0.054***	–	–	-0.056***	–	–
	(0.020)			(0.021)		
Uni. until '92	–	0.026*	0.042	–	0.028*	0.044
		(0.015)	(0.028)		(0.015)	(0.029)
Uni. after '92	–	-0.050**	-0.034	–	-0.050**	-0.035
		(0.024)	(0.028)		(0.025)	(0.029)
Poly. until '92	–	–	0.015	–	–	0.016
			(0.029)			(0.029)
Poly. after '92	–	-0.015	–	–	-0.016	–
		(0.029)			(0.029)	
Individual charact.	Yes	Yes	Yes	Yes	Yes	Yes
Industry charact.	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Selection Poly	No	No	No	Yes	Yes	Yes
Selection Occ	Yes	Yes	Yes	Yes	Yes	Yes
N	3759	3759	3759	3759	3759	3759
R^2	0.382	0.382	0.382	0.384	0.385	0.385
Chi^2	3733	3672	3672	3752	3689	3689
p	0.000	0.000	0.000	0.000	0.000	0.000

Note: Standard errors in parentheses. *,** and *** denote significance level of 10%, 5% and 1% respectively. Standard errors are bootstrapped with 400 replications.

References

Altonji, J. G. and C. R. Pierret (2001). Employer Learning and Statistical Discrimination. *The Quarterly Journal of Economics 116*(1), 313–350.

Bauer, T. K. and J. P. Haisken-DeNew (2001). Employer learning and the returns to schooling. *Labour Economics 8*(2), 161–180.

Blanden, J. and S. Machin (2004). Educational Inequality and the Expansion of UK Higher Education. *Scottish Journal of Political Economy 51*(2), 230–249.

Chevalier, A. and G. Conlon (2003). Does It Pay to Attend a Prestigious University? IZA Discussion Papers 848, Institute for the Study of Labor (IZA).

Chevalier, A. and J. Lindley (2009). Overeducation and the skills of UK graduates. *Journal Of The Royal Statistical Society Series A 172*(2), 307–337.

Currie, J. and B. C. Madrian (1999). Health, health insurance and the labor market. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, Volume 3, Chapter 50, pp. 3309–3416. Elsevier.

Delaney, L., C. Harmon, and C. Redmond (2011). Parental education, grade attainment and earnings expectations among university students. *Economics of Education Review 30*(6), 1136–1152.

Dolton, P. and A. Vignoles (2000). The incidence and effects of overeducation in the U.K. graduate labour market. *Economics of Education Review 19*(2), 179–198.

Dustmann, C. and M. E. Rochina-Barrachina (2007). Selection Correction in Panel Data Models: An Application to the Estimation of Females' Wage Equations. *Econometrics Journal 10*(2), 263–293.

Economist (2012). Pretty polys – The new universities are 20 years old, and still spry. Technical report, http://www.economist.com/node/21549955/ retrieved Jaunary 2nd, 2013.

English Housing Survey (2009). Household Report 2008/9. Technical report, Office for National Statistics.

Fisman, R. and M. O'Neill (2009). Gender Differences in Beliefs on the Returns to Effort. *Journal of Human Resources 44*(4), 858–870.

Green, F., S. Machin, R. Murphy, and Y. Zhu (2012). The Changing Economic Advantage from Private Schools. *Economica 79*(316), 658–679.

Gutierrez-Domenech, M. and B. Bell (2004). Female Labour Force Participation in the United Kingdom: Evolving Characteristics or Changing Behaviour? *Bank of England Working Paper No. 221*, 1–30.

Haisken-DeNew, J. P. and M. Hahn (2006). PanelWhiz: A Flexible Modularized Stata Interface for Accessing Large Scale Panel Data Sets.

Harmon, C., H. Oosterbeek, and I. Walker (2003). The returns to education: Microeconomics. *Journal of Economic Surveys 17*(2), 115–156.

Harmon, C. and I. Walker (1999). The marginal and average returns to schooling in the UK. *European Economic Review 43*(4-6), 879–887.

Hartog, J. (2000). Over-education and earnings: where are we, where should we go? *Economics of Education Review 19*(2), 131 – 147.

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica 47*(1), 153–161.

Lange, F. and R. Topel (2006). The Social Value of Education and Human Capital. Volume 1 Chapter 8 of *Handbook of the Economics of Education*, pp. 459 – 509. Elsevier.

McDowell, J. M., L. D. Singell, and J. P. Ziliak (1999). Cracks in the Glass Ceiling: Gender and Promotion in the Economics Profession. *American Economic Review 89*(2), 392–396.

Migali, G. and I. Walker (2011). Estimates of the causal effects of education on earnings over the lifecycle with cohort effects and endogenous education. Technical report, Working Paper. Lancaster University Management School, Lancaster.

O'Leary, N. C. and P. J. Sloane (2011). The Wage Premium for University Education in Great Britain during a Decade of Change. *The Manchester School 79*(4), 740–764.

Riley, J. G. (2001). Silver signals: Twenty-five years of screening and signaling. *Journal of Economic Literature 39*(2), pp. 432–478.

Riphahn, R. T., M. Eschelbach, G. Heineck, and S. Müller (2010). Kosten und Nutzen der Ausbildung an Tertiärbildungsinstitutionen im Vergleich. *Perspektiven der Wirtschaftspolitik 11*(2), 103–131.

Robst, J. (2007). Education, college major, and job match: Gender differences in reasons for mismatch. *Education Economics 15*(2), 159–175.

Rubb, S. (2010). Factors influencing the likelihood of overeducation: a bivariate probit with sample selection framework. *Education Economics 22*(2), 1–28.

Russo, G. and W. Hassink (2011). Multiple Glass Ceilings. IZA Discussion Papers 5828, Institute for the Study of Labor (IZA).

Sloane, P. J., H. Battu, and P. T. Seaman (1999). Overeducation, undereducation and the british labour market. *Applied Economics 31*(11), 1437–1453.

Walker, I. and Y. Zhu (2008). The College Wage Premium and the Expansion of Higher Education in the UK. *Scandinavian Journal of Economics 110*(4), 695–709.

Weale, M. R. (1992). The Benefits of Higher Education: A Comparison of Universities and Polytechnics. *Oxford Review of Economic Policy 8*(2), 35–47.

Weiss, A. (1995). Human capital vs. signalling explanations of wages. *The Journal of Economic Perspectives 9*(4), 133–154.

Winter-Ebmer, R. and J. Zweimüller (1997). Unequal Assignment and Unequal Promotion in Job Ladders. *Journal of Labor Economics 15*(1), 43–71.

Wooldridge, J. M. (1995). Selection Corrections for Panel Data Models Under Conditional Mean Independence Assumptions. *Journal of Econometrics 68*(1), 115–132.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. MIT.

Appendix

Table A1: First-Stage Probit Regressions – Sorting into Polytechnic

	1991/92	1993/94	1995/96	1997/98	1999/00	2001/02	2003/04	2005/06	2007/08
Uni share 100km	0.199	0.214	0.009	0.060	-0.510*	-0.537*	-0.437	-0.371	0.476
	(0.492)	(0.476)	(0.434)	(0.425)	(0.289)	(0.303)	(0.336)	(0.375)	(0.415)
Total institutions in 100km	0.040***	0.016	0.020	0.014	0.022**	0.014	-0.008	-0.009	-0.008
	(0.014)	(0.014)	(0.014)	(0.013)	(0.010)	(0.010)	(0.011)	(0.012)	(0.013)
Age	-0.000	0.171	0.127	0.207**	0.106*	0.015	0.222***	0.274***	0.267***
	(0.105)	(0.114)	(0.111)	(0.096)	(0.056)	(0.065)	(0.068)	(0.069)	(0.086)
Age^2	-0.001	-0.003*	-0.002	-0.003**	-0.001**	-0.000	-0.003***	-0.003***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Father prof.	-0.728***	0.001	-0.233	-0.364**	-0.264**	-0.177	-0.239	-0.592***	-0.576***
	(0.202)	(0.191)	(0.190)	(0.183)	(0.128)	(0.135)	(0.148)	(0.154)	(0.168)
Mother prof.	0.241	-0.382	-0.445	-0.321	-0.315	-0.617***	-0.142	-0.278	-0.118
	(0.273)	(0.301)	(0.282)	(0.269)	(0.200)	(0.220)	(0.221)	(0.242)	(0.238)
Father not working	-1.324*	–	-0.114	-0.346	-0.504	-0.292	-0.290	-0.399	-0.577
	(0.687)		(0.505)	(0.513)	(0.455)	(0.428)	(0.593)	(0.452)	(0.601)
Mother not working	0.431**	0.054	0.003	-0.151	-0.110	-0.281**	-0.259*	-0.096	-0.044
	(0.211)	(0.202)	(0.188)	(0.184)	(0.133)	(0.139)	(0.153)	(0.160)	(0.179)
Constant	-0.398	-3.561*	-2.775	-3.975**	-2.181**	0.172	-4.174***	-5.176***	-5.574***
	(1.850)	(2.112)	(2.190)	(1.803)	(1.103)	(1.283)	(1.390)	(1.495)	(2.013)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	355	315	332	343	546	471	418	411	364

Note: Coefficients of first stage probit regressions. Observation numbers slightly diverge from the estimation sample. Some observations are dropped as they would predict the outcome perfectly as some cells are very small. Standard errors in parentheses. *,** and *** denote significance level of 10%, 5% and 1% respectively. Standard errors in parentheses.

Table A2: First-Stage Probit Regressions – Sorting into High Occupation

	1991/92	1993/94	1995/96	1997/98	1999/00	2001/02	2003/04	2005/06	2007/08
Father prof.	-0.058	0.076	0.060	-0.002	0.194*	-0.140	0.017	-0.007	-0.033
	(0.147)	(0.146)	(0.144)	(0.137)	(0.102)	(0.108)	(0.121)	(0.119)	(0.127)
Mother prof.	-0.156	-0.158	-0.470**	0.112	-0.297*	-0.186	-0.037	-0.036	0.216
	(0.222)	(0.244)	(0.224)	(0.210)	(0.155)	(0.175)	(0.187)	(0.182)	(0.184)
Father not working	-0.068	-0.663	-0.317	-0.125	-0.426	-0.136	-0.769**	0.230	0.091
	(0.349)	(0.425)	(0.417)	(0.400)	(0.340)	(0.296)	(0.387)	(0.328)	(0.342)
Mother not working	-0.263*	-0.142	-0.543***	-0.239*	-0.211*	-0.146	-0.032	-0.203	0.045
	(0.157)	(0.161)	(0.154)	(0.142)	(0.108)	(0.115)	(0.124)	(0.129)	(0.135)
Polytechnic	-0.375**	-0.668***	-0.378**	-0.178	-0.267**	-0.225**	-0.185	-0.027	0.108
	(0.168)	(0.173)	(0.167)	(0.154)	(0.112)	(0.113)	(0.126)	(0.130)	(0.138)
Higher degree	-0.030	0.399**	-0.144	0.563***	0.110	0.442***	0.343***	0.564***	0.698***
	(0.189)	(0.197)	(0.167)	(0.170)	(0.115)	(0.125)	(0.133)	(0.138)	(0.146)
Private school	0.581***	0.222	0.291	0.505**	-0.245	0.253	0.665***	0.240	0.127
	(0.219)	(0.238)	(0.235)	(0.225)	(0.157)	(0.193)	(0.221)	(0.213)	(0.225)
Tenure	0.043*	0.016	-0.035	-0.011	-0.010	-0.011	-0.005	-0.029	-0.045**
	(0.026)	(0.030)	(0.024)	(0.025)	(0.015)	(0.017)	(0.019)	(0.018)	(0.020)
Tenure^2	-0.001	0.000	0.001	0.001	0.001*	0.001	0.001	0.001	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Age	0.140**	0.136*	-0.000	-0.014	0.122***	0.056	0.105**	0.040	0.074
	(0.063)	(0.079)	(0.087)	(0.065)	(0.042)	(0.044)	(0.048)	(0.048)	(0.053)
Age^2	-0.001*	-0.001	0.001	0.000	-0.001***	-0.001	-0.001*	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Health status	0.045	-0.233**	-0.133	-0.145	-0.097*	-0.132**	-0.128*	-0.090	-0.115
	(0.096)	(0.097)	(0.086)	(0.090)	(0.056)	(0.067)	(0.077)	(0.080)	(0.081)
Constant	-2.676**	-2.549*	-0.039	0.861	-1.848**	-0.591	-1.858*	-0.188	-0.732
	(1.205)	(1.527)	(1.706)	(1.285)	(0.859)	(0.916)	(0.981)	(1.048)	(1.306)
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	480	464	458	516	777	689	601	575	535

Note: Coefficients of first stage probit regressions. Standard errors in parentheses. *,** and *** denote significance level of 10%, 5% and 1% respectively. Standard errors in parentheses.