CEE DP 127

From Grants to Loans and Fees: The Demand for Post-Compulsory Education in England and Wales from 1955 to 2008

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September 2011

Published by

Centre for the Economics of Education

London School of Economics

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London WC2A 2AE

Executive Summary

For a long time after 1945, Higher Education (HE) in the UK was provided free of charge as Local Education Authorities (LEAs) paid each student's HE tuition fees. In addition, the Education Act of 1962 introduced a national Mandatory Awards system for student maintenance grant. However, when HE participation increased steadily during the 1980s and 1990s, the total amount of necessary funding did not rise in line with the HE expansion and it became untenable to subsidize HE. In response to the HE expansion and the heavy burden this imposed on public expenditure, new HE policies were formulated, which shifted part of the financing burden from the state to the students and/or their families by introducing student loans in 1990/91, scrapping student grants through the 1990's and charging tuition fees since 1998/99. The central policy question is – have the less generous student financial support arrangements had any effect on the participation in post-compulsory education? Although it was argued that these funding arrangements would provide the policy makers leverage to widen participation, there has been increased concern that these reforms could reverse the trend of rising participation in post-compulsory education.

Empirically an issue in estimating the causal effect of the HE finance policies on the demand for post-compulsory education in a time-series framework is that, throughout the time period in question, in addition to the changes in HE finance described above, there has been a sequence of other policy changes that might have had important impacts on the participation rates as well as other key variables. Are these policy changes linked to structural breaks, i.e., statistically robust shifts in means and trends, in the demand for post-compulsory education and other key variables, and in the model of post-compulsory education participation? And to what extent do the trends in post-compulsory education participation rates represent a change in the underlying demand for post-compulsory education, rather than short-run dynamic adjustments, demographic changes or structural break responses to HE funding policy changes?

This paper addresses these questions over a sample period from 1955 to 2008 which saw great variation in education policies. Instead of arbitrarily choosing break points by eyeballing the data series, we apply a newly developed approach by Qu and Perron (2007) to detect and estimate the nature and timing of these breaks so as to obtain robust estimation results.

Our structural change tests suggest that regime changes in HE funding, especially the introduction of student loans in 1990, and the scrapping of student grants initiated from early 1990s, did result in significant structural breaks in the model of post-compulsory education participation. Our estimation outcomes do lend credence to the view that the less generous student support arrangement deters HE participation. Specifically, the results suggest a clear negative relationship between the net college costs and university entrance rates for both males and females, as has been found in many studies based on individual data, especially in the US literature. Moreover, among the samples split by the estimated break dates, the most recent periods always exhibit significantly negative effects of college costs. The parameter estimates for males and females are broadly comparable in terms of signs, although the magnitude is always larger for males.

Our policy simulation indicates that if the cap of fees is increased to £7,000, the university enrolment rate would decrease from 2008 by 5.33 percentage points for boys, and 2.84 percentage points for girls. Further, assuming that the cap of fees is increased to £9,000, calculation indicates that the university entrance rate would decrease from 2008 by 7.51 and 4.92 percentage points for boys and girls, respectively.

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The GAUSS code provided by Pierre Perron and Zhongjun Qu is gratefully acknowledged. The authors would also like to thank Steven McIntosh for his help in collecting data. Thanks also for valuable comments from Stijn Broecke, Gauthier Lanot, Hilary Steedman, John Treble, Gill Wyness, and participants at the 2009 Centre for Economic Performance annual conference, the 2010 Work Pensions and Labour Economics conference, and Royal Economic Society 2011 Conference.

1. Introduction

The UK university system is on the cusp of a seismic change. From September 2012 most universities will be charging £9,000 per year in fees for each undergraduate. This change will be accompanied by a major reduction in core central funding from the government. These changes will cause a structural shift in the way universities do business. Most critically, universities need to know what the effect of the raising student fees will be on the demand for university places. The future shape of the UK university system will depend on the nature of this reaction but little serious research has been devoted to this question. This paper aims to fill this gap by examining the evidence on the demand for university places over the post war period.

Historically, the participation rate in post-compulsory education and training in Great Britain has been low compared with other OECD countries (OECD 1995; Layard 1995; OECD 2007). In an attempt to acquire a comparative workforce with higher skills and more qualifications the UK government implemented successive reforms over the last 50 years to expand access to post-compulsory education. Indeed in 2001, the Labour Government set a target of 50 per cent of 17 to 30-year-olds participating in HE by 2010 (Labour Party General Election Manifesto 2001). The aim was also to widen access to post-compulsory schooling to students from wider social economic backgrounds with the goal of relieving persistent inequalities in the education system.

To analyze the participation in post-compulsory education and to model the demand for higher education (HE), it is important to consider young people's sequential decisions: to stay on at school past the compulsory minimum school leaving age of 16[1], to qualify for university entrance and to enter university. Most pupils who do not enter training or try to enter the labour market at the age of 16 will stay on in schools or colleges of further education, and take the 'A' level examinations at the age of 18. Those who pass two or more 'A' levels will be qualified to enter university in the same year. Accordingly we define the post-16 staying on rate, S, as the proportion of 16-year-old age group attending schools and colleges of further education, the qualified leaver rate,

[1]The school leaving age in England and Wales was 15 before 1972, and was raised from 15 to 16 in September 1972.

Q, as those qualified leavers with two or more ‘A’ level passes as a proportion of the relevant age group, and the university entrance rate, UE, as the university entrants as a percentage of the relevant age group.[2] These relations are logically interconnected and ordered recursively in the sense that the staying on rate will inevitably change the qualified leaver rate and that the university entrance rate can only rise if both these two have risen. Hence it makes sense to study these decisions together and model them in this sequential way.

Figure 1 depicts trends in the staying on rate, qualified leaver rate and university entrance rate from 1955 to 2008 for males and females.[3] Clearly, the staying on rate, after controlling for the increase of school leaving age in 1972, has been rising steadily over the whole period, and increased substantially in the 1980s and 1990s. The qualified leaver rate and the university entrance rate are also clearly trended upwards.[4]

A radical expansion of HE required an alternative funding system. For a long time after 1945, HE in the UK was provided free of charge as Local Education Authorities (LEAs) paid each student’s HE tuition fees. In addition, the Education Act of 1962 introduced a national Mandatory Awards system for student maintenance grant. However, when HE participation increased steadily during the 1980s and 1990s, the total amount of necessary funding did not rise in line with the HE expansion and it became untenable to subsidize HE. Figure 2 plots the long run trend of student finance over the past half century. This time series data, from official ‘Statistics of Education’ and ‘Statistical First

[2]These variables are defined on the basis of Pissarides' earlier works on post-compulsory education which will be discussed in Section 2.2.

[3]The variables discussed in this paper mainly refer to England and Wales only. See Section 3.1 for further discussion of key variables.

[4]It should be noted that our university entrance rate is much lower than official participation indices such as the Age Participation Index (API) and the Higher Education Initial Participation Rate (HEIPR) due to different definitions. The university entrance rate here is defined as new entrants to first-degree undergraduate courses in universities and colleges as a percentage of the relevant age groups. The API and the HEIPR is much higher because they cover more higher education institutions. The API measures full-time participation by UK-domiciled students, aged below 21 years, in higher education courses in Great Britain. (Source: ‘House of Commons Hansard Written Answers for 26 Jan 2006', http://www.parliament.the-stationery-office.co.uk/pa/cm200506/cmhansrd/vo060126/text/60126w13.htm, last accessed: 1 July 2010.) And the HEIPR counts English-domiciled 17-30 year old Higher Education students. Students are counted if they participate for at least six months on a course expected to last for at least six months, except that students are not counted if they have participated in Higher Education previously for at least six months. Students at FECs in England, Scotland and Wales are counted if they are on courses designated as National Vocational Qualification Level 4 or above, or listed as Higher Education. (Source: 'Methodological Revisions to the Higher Education Initial Participation Rate', http://www.dcsf.gov.uk/rsgateway/DB/SFR/s000714/SFR08-2007.pdf, last accessed: 1 July 2010.)

Releases', shows the steady decline of student funding from 1962 onwards. By the mid 1990s the average LEA expenditure on maintenance per student had fallen dramatically by 42% since 1980. It fell gradually from 1993 and then much more steeply from 1998.

In response to the HE expansion and the heavy burden this imposed on public expenditure, new HE policies were formulated, which shifted part of the financing burden from the state to the students and/or their families. In the 1990/91 academic year, mortgage-style student loans were first introduced for HE students to partially replace grants and provide extra resources towards living expenses up until 1997/98. Then following the Dearing Report, a new student finance scheme in HE came into effect in 1998/99. New entrants to full-time HE courses paid an upfront contribution towards a means tested tuition fee up to £1,000 per year. In the same year, means tested maintenance student loans (so-called income-contingent loans) were introduced. The loans were separated from fees and paid by the government-owned Student Loans Company (SLC). Students were expected to repay the loans after they graduated according to their income.

As shown in Figure 2, over the period from 1990 to 2000, the average level of maintenance loans continued to rise; ever since then it has remained approximately constant.[5] Meanwhile, student grants were gradually reduced and completely phased out in 1999/2000: the average level of LEA expenditure on maintenance declined dramatically in 1998, and remained relatively low after 2001 until recent years when student grants were reintroduced. The new HE Grant was introduced in 2004/05, and a means-tested Maintenance Grant of £2,700 was introduced in 2006/07.

Further reforms took effect in 2006/07 under the Higher Education Act of 2004. Variable fees up to £3,000 per year were introduced in England (£1,200 in Wales). Up-front fees were removed; government-subsidized fees loans were introduced so that tuition fees are deferrable until after graduation. With the rate of fees rising in line with inflation, the average level of fees loans has increased at the same time.[6]

This brief history brings us up to date in the sense that this is the system of

[5]In Figure 2 we put the loan as positive as a loan is considered to facilitate HE participation through the provision of short run financial funds. Recipients of student loans typically benefit from a liquidity effect and a subsidy effect. Further discussion is provided in Section 3.2.1.

[6]Further details of rates of grants and loans since 1962 are set out in Table A1.

university finance which will be in operation until September 2012. In 2010 the Browne Commission reported and recommended that university fees should rise considerably. Since then the government has decided to allow universities to charge up to £9,000 per student per year (subject to various conditions regarding access and financial help for students from poorer family backgrounds).

Although it was argued that changes between 2004 and 2007 to funding arrangements would provide the policy makers leverage to widen participation, there has been increased concern that the impending rise in fees due in 2012 could reverse the trend of rising HE participation.[7] So, to what extent do the upward trends in S, Q and UE represent an increase in the underlying demand for post-compulsory education, rather than short-run dynamic adjustments, demographic changes or structural break responses to HE funding policy changes? This paper will address this question over a sample period from 1955 to 2008 which saw great variation in HE student support policy.

It should be noted that our analysis takes as given and unconstrained the supply of university places. Our calculations suggest that after 1994 a roughly constant fraction of 75-80%[8] of applicants to university succeed in getting in and we posit that this is consistent with unconstrained supply if we allow for applicants who fail to make their 'A' level grades or who decide not to go to university or defer entry. In some sense the 'raw' demand for university places is the total number of young people applying to university. However, this number is not the true demand as a sizeable fraction of the applicants either do not obtain 2 'A' level passes or the necessary grades for their chosen course. These applicants who are unable to go to university by reason of insufficient qualifications should not be added into any calculation of the demand for places.

A future issue is whether any limitation on the supply of places has curtailed demand from students who think they will be unable to find a university place. Our analysis cannot hope to model this inevitable interaction of potential supply on 'discouraged demand'. However we suggest that since supply of university places has been relatively unconstrained (specially in terms of LEA maintenance funding to

[7]There is also concern that students from lower social class backgrounds would be under represented. This paper is unable to comment on this aspect of the debate on the demand for HE as participation rates in full-time post-compulsory education by social class are not available on a consistent basis over the whole time period in question.
[8]In Appendix B we provide further details of the available data.

individual students up to 1999)[9] then this will not detract from our analysis.

An issue in estimating the causal effect of the HE finance policies on the demand for post-compulsory education in a time-series framework is that, throughout the time period in question, in addition to the changes in HE finance described above, there has been a sequence of other policy changes that might have had important impacts on the participation rates as well as other key variables. For instance, the raising of school leaving age (ROSLA) was introduced in 1972 when the legal age a child is allowed to leave compulsory education increased to 16. In subsequent years the post-16 staying on rate is observed to increase. In 1988, the dual system of O-Levels (sat by grammar school children) and CSE exams (sat by secondary modern school children) in the UK were abolished and replaced by a new system, GCSE, for 16 year olds. This unified exam put all children on the same scale, with a range of seven grades from A to G. The introduction of GCSE resulted in the proportion of the cohort achieving five or more GCSEs at grade C or above (or the equivalent of this prior to 1988) increasing substantially as Figure A3 shows. And this appears to correspond to a significant upward shift in the trend of the qualified leaver rate and the university entrance rate as reflected in Figure 1. In addition, the Education Maintenance Allowance (EMA), which is available to 16 to 19 year olds, was rolled out nationally in 2004. The new financial scheme might also be linked to shifts in the staying on rate.

All these important policy changes are summarized as a timeline in Figure 3. Are these policy changes linked to structural changes, i.e., statistically robust shifts in means and trends, in the demand for post-compulsory education and other key variables, and in the multi-equation system we are going to examine? If some changes did occur to these variables, then the traditional unit root tests are likely to be biased towards the nonrejection of the unit root null and will lead to false test results. Moreover, in the presence of structural changes in a multi-equation system, it is crucial to detect and estimate the nature and timing of these breaks so as to obtain robust estimation results. Although the examination of structural breaks is commonplace in time-series analysis,[10]

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[9]Any student who obtained a university place prior to 1999 was automatically guaranteed a maintenance grant from their Local Education Authority.

[10]The seminal paper is the work by Perron (1989) who examines the testing for the unit root null hypothesis in a framework allowing for a one-time change in the level or in the slope of the trend function. The paper

it has not yet been used in examining the demand for post-compulsory education. A major contribution of this paper lies in making allowance for changes in the shocks. Specifically, we will account for structural shifts in dependent variables and regressors when running unit root tests, and apply an approach developed by Qu and Perron (2007) to deal with structural changes in a system of regressions which models the simultaneous determination of S, Q and UE.[11] Such a framework allows discrete changes in HE and funding, and models these changes as exogenous events. In addition, it explicitly assesses the effect of changing costs on the demand for HE.

The purpose of this article is to analyze discrete changes in the HE funding policy to identify the causal impact of the grants, loans, and tuition fees regime changes on the demand for HE in a time-series framework where allowance is made for the structural changes we have discussed. We incorporate these structural changes into a model of the determination S, Q and UE, using time-series data for England and Wales over the period 1955 to 2008. The remainder of this paper is organized as follows. Section 2 provides a brief review of the existing empirical work on the demand for post-compulsory education and HE participation. Section 3 describes the data and discusses the stationarity of data. As our approach of testing and estimating the break changes builds upon Qu and Perron's recently developed theoretical framework, this is outlined in Section 4. Section 5 discusses the empirical results. Proceeding on the basis of these empirical results, Section 6 presents a policy simulation of a potential upcoming reform which is to lift the level of tuition fees. Section 7 concludes.

2. Existing Evidence on the Demand for Post-compulsory Education and HE Participation

2.1. HE Finance and HE Participation

There is a lot of evidence from the US on the relationship between HE finance and HE

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has induced many empirical studies in this area, for instance, by Christiano (1992), Zivot and Andrews (1992), Ben-David and Papell (1995), Corman and Mocan (2000), Hansen (2001) , Bekaert *et al.* (2002), and Fisher (2006).

[11]The Qu and Perron approach has been applied in financial economics by Bataa *et al.* (2009) and Roine and Waldenstrom (2009).

participation. Some of these studies are facilitated by a variety of changes in State or federal financial policies in post-secondary education. The implications of changing educational finance policies on the demand for post-secondary education have been extensively researched, with significant contributions by Kane (1994), Keane and Wolpin (1997), Heckman *et al*. (1998), Cameron and Heckman (2001), Dynarski (2002), Carneiro and Heckman (2002), Dynarski (2003a), Avery and Hoxby (2004), and Epple *et al*. (2006). There is less evidence from the UK but there have been a number of attempts to evaluate the effects of changing tuition fees and student financial support.

Blanden and Machin (2004) study temporal shifts in HE participation and attainment of children from different parental income groups. They make use of longitudinal data from three time periods (NCDS -- the National Child Development Study, BCS -- the British Cohort Study, and BHPS -- the British Household Panel Survey) to address this question over the period from the early 1970s to the late 1990s, when the UK HE experienced a rapid expansion and the HE financial policy gradually became less generous to students. They find a growing imbalance in access to HE by income group as HE expanded, that is, the participation gap was widened between rich and poor children.

Galindo-Rueda *et al*. (2004) examine the relationship between the HE participation and their estimated mean neighbourhood income over a more recent period, from 1994 to 2001. To do this they construct a postcode level data by matching a Higher Education Statistics Agency (HESA) data to household income data and the 2001 Census. The results indicate that richer postcodes experienced a more rapid increase in HE participation as compared with poorer neighbourhoods, particularly in the early and mid 1990s. This positive relationship disappeared after the introduction of tuition fees, however. They then use the Youth Cohort Study (YCS) data to identify the determinants of HE participation. The micro-analysis compares Cohort 7 of YCS data consisting of young individuals who were 18 in 1996 (i.e. before the introduction of tuition fees) with Cohort 9 consisting of those who were 18 in 2000 (i.e. after the introduction of tuition fees). The results provide some evidence of the impact of low socio-economic background on the lower probability of participating in HE over the period.

Dearden *et al*. (2008) provide an analysis of the HE student finance reforms introduced by the Higher Education Act of 2004. They exploit the distributional effects of the reforms in two dimensions: how individuals are affected by their parental income and their simulated graduate lifetime earnings. They find that there has been a significant reduction in HE costs over the lifecycle for students from low income families, and an increase in the costs for those from middle and upper income families. The paper provides some empirical support for income-contingent student loans. Specifically, the net present value of loan repayment is found to increase with graduate lifetime earnings, while both the loans subsidy (expressed as a proportion of the face value of the loan) and the time for repayment are decreasing in lifetime earnings.

In a more recent study based on the cross-sectional Labour Force Survey (LFS) data from 1992 to 2007, Dearden *et al*. (2010) analyze the separate effects of up-front fees and student support on university participation. Their analysis, based on a pseudo-panel approach, finds a significant negative impact of up-front fees on university participation, and positive effects of loans and grants. Specifically, a £1,000 increase in fees reduces degree participation by 4.4 percentage points, while the same amount of increase in loans increases participation by 3.2 percentage points, and the same amount of increase in maintenance grants raises participation by 2.1 percentage points.

2.2. Time-series Studies on the Demand for UK Post-compulsory Education

Most of the existing research on the demand for HE is based on cross-section or panel data. It is difficult to identify the underlying relationship between the cost of HE and the demand for HE if all young people face the same fees and tuition costs at a given point in time. The alternative is to collate long run time-series data over the whole post war period to attempt to identify regime changes in HE funding when examining the variation in participation rates over time. Modelling long run time series data of aggregate variables relating to the education system is inherently problematic as these data are usually trended and predominantly influenced by legislative or structural change and institutional reform. This means that the data are invariably non-stationary and difficult to model without investigating the timing of these structural changes explicitly. This is what we do in this paper.

Looking at the literature, it is apparent that relatively few time-series studies have investigated the HE funding regime changes, although there has been a literature of time-series econometric studies on post-compulsory education choices of young people. The UK literature is mostly concerned with the post-compulsory education choice of young people at the age of 16 and examines the determinants of participation rates.[12]

Pissarides (1981) models the staying on rate between 1955 and 1978, and concludes that variations in the proportion of 16-year-olds attending post-compulsory education were mainly driven by changes in household permanent income and movements of relative earnings between manual workers and highly qualified workers. In a second paper by the same author, Pissarides (1982) presents another time-series analysis to examine the transition from school to university. In addition to the determinants of the staying on rates, the paper investigates the determinants of proportion of 18-year-old age group qualifying for university entrance, and the determinants of the proportion of the age cohort entering university for the first time. The result suggests that the school staying on rate is mainly driven by the relative present values, per-capita consumption and the unemployment rate. The major determinants of qualified leaver rate are the school staying on rate (two years earlier), the real permanent income (two year earlier), and the ratio of the present value of earnings of early school leavers to that of university graduates (one year earlier). And the qualified leaver rate is a good indicator of variations in the demand for university places.

Whitfield and Wilson (1991) re-estimate the Pissarides (1981) model over a longer period from 1955 to 1986 and find that the model specification becomes inadequate when applied to this later time period. They then extend Pissarides' work by adopting dynamic specifications, applying vector auto-regression techniques, and including additional explanatory variables to take account of changing social class structure, the rate of return to schooling and the level of unemployment in the youth labour market. Their results suggest that these variables play a key role in determining the decision of whether to pursue post-compulsory education.

McIntosh (2001) presents an international comparison of the determinants of participation rates in post-compulsory education, comparing England and Wales, Germany, the Netherlands and Sweden. The investigation examines data within a

[12]The US literature also provides time-series analysis of college enrolments, such as Mattila (1982), and McPherson and Shapiro (1991).

cointegration framework and applies the Engle-Granger two-step estimation procedure. McVicar and Rice (2001) adopt cointegration analysis to an extended period from 1955 to 1994. Both papers provide time-series analyses regarding how the public policy interventions have affected young people's decisions of post-compulsory education. Both papers suggest a key variable to measure the prior academic performance: the proportion of the relevant age cohort achieving five or more grade A*-C Olevel/CSE/GCSE. This is concerned with the introduction of GCSE examination in England and Wales in 1988 which is followed by an upward shift in examination results, as reflected in Figure A3. McIntosh argues that the growth of participation is attributable largely to GCSE attainment. Other key variables are the real income and the relative wage between professional workers and manual workers. The level of youth unemployment seems to play only a small role in determining whether to stay on at school. These results are partially confirmed by Rice and McVicar who find a significant role for GCSE attainment and the expansion of the HE sector (as measured by the proportion of 18 and 19 year olds going on to HE in the relevant year) in influencing the participation decision of 16-year-olds. Other important factors include changes in unemployment and the ratio of professional earnings to manual earnings.

The most recent study relating to the UK is the paper by Clark (2009), who assesses the determinants of the enrolment in post-compulsory education in England. His analysis focuses on the impact of local labour market conditions (mainly proxied by youth unemployment and adult unemployment) and labour market expectations. The paper uses a regional panel data over the period from 1975 to 2005. Overall the empirical results are robust to the addition and exclusion of control variables, and indicate strong positive effects of youth unemployment and GCSE exam achievement, especially for girls. These estimates are used to decompose enrolment across two periods when the enrolment grew rapidly and another two periods when the enrolment was relatively stable. He then aggregates the data to national level and estimates time series models. Without other controls, the estimate of the youth unemployment has a strong and positive effect on enrolment. However, this effect is sensitive to model specification: with other control variables added to the model, the magnitude of the youth unemployment coefficient becomes smaller in boys' enrolment model, and the sign of coefficients for girls' model is even reversed.

These papers have presented a consistent framework highlighting the post-compulsory education choice of young people, but either predate the policy changes in HE finance, or have not presented evidence of the regime changes in question. As for methodologies, the earlier papers predate the commonplace concern with stationarity of the stochastic time series variables. Stationarity is first discussed by Whitfield and Wilson (1991), and all the following papers investigate stationarity but do not consider the changing cost of HE or allow for any structural change in any variable, which might lead to spurious results. In addition, the modelled relationships in these works treat the break dates as known, without performing the relevant tests. Specifically early works use step dummy variables to capture important regime changes, and Clark (2009) decomposes the sample on the basis of growth in enrolment. This is problematic since if a break date is chosen as known, then this choice cannot be treated as exogenous. In essence any break point chosen by eye balling the data is still arbitrary.

To solve these problems, we first use unit root tests allowing for structural changes. Then our analysis adopts methodological developments presented in Qu and Perron (2007) to take account of the regime changes in post-compulsory education policies. The framework developed by Qu and Perron, whereby the break dates are treated as unknown a priori, allows us to estimate these structural break dates exogenously, i.e., without imposing prior notions about their existence, number or timing, and then test for their validity.

Clearly one cannot really study the demand for HE without examining the determinants of school staying on rates and exam performance. In line with demographic constraints, university entrance rate can only rise if staying-on rate rises and then qualified leaver rate increases. To do this we use the Seemingly Unrelated Regressions (SUR) model proposed by Zellner (1962) to estimate of a system of equations of the post-16 staying on rate, the qualified leaver rate, and the university entrance rate. SUR allows us to estimate multiple equations simultaneously while accounting for the correlated errors due to the fact that the models involve the same observations. This leads to efficient estimates of the coefficients and standard errors.

3. Data

This paper uses time series data from 1955 thorough to 2008 to model the role of different factors in driving the demand for post-compulsory education in the UK. The time-series data is collected from, or calculated on the basis of, various data sources which are detailed in the Data Appendix (Appendix A). The data used relate to England and Wales, and the variables are derived separately for male and female subsamples to facilitate gender comparisons.

3.1. Dependent Variables

The dependent variables for our estimation in the following sections are the staying on rate (S), the qualified leaver rate (Q), and the university entrance rate (UE). Following Pissarides (1981 and 1982), we define as the proportion of the age cohort attending full-time education in schools[13] and colleges of further education. The 16-year-old age group consists of people aged 16 on 1 January, and who are above the minimum school leaving age in September of the same academic year. Therefore in our data, prior to 1972/73, when the minimum school leaving age was set at 15, the age group is composed of all the 16-year-olds. And the staying on population consists of the number of 16-year-old pupils attending full-time education in schools and major further education establishments. In academic year 1972/73, the minimum school leaving age was raised to 16, and the staying on rates in subsequent years are defined as the 16-year-old age group above the minimum school-leaving age attending full-time education in schools. In other words, only those born between 1 January and 1 September are included in the data for these years.[14] It should be noted that, due to the change in the definition of relevant age group for calculating S since 1972/73, the average age of the defined '16-year-olds' is higher after 1972/73 than that of the age cohort in previous years. And there turns out to be an obvious downward shift in in 1972/73, as shown in Figure 1.

[13]Including schools maintained by LEA, direct grant schools and independent schools.

[14]However, for academic years 1972/73 to 1978/79, the statistical records only provide relevant data defined on the age at the beginning of calendar year (i.e. January in a specific academic year). Following Pissarides (1981 and 1982), the denominator was taken to be two-thirds of the entire age group in the calculations of S for these years, by the assumption of a uniform birth distribution. No such adjustment was necessary for the data in subsequent years when the relevant data are defined on ages at the beginning of the academic year.

To analyze the HE student finance we focus on those school leavers who are qualified to enter university and those who actually enter university, as HE financial arrangements relate to entrants to HE. We define Q as those qualified leavers (with two or more 'A' level passes) as a proportion of 18-year-olds, and UE the home university entrants as a percentage of 18-year-olds.

3.2. Independent Variables

The first group of variables are assumed to directly influence the demand for post-compulsory education. The academic attainment before the end of compulsory education is expected to exert an essential impact on S. The measure of average academic attainment could be represented by the proportion of the group achieving five or more GCSEs at grade C or above, or the equivalent of this prior to 1988. Variations in Q, the proportion of 18-year-olds qualified to enter universities, are partially driven by the staying on rate of 16-year-olds two years earlier, and subsequent changes in Q should lead to changes in UE in the same year.

As discussed in Section 2, several cross-sectional analyses have focused on the relationship between HE participation and family background (such as parental income and socio-economic status). In our time-series analysis we use alternative aggregate variables such as the social class and consumption expenditure to capture the consumption value of education. Specifically, social class is represented by the proportion of employees in the UK working in professional and scientific services and public administration, and the level of per-capita consumer expenditure in real terms is used as an indicator of average consumption expenditure.[15]

The probability of current unemployment or the expectation of future unemployment should have an impact on the demand for education. For early school leavers the ideal indicator of labour market conditions is youth unemployment, i.e., the unemployment rate of young people aged under 20. Due to data limitations in earlier statistical records, we define the youth unemployment as the number of 18-19 year old unemployed as a percentage of the number of employees (i.e. employees in employment plus the unemployment) of the age cohort. The time-series pattern of youth

[15]All monetary variables in this study are measured in real terms (at 2006 prices).

unemployment rate is depicted in Figure A5(i). Alternatively we also use adult unemployment to represent the current demand conditions that the 16-year-olds are faced with in the labour market. The variable is graphed in Figure A5(ii). And either of youth unemployment or adult unemployment enters the S equation as an indicator of labour market condition that early school leavers are faced with. In this sense the staying on rate should increase with the unemployment rate.

In addition, we include in the model the unemployment rate of new university graduates which is assumed to be related to Q and UE. The pattern of graduate unemployment is shown in Figure A5(iii). The potential effect of graduate unemployment is somewhat ambiguous. On the one hand, the variation in undergraduate unemployment will influence the 18-year-olds' expectation of future employability, and should thus induce a negative effect on the demand for education. The magnitude of this effect should depend on the extent to which young people treat it as an indicator of future labour market conditions. On the other hand, the graduate unemployment is related to the youth unemployment and adult unemployment, and therefore also reflects the possibility of being currently employed. In this respect it may exert a positive effect on the demand for education. Nevertheless it is of interest to examine the influence of undergraduate unemployment in the following analysis.

Several other factors have been identified as important determinants of the demand for HE. The expected rate of return to additional schooling should be incorporated to the model. This could be represented in the form of the internal rate of return (IRR) to undertaking a graduate job. The variable is constructed on the basis of LFS and New Earnings Survey (NES), and Wilson (1980, 1983 and 1985)'s estimates for earlier years. The methodology for calculating follows Ziderman (1973), Wilson (1980, 1983 and 1985) and Dolton and Chung (2004). Details can be found in Appendix C. Figure A6 graphs our estimates of the IRR over the duration of our sample years. And finally, our focus will be on the effect of regime changes in HE finance policies. We now discuss our financial variables in details.

3.2.1 Average Net College Costs

A large volume of evidence suggests that higher net average college costs drive university enrolment rates downward. In the traditional approach, student loans are excluded and treated simply as a mechanism through which students delay paying for fees, and students are assumed to respond to a single net price, i.e., tuition costs minus grants. This approach is challenged by St. John and Starkey (1995), who suggest an alternative approach which assumes that students respond to a set of prices and subsidies. In our study, student loans will be included as a factor influencing average net college costs. However, no distinction can be made in the data among the effect of tuition fees, student grants and student loans due to the inherent nature of the time-series data. Therefore we focus on the derivation and computation of an average cost of HE to the students instead, in order to assess the impact of changing costs on demand for HE. As summarized in Section 1, the student loans scheme was implemented in the early 1990s, and no fees were charged to university students until the late 1990s. Hence we construct a net cost variable from a combination of all the data on tuition fees, student grants and student loans. As a matter of fact, a combination of these financial variables contributes to explicitly testing how students react to a change in net costs resulting from different but fundamentally similar reforms.

Tuition fees represent an important form of direct college costs.[16] The rate of tuition fees charged to university entrants is the best measure of the direct cost of HE to the prospective student. This is because we are examining a young person's demand for university education, and it is necessary to associate a representative average direct cost of HE participation to each individual who may be a prospective participant. One can reasonably expect that a higher rate of tuition fees will affect young people's willingness to undertake university study and therefore deter HE participation.[17]

Demand for university study might be expected to increase, the higher is the direct subsidy which is available to students. We use the average LEA expenditure on maintenance awards per student to approximate the average level of student grants or the average subsidy to each student.[18]

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[16]Although university students also incur other cost of attendance such as books and accommodation, we ignore these factors due to lack of a consistent series of data.

[17]For recent years when variable tuition fees were charged, we use the cap of tuition fees to proxy the rate of fees as most of the institutions actually charged the maximum of fees.

[18]One measure of the volume of average student grants will be obtained by multiplying the proportion of full-time new university entrants by the average amount received, but such a series does not exist in the

A different form of financial aid, namely the student loan, has been found to modestly increase college attendance. However, the interpretation of student loans is somewhat complicated, as a loan facilitates HE participation through the provision of short run financial funds but nevertheless -- since this is a loan which has to be repaid then one would expect, vis-a-vis a comparison with a system of grants or subsidies, that a loan system would discourage HE participation. Recipients of student loans typically benefit in two ways: a liquidity effect and a subsidy effect. In fact, given that student loans are not restricted to those who are credit constrained, the liquidity effect is dominated by the subsidies provided in the form of below market interest rate charges and government payment of interest during the recipient students' university study. Therefore for simplicity we will only consider the subsidy value of student loans when comparing its effect with other forms of student supports. If we assume that students are rational economic agents, they will react differently to student grants and student loans. Subsidized loans should in theory yield a smaller effect than student grants at the same face value. The subsidy value of student loans is normally assumed to be anywhere from zero to about 50 percent of the face value. For instance, in studies by Clotfelter *et al*. (1991), McPherson and Schapiro (1991), Feldstein (1995), student loans are assumed to provide a subsidy value of half of the face value. Kane (1995) and Dynarski (2003b) put the subsidy value at approximately one-third of the value. Epple *et al*. (2006) put the implicit subsidy at 25% of the dollar value. Furthermore, as student loans are provided for both maintenance and tuition fees in recent years, it is a good practice to apply specific weights separately to the average maintenance loan subsidy and the average fee loan subsidy. According to DfES projections, the weights are 21% and 33% for maintenance loans and fee loans, respectively.[19] In practice these weights will be applied to average maintenance loans and fees loans per student. The weighted sum is used to approximate the average student loans. Therefore the following analysis will apply a range of values: loans valued at one quarter, one-third and one-half of the face value, together with a weighted sum of maintenance loans and fee loans.

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statistical record.

[19]Source: Hansard, 10 November 2005. 'Education finance', http://www.publications.parliament.uk/pa/ld200506/ldhansrd/vo051110/text/51110-25.htm (last accessed: 1 July 2010)

Figure A7 presents the series of student finance elements on the basis of different definitions of student loans discussed above. The average net college cost ($COST_t$) is then calculated as a weighted sum of the fees (fee_t), grants ($grant_t$), maintenance loans ($mloan_t$) and fee loans ($floan_t$), namely rate of fees minus the face value of grants and the subsidy value of loans. Take the fourth definition of loans as an example: $COST_t = fee_t - grant_t - (0.21 mloan_t + 0.33 floan_t)$. The net cost variable calculated in this way may take negative values for some years. Therefore we measure these financial variables in thousands of real pounds (expressed at 2006 prices) rather than in natural logs.

3.3. Unit Root Tests Allowing for Structural Changes

Natural log transformations are taken for all variables except the net college costs. To circumvent the possibility that our regression analysis may give rise to spurious relationships, we carry out Augmented Dickey-Fuller unit root tests to check the stationarity of each variable. A well known weakness of the Dickey-Fuller style unit root test is its inability to account for structural changes of the variable itself. In fact in the presence of structural shifts, the test will be biased towards the nonrejection of the unit root null. It is particularly crucial to take account of structural changes in our unit root analysis, since most of the series of variables in study appear to exhibit some sort of structural changes; these structural changes are evident by even a casual examination of the time series plots of S, Q and UE as in Figure 1 and the plot of GCSE results in Figure A3. To overcome this complication, we then perform alternative unit root tests allowing for structural changes, namely Zivot-Andrews (1992) and Clemente-Montanes-Reyes (1998) tests, as robustness checks for the Augmented Dickey-Fuller tests. Our test statistics are reported in Tables A2-A4 and details are discussed in Appendix D. These results confirm that all the stochastic variables are $I(1)$. This suggests that we use first-differenced variables in our analysis.

4. Methodology

4.1. An SUR Model of HE Demand

We include in the SUR model the expected gain from a university degree (IRR), coupled with two groups of variables to capture the consumption value of education ($Cons$) as measured by either consumer expenditure (C) or social class demographic change ($CLASS$) respectively. The consumption value of education is included in all the three equations of S, Q and UE, and IRR is assumed to influence the university entrance rate.

The impact of local labour markets is represented by adult unemployment or youth unemployment, with one-year lag (U_{t-1} or YU_{t-1} respectively) in the equation, and the graduate unemployment (GU_{t-1}) enters both of the Q and UE equations. Other variables do not vary across models. We measure the impact of average academic attainment ($GCSE$) in the S equation, S with two-year lag in the Q equation, and finally Q in the UE equation.

In summary, we estimate models of the form, for males and females respectively:

$$\Delta \ln S_t = \alpha_{0,j} + \alpha_{1,j}\Delta \ln GCSE_t + \alpha_{2,j}\Delta \ln Unemp_{t-1} + \alpha_{3,j}\Delta \ln Cons_t + \mu_t \quad (1)$$

$$\Delta \ln Q_t = \beta_{0,j} + \beta_{1,j}\Delta \ln GU_{t-1} + \beta_{2,j}\Delta \ln Cons_t + \beta_{3,j}\Delta \ln S_{t-2} + \upsilon_t \quad (2)$$

$$\begin{aligned}\Delta \ln UE_t = {} & \gamma_{0,j} + \gamma_{1,j}\Delta \ln GU_{t-1} + \gamma_{2,j}\Delta \ln Cons_t + \gamma_{3,j}\Delta \ln IRR_{t-1} \\ & + \gamma_{4,j}\Delta \ln COST_t + \gamma_{5,j}\Delta \ln Q_t + \varepsilon_t\end{aligned} \quad (3)$$

Where j indicates regimes, $Unemp$ is represented by U or YU in different model specifications, and $Cons$ by C or $CLASS$ in different settings. Specifically we estimated models which used the adult unemployment rate and consumption (Model I), the adult unemployment rate and social class (Model II), the youth unemployment rate and social class (Model III) and the youth unemployment rate and consumption (Model IV).

Two features of this model should be noted. Firstly, as explained in Section 4.2, the methodology of estimating structural changes rules out unit root regressors. Since we are constrained to model in variable differences (due to the fact that all our variables are $I(1)$ in their level form), then we are inevitably modelling the short-run relationship between our educational demand variables and their determinants. Secondly, in the specifications of our equations we are constrained by the logical recursive time structure of the university process. Specifically, since GCSE's, which determine S, are sat two years before 'A' levels, this means that S_{t-2} is the appropriate regressor in equation (2). Likewise 'A' levels are sat in the same year that university entrance takes place, so Q_t (unlagged) is the appropriate form in equation (3). Also since each year in the time series data relates to a separate cohort of 18 year olds then there is little scope for any dynamic determinants in the specification. It is for these reasons that we do not employ any error correction model (by including lagged dependant variables in the models). Therefore more flexible dynamic modelling is precluded. We realise that this may be considered a shortcoming of model specification; but given that our main interest is in the short-run effect of average net college cost on UE, we think this model captures the focus of this paper, which is that we wish to determine the likely short-run impact of the immediate increase in fees to £9,000.

4.2. Estimation of Structural Changes in a System of Regressions

We turn next to the structural changes in our HE demand model. Our multivariate analysis builds upon methodological developments of estimation and testing in the context of structural changes. A 'structural change' is defined as an abrupt change in the structure of the modelled relation, with statistically significant and lasting shifts in the parameters of the conditional mean, the variance of the error term, or both. In a pure structural change model the structural change could occur to all coefficients, while in a partial structural change model only part of the coefficients are different in different regimes.

The development of estimating multiple structural changes simultaneously in a system of regressions is relatively recent. Bai and Perron (1998, 2003) provide a comprehensive treatment of various issues in the context of multiple structural change models, such as tests for structural changes, methods to select the number of breaks, and efficient algorithms to compute the estimates.

Qu and Perron (2007) provide a general framework that permits various more complex models including SUR. Using their method, we regress the three equations SUR model in the form of

$$y_t = (I \otimes z_t')S\beta_j + u_t \qquad (4)$$

In this equation, the subscript t indexes a temporal observation $(t=1,...,T)$, and j a regime $(j=1,...,m+1)$ where m is the total number of structural changes in the system and $m \leq M$, the pre-specified maximum number of breaks. y_t denotes an n-vector of dependent variables representing the post-war trend of participation rates (in our model $n=3$), I an $n \times n$ identity matrix, $z_t=(z_{1t},...,z_{qt})'$ a q-vector that includes the regressors from all equations, S a selection matrix that specifies which regressors in z_t enter in each equation, β_j a vector estimated coefficients in the $j\ th$ regime $T_{j-1}+1 \leq t \leq T_j$. The error term u_t has mean 0 and covariance matrix Σ_j for the $j\ th$ regime. By assumption Qu and Perron (2007) rule out unit root regressors. Since our unit root tests show that almost all of the variables are $I(1)$, the first-difference of the variables are used in the following model settings to ensure all the regressors are stationary, i.e. $I(0)$. Qu and Perron's results are asymptotic in nature, and as such we must acknowledge that with our relatively small sample size this is a clear limitation of our analysis. Therefore it is necessary to evaluate the quality of the approximations, which will be addressed in our future research on the basis of newly developed methodologies.

We then use the procedure suggested by Qu and Perron to determine the presence, number and timing of structural changes in the regression coefficients.[20] In short, the double maximum statistic is used to test the null of no breaks versus the alternative hypothesis of $m \leq M$ breaks. If the double maximum test rejects the null of no breaks, a sequential F-type test, based on the estimates of the break dates obtained from a global maximization of the likelihood function, is then performed to test the null of l breaks against the possibility of $l+1$ breaks and determine the number of breaks and their locations. The procedure conducts a one break test for each of the $l+1$ segments defined by the partition and adds one break each time the test is significant. Throughout the procedure, a trimming value is pre-specified to impose a minimal length for each

[20]Qu and Perron provide tests that allow for changes occurring in the coefficients of the conditional mean (pure structural change model in the conditional mean), or changes occurring in the variance of the error term (pure structural change model in the covariance matrix), or changes occurring simultaneously in both (complete pure structural change model). In our analysis, we will concentrate on the first case.

regime.[21] Finally, the estimated break dates are defined in the SUR model, and intercept and trend coefficients are estimated.[22]

5. Results

In this section we present the empirical results. The system to be analyzed consists of stochastic variables as discussed in Section 4.1. As we have detailed in Section 3.2.1, different weights are assigned to student loans to represent part of the college costs, corresponding to four definitions of net college costs. We estimate a series of models with each of these definitions of college costs but the same settings of other variables. Preliminary estimates indicate that the different definitions of college costs do not change results significantly. Therefore in the following analysis we only report the results of models with the fourth definition of college costs, i.e., the weights are 21% and 33% for maintenance loan and fee loan, respectively. The corresponding variable ($COST$) is entered in the UE regression.

We estimated models which used the adult unemployment rate and consumption (Model I), the adult unemployment rate and social class (Model II), the youth unemployment rate and social class (Model III) and the youth unemployment rate and consumption (Model IV). Since qualitatively the results are similar we omit all but the last results (Model IV) and relegate the other specifications to the Appendix (Tables A5-A7). Table 1 reports the estimation results associated with the preferred model specifications. The estimated coefficients are reported together with their standard errors. In what follows, we first show the structural change test results. One of our primary interests is whether the net average college costs drive participation in further education for both males and females, so subsequently we discuss in details the estimated effects of college costs on UE. Finally the estimates of other variables in the models are reported.

5.1. Structural Break Points

Our starting point is to discuss the break points. These are documented in the first column of Table 1. We can see for males the break points are estimated as 1971 and 1991. Hence

[21]For details the reader is referred to Bai and Perron (1998, 2003), Perron (2005) and Qu and Perron (2007).
[22]The tests were performed using the GAUSS code provided by Qu and Perron. Then we used STATA to do the inference conditioning on the estimated break dates and fit the model.

the estimated coefficients on the regressors are split into three periods: 1958-1970, 1971-1991 and 1992-2008. These are reported in the first three rows of the table. Correspondingly, in the second panel relating to females the estimated break points are 1973 and 1991 with the estimated parameters set out in the second panel set of three rows. Along with the structural break points we report the 95% critical intervals as detected by the Qu and Perron (2007) procedure. Interestingly, most of the structural breaks are found to have occurred in either early 1970s, or between late 1980s and early 1990s, especially for the female cohort. These break points correspond to the raising of school leaving age in 1972, the introduction of GCSE exams system in 1988, the introduction of student loans in 1990, and the scrapping of student grants initiated from early 1990s. This suggests that these policy changes are most closely associated with the structural breaks in the model. It should be noted that most of the confidence intervals are relatively loose and larger than four years, indicative of gradual changes over a longer time period rather than abrupt structural shifts in these cases.

The tests haven’t detected break points associated with the introduction of tuition fees, due to the sample size and our specification of the trimming value for a minimal length for each regime. The trimming value is an essential parameter which must be pre-specified in the estimation. There is a trade-off when deciding an appropriate minimum length for the regime. If we define a minimum length that is too large, we might miss some potential break points, while an overly short minimum length will probably lead to misleadingly detecting a short-run adjustment as a structural change. In practice we use a trial-and-error procedure to decide a minimum length. As a result, a minimum length of approximately one quarter of the sample size is used, although it is slightly different in different model specifications. Over the period in our sample, it has been only one decade since the tuition fees were introduced, therefore we do not have enough data to observe these events on data break points. Nevertheless it would be of interest to perform the tests again in the future when we obtain a larger number of observations.

5.2. The Role of Net College Costs

Our estimation outcomes do lend credence to the view that the less generous student support arrangement deters HE participation. Specifically, the results suggest a clear negative relationship between the net college costs and university entrance rates for both males and females, as has been found in many studies based on individual data, especially in the US literature. Moreover, among the samples split by the estimated break dates, the most recent periods always exhibit significantly negative effects of college costs.[23] The parameter estimates for males and females are broadly comparable in terms of signs, although it appears that the magnitude is always larger for males (-0.107 as opposed to -0.063 in our preferred model setting as shown in Table 1). In Section 6 we will proceed to discuss the marginal effect of tuition fees and provide a policy simulation of increasing tuition fees on the basis of the estimated coefficients.

5.3. Other Results

The regression results suggest that the post-16 staying on rate is primarily driven by the average academic attainment measured by exam results in GCSE (or equivalent prior to 1988). This effect is especially significant and higher for the period around the replacement of O-levels with GCSE. This is supported by earlier findings (McIntosh, 2001; Rice and McVicar, 2001) that the improvement in GCSE attainment levels since the late 1980s has contributed greatly to the rapid growth in participation rates.

In turn, the staying on rate is found to exert a significant positive effect on the qualified leaver rate, and the latter plays a significant role in determining the movements of university entrance rate. This is consistent with the results from Pissarides (1982).

Of the labour market variables, the staying on rate increases with the adult unemployment or youth unemployment, as expected. The unemployment rate in the equation represents the probability of employment for early school leavers, so an increase in it will induce a higher demand for education. However, the interpretation of the impact of graduate unemployment remains unclear in the Q and UE equations. In most cases graduate unemployment exerts significant positive effects on both of the qualified leaver rate and the university entrance rate for pre-1970 period for both boys and girls. For the female cohort, the variable appears to be negatively related to university entrance rate

[23]This does not mean that similar results could necessarily be obtained using the last sample period of data only. As a matter of fact, estimation on the last sample period yields very different results, which suggests that we do need the whole sample period of data to obtain the estimation results reported here.

between the early 1970s and late 1980s (or early 1990s). This result indicates that the expectation of future employability did not play a consistent role in the determination of the demand for HE. An alternative explanation is that the graduate unemployment is tracked by the adult unemployment, and the adult unemployment is picking up the long-run relationship determining the demand for HE and offsets the negative effect of graduate unemployment.

The average consumption expenditure is not significant in all the models. And the effects of socio-economic social class variable are ambiguous or negligible. It exerts a positive effect on post-16 staying on rate since 1988, has a negative effect on qualified leaver rate before 1988, but does not enter the UE equation. The negative effect in the Q equation to some extent implies an imbalance in access to HE by socio-economic background.

Finally we find some evidence that the internal rate of return to university education is negatively related with the demand for HE prior to 1970s, but this effect is not significant afterwards. However, this might be caused by the nature of data. As discussed in Appendix C, our estimated series of IRR only dates back to 1975 due to data limitations. In the absence of an appropriate data set prior to 1975, we used the data in Wilson’s work as a proxy of so as to obtain a complete series covering the whole time period in our question. To investigate this further and provide checks on the robustness of the estimated effects of college costs, it is necessary to run the regressions using a sample from 1975 to 2008 to ensure that our IRR data is consistent. Results are discussed in Section 5.4.

5.4. Robustness Checks

Tables A8-A11 report the results for a shorter span of time from 1975 to 2008, as a check of robustness of the estimated coefficients of net college costs discussed in the previous section. As indicated in the results, when we exclude Wilson’s IRR data from the regressions, this variable enters the models insignificantly, while there are no obvious changes in the sign or magnitude of the coefficients of college costs variable. This suggests that our interpretation of the effect of HE finance policy changes is convincing.

A further limitation of the use of the SUR model is that it assumes a diagonal variance-covariance matrix, i.e. that the covariances of the errors are zero. This could be particularly problematic when we include contemporaneous right hand side regressors. Our robustness checks described in our appendix (Tables A12-A15), where $\Delta \ln Q_t$ is replaced by $\Delta \ln Q_{t-1}$ in the UE equation, suggest that our results may be sensitive to this assumption. This is understandable given our small sample size, but nevertheless unavoidable.

6. Policy Simulations of Increasing Tuition Fees

The study of the effect of HE funding on the demand for HE is very topical. A recent Universities UK publication (Universities UK, 2009) suggests that students are insensitive to variations in tuition fees below £5,000 a year. The report draws a conclusion from a projection of funding scenarios that the cap of tuition fees may have to be raised to £5,000 or £7,000. In addition, The Times states that ‘in a written statement, rather than an announcement in person, Lord Mandelson is expected to say that students from poorer families have not been put off from applying to university by higher tuition fees since 2006’, and claims that ‘students could be paying more than double the present fees for university courses’ (‘Students face doubling of fees and rise in loan costs’, The Times, 9th November 2009). The article also states that ‘some vice-chancellors are pressing for fees to rise to £7,000 a year... Others believe that £5,000 a year is a more realistic level.’ Another report published by the Department for Business, Innovation and Skills suggests that ‘financial factors tend not to dent HE aspirations among those planning to apply. Indeed, they tend to be outweighed by a range of non-financial factors, especially for younger people’ (Usher *et al.*, 2010, p.1).

In November 2009, an inquiry team chaired by Lord Browne of Madingley was appointed by the Government to look at the reform of HE funding system, and specifically the level of student fees. In reply to the first call for evidence, quite a few universities claimed that the introduction of variable fees has had not harmed access. For example, in Imperial College London, since the introduction of variable fees there has been

‘an increase of 17.3% in total undergraduate applicants, and nearly 22% in accepted applicants from the bottom three socio-economic groups. In 2008/09, 13.8% of applicants and 13.6% of undergraduate intake were from the bottom three socio-economic groups. Further to this, the proportion of undergraduate students at the College from state schools and colleges has increased to 66.8% in 2009/10, an increase of nearly 8% in three years. This demonstrates that the introduction of fees has not discouraged students from the lower earning social groups from applying and being accepted by one of the most selective HEIs in the UK'. (Independent Review of Higher Education Funding and Student Finance - First Call for Evidence, Imperial College London, January 2010, p.3)

The Browne Review, published in October 2010, proposed removal of the cap of tuition fees. The government's response was to allow universities in England to charge fees up to £9,000 per year from September 2012.

At first sight the above-mentioned statements are consistent with the aggregate statistics of university entrance rate which has exhibited a continuous upward trend so far. However, given the estimated coefficients on $\Delta COST$ which is negative, if the tuition fees continue to rise, the net college costs might be increased to such a high level that would deter the enrolment. To illustrate this, proceeding on the basis of our estimated results, we present a simulation of a potential upcoming reform. We explore the consequences of a rise in tuition fees. Specifically we estimate the effect of an increase in fees to £7,000, and given the new fees policy, a higher level of £9,000, *ceteris paribus*.

Starting from the coefficient of $\Delta COST$, we have

$$\gamma_4 = \frac{d(\Delta \ln UE_t)}{d(\Delta COST_t)} \tag{5}$$

From equation (5) the following equation is derived, reflecting the change in $\ln UE_t$ from 2008 to 2009 is

$$\Delta \ln UE_{2009} = \gamma_4 d(\Delta COST_{2009}) + \Delta \ln UE_{2008} \tag{6}$$

where $\Delta COST_{2009}$ is the increase in fees in real terms. Based on equation (6) and the estimated γ_4 in Table 1 (-0.107 and -0.063 for boys and girls, respectively), we can then predict the new university entrance rate with the tuition fees rising, and compare it with the current university entrance rate UE_{2008}. Under the assumption that fees rise from the current level (as of year 2008) of £3,145 to £7,000, results suggest that the university entrance rate will drop by 5.33 and 2.84 percentage points for boys and girls, respectively. Furthermore, assuming that fees are increased to £9,000, the calculation indicates that the university enrolment rate would decrease from 2008 by 7.51 percentage points for boys, and 4.92 percentage points for girls.[24] This projection assumes that there have been no changes to grants and loans, and that the underlying regression results are valid for 'out of sample' predictions. Such assumptions are only a first approximation to the scale of the effect of raising fees.

Put another way, we can also calculate the rate of fees at which the university enrolment ceases to increase. Proceeding on the basis of the empirical results, we find a threshold of approximately £3,315 for the male cohort, and £4,610 for the female. This suggests that if the rates of fees pass these threshold levels, the HE system would experience an adverse impact on the demand for university places.

Although the past years have seen no adverse impact on widening participation from the introduction of the higher cap of fees, all the above results suggest that if fees are increased to a certain threshold level, it will reduce the demand for HE. Furthermore, there might be a significant impact on some poorer and less selective institutions who recruit their students predominantly from these marginal groups. These effects could be all the more important under likely imminent funding cuts to higher and further education. In the pre-budget on 9th December 2009, some £600m of cuts to the HE and science and research budgets by 2012-13 were identified, on top of £180m the government asked universities to find in 'efficiency savings' by 2011 (announced by the Department for Innovation, Universities and Skills on 6th May 2009), and a further cut of £135m (announced by the Department for Business, Innovation and Skills on 22nd December 2009) to meet additional pressures. According to the most recent HEFCE university funding publication (HEFCE Summary of 2011/12 Grant Tables (March 2011)), those in the bottom quartile of all 131 institutions in England only received 3.60% of the total recurrent research, access and teaching funding from HEFCE over 2009-10. Under the circumstance that the current level of tuition fees is to be lifted, and if the participation rate drops subsequently as predicted in our model, then the already large resourcing

[24]To obtain elasticities from the coefficient estimates we use the sample means of $COST$ (2328.66) and UE (10.69 for males and 8.78 for females). For the latter case, our estimates generate a marginal effect of -0.0013 for the male cohort and -0.0007 for the female cohort, suggesting an elasticity of the university entrance rate with respect to the net college cost is -0.29 for males, and -0.19 for females. Note that since our data only goes to 2008 these predictions would nominally be dated at 2008 in the event of these changes. As a result our predictions could be slightly different for 2010'11 if we had 2009, and 2010 data to base them on.

disparities between institutions will be exacerbated and may endanger the very existence of some of less well established institutions. Furthermore, it is quite likely that raising the tuition fees in the way we have explained could give rise to some issues in the equity of educational access to HE as it is these less well established universities which have a better track record in providing HE places to students from less wealthy parental backgrounds.

7. Conclusion

A central and controversial issue currently facing HE policy makers in any country is whether less generous student financial support arrangements have any effect on the demand for HE. Specifically in the UK, at the time of writing, the government announces the controversial plan to allow universities in England to charge fees up to £9,000 per year from September 2012. Hence the motivation for this paper is both clear and timely. This paper models the nature of the post war time-series demand for UK HE. Specifically we set out to exploit the regime changes in HE funding to identify the causal impact of these regime changes on the demand for HE, using the recently developed procedures of Qu and Perron (2007) for determining system breaks in a SUR model.

Three broad conclusions can be drawn from our results. First, there are various important factors influencing post-compulsory education participation which include: the average academic attainment measured by exam results in GCSE and the probability of employment for early school leavers (in the S equation), the post-16 staying on rate (in the Q equation), and the qualified leaver rate (in the UE equation).

Second, our test for structural break points suggests that regime changes in HE funding, especially the introduction of student loans in 1990, and the scrapping of student grants initiated from early 1990s, did result in significant structural changes in the SUR model of post-compulsory education participation.

Our final conclusion is the most important as it relates to policy. Our results suggest that higher college costs will deter HE participation, and have a larger adverse impact on young males than young females. Our policy simulation suggests that if fees are increased to £9,000, the university entrance rate would decrease from 2008 by 7.51 and 4.92 percentage points for boys and girls, respectively.

All in all, sharing the costs between the society and the individual participants in HE ought to be both efficient and equitable. Policy makers should be fully aware of the potential consequences of the soaring costs of HE and the trade-off between resource and equity. Realistically any change to a system of HE funding which relied more on individual student fees could endanger some of the less well established institutions.

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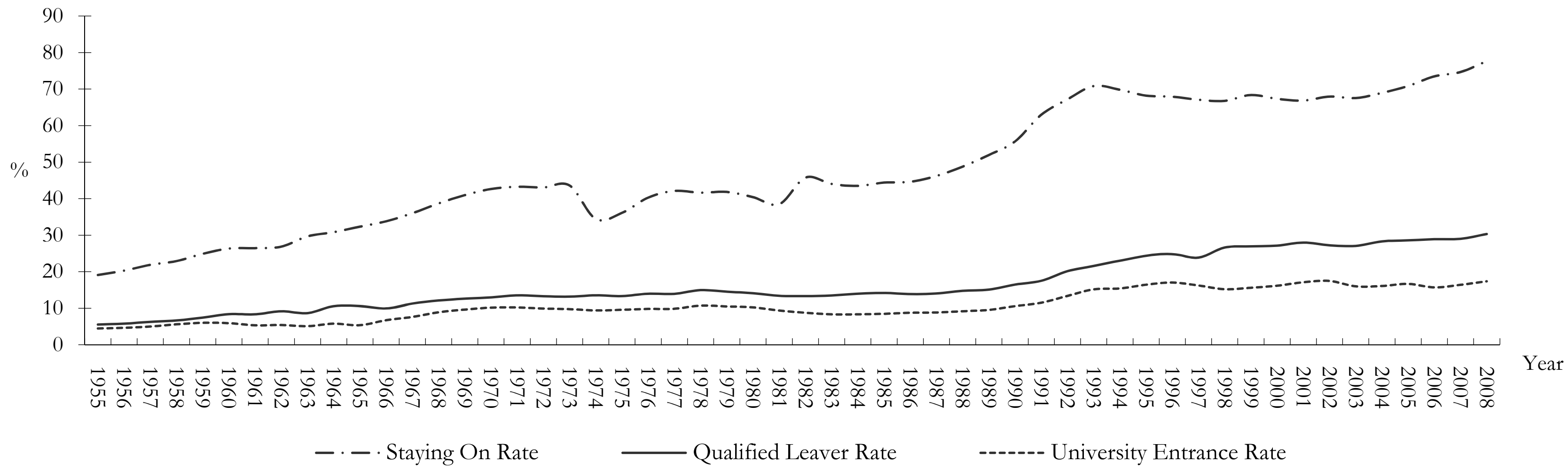
Fig. 1. Staying on Rate (S), Qualified leaver Rate (Q) and University Entry Rate (UE)

Male



Female

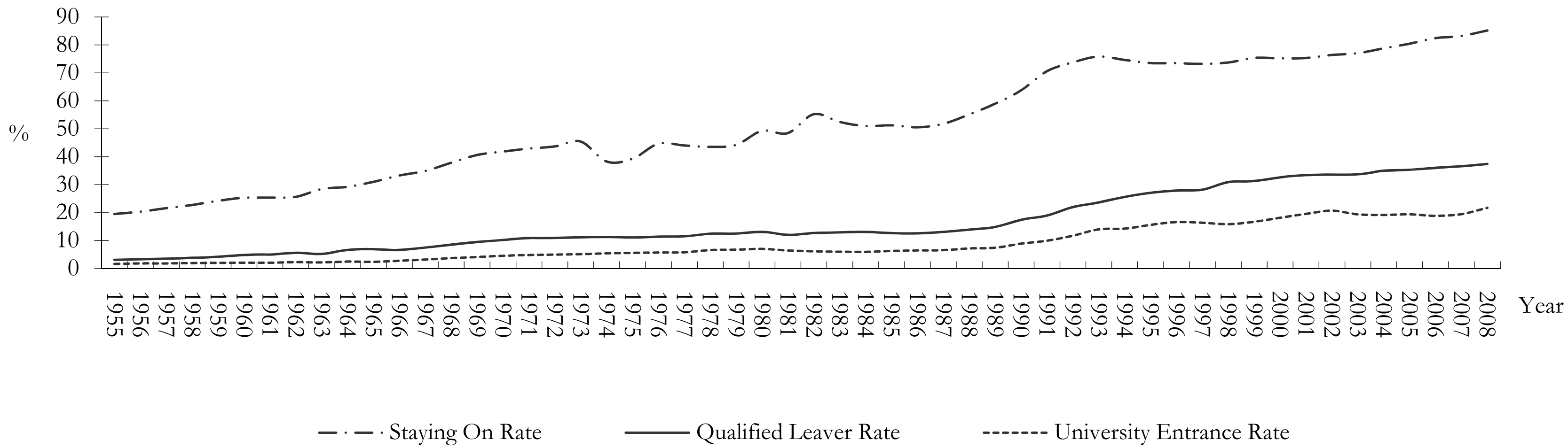
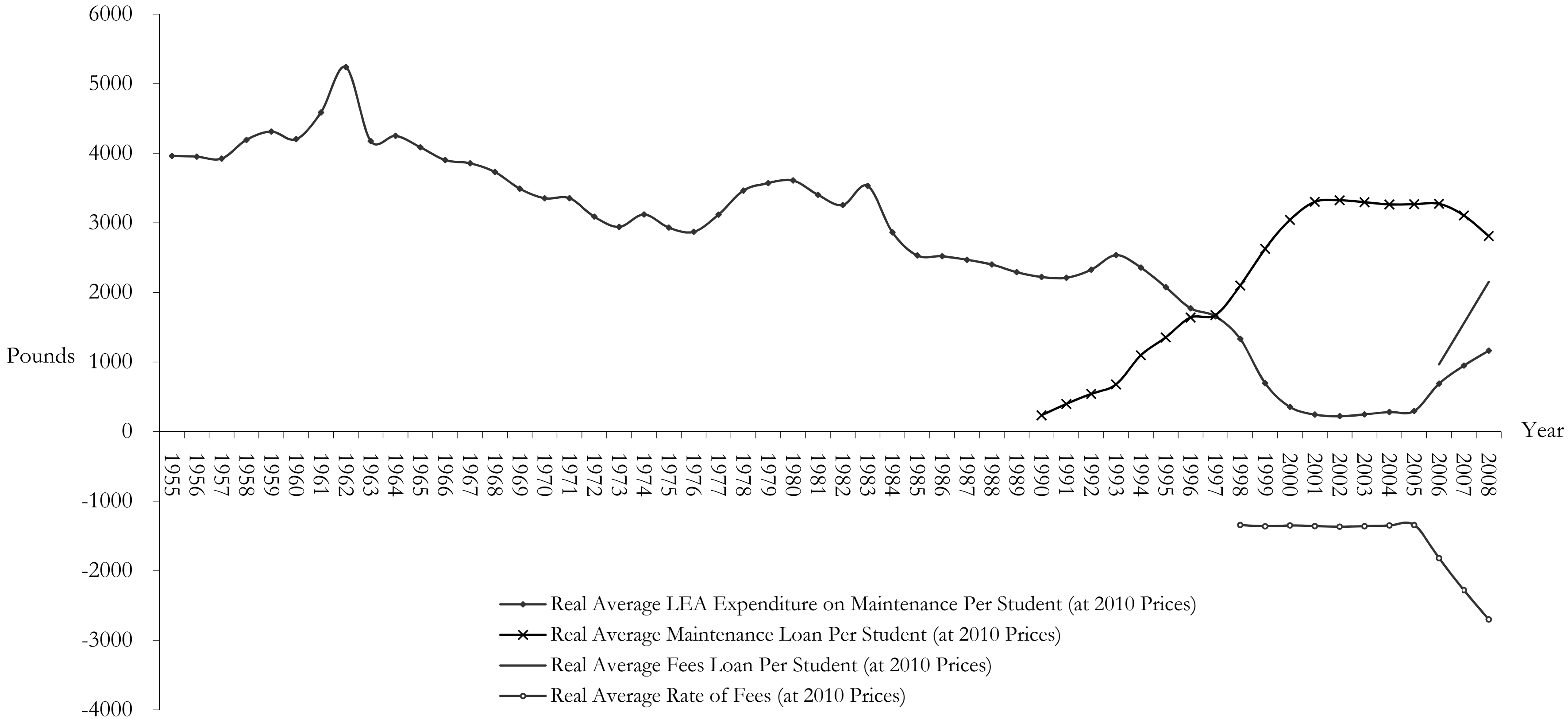


Fig. 2. Student Grants, Loans, and Fees



Sources: Statistics of Education, Statistical First Releases (Department for Children, Schools, and Families), Statistical First Releases (Student Loans Company)

Fig. 3. A Timeline for Relevant Policy Changes

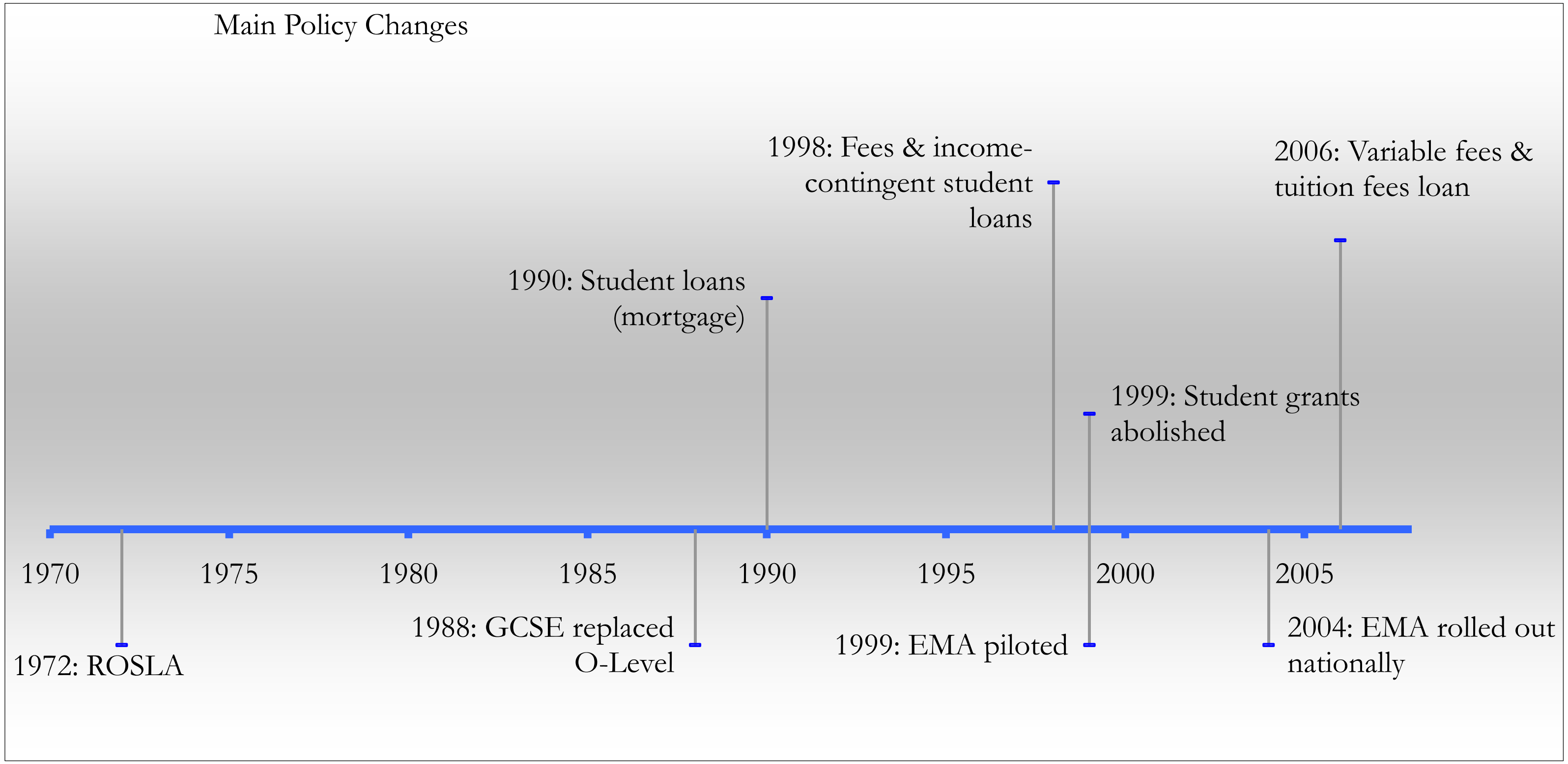


Table 1. Structural Break Test and Estimation (Model IV): 1958-2008

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Male		0.032	0.396	0.027	-0.096	0.048	0.091	0.221	-0.075	-0.016	0.130*	0.593	-0.743***	0.034	0.335
	1971	(0.022)	(0.516)	(0.033)	(0.384)	(0.036)	(0.063)	(0.422)	(0.529)	(0.027)	(0.068)	(0.542)	(0.200)	(0.047)	(0.219)
	[1969 1973]	-0.008	0.964***	0.141***	-0.011	0.018	-0.014	-0.198	0.037	-0.009	-0.019	0.160	0.127	-0.020	0.962***
	1991	(0.013)	(0.249)	(0.033)	(0.326)	(0.015)	(0.047)	(0.407)	(0.155)	(0.016)	(0.044)	(0.425)	(0.186)	(0.053)	(0.314)
	[1988 1994]	-0.004	0.353	0.074	0.053	-0.002	-0.063	0.623	0.698**	-0.003	-0.141	0.669	0.212	-0.107**	0.655**
		(0.027)	(0.587)	(0.089)	(0.350)	(0.018)	(0.095)	(0.413)	(0.299)	(0.018)	(0.130)	(0.488)	(0.235)	(0.043)	(0.316)
	N	51				51				51					
	R^2	0.562				0.453				0.582					
	F-Stat	5.434				3.541				3.994					
	Prob > F	3.36e-07				0.000183				2.75e-06					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Female		0.051**	0.039	0.030	-0.294	0.065*	0.151***	0.013	0.138	0.030	0.126**	0.110	-1.812**	-0.013	0.199
	1973	(0.021)	(0.363)	(0.030)	(0.345)	(0.034)	(0.047)	(0.448)	(0.510)	(0.027)	(0.053)	(0.446)	(0.721)	(0.042)	(0.195)
	[1971 1975]	-0.001	0.635***	0.110***	0.066	0.029	-0.051	-0.065	0.178	0.039**	-0.149**	-0.592	0.149	-0.073	0.652***
	1991	(0.013)	(0.202)	(0.034)	(0.338)	(0.018)	(0.069)	(0.519)	(0.179)	(0.018)	(0.066)	(0.452)	(0.171)	(0.054)	(0.219)
	[1988 1994]	-0.002	0.311	0.030	0.059	0.006	-0.073	0.601	0.717*	0.014	0.014	0.204	-0.116	-0.063*	0.853**
		(0.019)	(0.548)	(0.060)	(0.286)	(0.018)	(0.105)	(0.382)	(0.424)	(0.017)	(0.111)	(0.426)	(0.183)	(0.036)	(0.405)
	N	51				51				51					
	R^2	0.496				0.599				0.711					
	F-Stat	4.110				6.418				7.079					
	Prob > F	2.67e-05				1.49e-08				0					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Appendix A: Data Appendix

Variable	Definition	Data Source
S (male/female)	16-year-old age group attending schools and colleges of further education as a percentage of 16-year-olds	*Statistics of Education* *Schools and Pupils in England* *Statistics of Education in Wales* *Schools in Wales* *Statistics of Further and Higher Education in Polytechnics and Colleges* *Education Statistics of the UK* *Education and Training Statistics for the UK* *Statistics of Education in Wales* *Higher Education, Further Education and Training Statistics in Wales*
Q (male/female)	Qualified leavers with two or more 'A' level passes as a percentage of the relevant age groups	*Statistics of Education* *Statistics of Education, School Leavers, CES and GCE* *Statistics of School Examinations, GCSE and GCE* *Statistics of Education, Public Examinations, GCSE & GCE* *Statistical First Releases*
UE (male/female)	Entrants to first-degree courses as a percentage of the relevant age groups	*Returns from Universities and Universities Colleges* *Statistics of Education* *University Statistics* *Statistics of Further and Higher Education in Polytechnics and Colleges* *Further and Higher Education and Training Statistics in Wales* UCAS data
GCSE	School leavers with five or more A*-C as a percentage of age groups	*Statistics of School Leavers, CSE and GCE* *Statistics of Education, School Examinations, GCSE and GCE* *Statistics of Education, Public Examinations, GCSE and GCE* *Statistics of Education: Public Examinations, GCSE/GNVQ and GCE/AGNVQ in England* *Statistical First Releases*
U (male/female)	Per cent adult males/females unemployment in Great Britain	*British Labour Statistics: Historical Abstract 1886-1968* *Department of Employment Gazette* *Labour Market Trends* *Economic & Labour Market Review*
GU (male/female)	Per cent unemployment of UK domiciled males/females who obtained undergraduate qualification through full-time study	*First Destination of University Graduates* *First Destination of Students Leaving HEIs* *Destinations of Leavers from HE* Self calculation for years 1955-1962
YU (male/female)	Per cent unemployment among males/females aged 18 and 19	*The Relative Pay and Employment of Young People* by William Wells *Department of Employment Gazette* Self calculation based on Labour Force Survey
C	Per-capita consumer's expenditure at 2006 price (deflated by RPI), £	*Annual Abstract of Statistics* and *The Blue Book*
CLASS	Proportion of employees in the UK working in a public administration, defence or professional service or related occupation	*Annual Abstract of Statistics*
IRR	Internal rate of return to undertaking a graduate job (See details in Appendix C)	Wilson (1980, 1983 and 1985) Self calculation based on New Earnings Survey and Labour Force Survey
COST	Average net college cost per student, calculated as a weighted sum of fees, grants, maintenance loans and fee loans, at 2006 price (deflated by RPI), £	*Statistics of Education* *Statistics of Finance & Awards* *Statistics of Education: Finance & Awards* *Statistics of Education: Student Support England and Wales* *Statistical First Releases*

Appendix B. Applicants to University

For completeness we add a further set of figures in this Appendix relating to trends in university applications. In examining these figures it should be remembered that up until 1993 prospective students could apply to polytechnics, universities or both. Unfortunately central data on polytechnic applications prior to 1993 do not exist. In addition, even if they did, we would not know the extent of double-counting (of students who applied to both types of institutions). In this Appendix we provide data on the number of male and female applicants to university by year and the fraction of applicants who gain entrance, respectively in Figures A1 and A2.

What we see from Figure A2 is that, post 1994, between 75-80% of applicants get into university. This is approximately the fraction of any cohort who are qualified and wish to continue their studies. This substantiates the view that the Robbins principle of 1963 has broadly been upheld. This also, conveniently establishes our point that supply of university places is, to all intents and purposes, unconstrained.

Looking further at the pre 1993 period it is clear that the university sector took between 50-55% of applicants -- where presumably the other 25-30% of applicants went to polytechnics. One clear ‘blip’ in the data occurs in the 1982/83 period which coincided with the Thacher university cuts of 1981. The dip in this fraction could be a pattern of the future, i.e. 2011-2013 with the upcoming cuts in higher education.

Appendix C. Internal Rate of Return Calculation

Here we explain how to calculate the internal rate of return to undertaking a graduate job. We use LFS and NES to calculate the series. First of all we give the definitions of a graduate and non-graduate. On the basis of these definitions, graduate jobs and non-graduate job are classified in order to sort out the average earnings of graduate jobs and non-graduate jobs by age.

C.1. Definitions of Graduate and Non-graduate

The LFS collects information on the highest qualification for each individual, and we use this information to define graduates and non-graduates. A graduate is defined as an individual holding a higher-education degree. This mainly includes higher degree, National Vocational Qualification Level 5, first degree and other (unspecified) degrees. An individual is classified as a non-graduate if his highest qualification is below a higher-education degree.

C.2. Definitions of Graduate Job and Non-graduate Job

Both NES and LFS record occupational information for each individual. The occupational codes and job titles vary over time, however, and in some cases different occupational codes are adopted in these surveys even in the same year. To deal with the discrepancies in the occupational coding, we convert each data set's occupational codes[1] to the most recent version of the UK national occupational classification, SOC2000, at 3-digit level (minor groups). Consistency checks are conducted on the basis of text descriptions as developed by the Office for National Statistics.

A consistent occupational coding then allows us to work on the LFS data to classify 'graduate jobs' and 'non-graduate jobs' for each year. An occupation (at 3-digit level of SOC 2000) is defined as a graduate job if the proportion of graduates in it is no less than 50%; otherwise it is defined as a non-graduate job.

We then apply these definitions to the NES. This is done by matching SOC2000 across the LFS and NES. Since the LFS data are not available for some years before 1983,

[1]Roughly speaking, these occupational codes include CODOT and the Key list of Occupations for Statistical Purposes (KOS) in earlier years, 1990 Standard Occupational Classification (SOC90), and 2000 Standard Occupational Classification (SOC2000).

the definitions derived from the 1977 LFS are used for NES 1975-1976, the 1979 LFS definitions for NES 1978, the 1981 LFS definitions for NES 1980, and the 1983 LFS definitions for NES 1982.

C.3. Construction of the Internal Rate of Return

The methodology for calculating the internal rate of return (IRR) to undertaking a graduate job follows Ziderman (1973), Wilson (1980, 1983 and 1985) and Dolton and Chung (2004).

Explicitly, the IRR is found by solving for r in the following expression,

$$\sum_{t=16}^{65} \frac{B_t - C_t}{(1+r)^{t-15}} = 0 \qquad \text{(C1)}$$

Where B_t, in our analysis, is interpreted as the earnings from undertaking a graduate job, and C_t is the foregone earnings that the individual could have earned in an alternative occupation, in this case, a non-graduate job.[2]

We calculate the average earnings of graduate jobs and non-graduate jobs by age.[3] For university graduates, we assume that they enter universities at 18 and receive maintenance grants at ages 18-20. Their income profiles are therefore adjusted to include the student maintenance.

Since real earnings may be expected to rise over time, it is necessary to adjust these cross-sectional age-earnings profiles to approximate the lifetime earnings patterns of given educated individuals ageing over time. In practice earnings profiles are adjusted to account for the expected growth in real earnings of 2 per cent per annum.[4]

Our estimates of IRR (and present values of lifetime earnings), based on the NES and LFS, date back to 1975. In order to extend the analysis of rates of return backwards in time beyond 1975, we decide to refer to Wilson's related work for a proxy of IRR in the absence of superior data sets prior to 1975. Wilson (1980, 1983 and 1985) examines the average private rate of return to becoming a professional scientist or

[2]For simplicity the direct costs to the individual of taking a course are assumed to be zero.
[3]We define similar samples for analysis: for NES, we use a sub-sample of full-time workers whose normal basic hours are no less than 30 per week; and for LFS, full-time employees whose total usual hours in the main job are no less than 30 hours per week.
[4]This assumption is close to the sample mean of the rate of growth of per-capital Gross National Income over time for the past 60 years, which is 0.0235.

engineer. In his work, B_t is the earnings of qualified scientists or engineers. The data is taken from surveys carried out by various professional institutions. The alternative income profile, C_t, represents the median earnings of all workers. The basic source for this comparison income profile is the NES, which was not started until 1968. There was no survey directly comparable to the NES prior to 1968, however. Therefore in his exercise to extend the analysis backwards, Wilson claims that the comparison income profile can be regarded as stable in shape over a 10-15 year period, and adjusts the NES data according to movements in the Index of average earnings, or movements in the earnings of manual men from the DE's earnings and hours survey when the former index is unavailable. In this way he extends the estimates back to 1955.

Wilson does not conduct the analysis by gender, but as he argues, the proportion of females in the professional institutions is very small, particularly for engineers. Therefore the estimates taken from Wilson's work are treated as IRR of males. For most of the years, Wilson provides various estimated IRR to different professional occupations. In this case, for each individual year we take averages of the estimates. In addition, for those unpublished years, the average of the estimates of the years before and after is inserted. Putting together these adjusted estimates and our results of IRR, we construct a series of males' IRR from 1955 to 2008.[5]

This series of males' IRR is then utilized to run OLS regressions to predict females' IRR for the earlier years from 1955 to 1974.

[5]It should be noted that Wilson's comparison income series is based on median incomes, while our age-earnings profiles used here are based on mean incomes. A similar exercise was actually done based on median incomes. There is no much difference between the outcomes, but the estimated IRR based on mean incomes display a more consistent pattern than Wilson's results, and therefore this is what we adopted.

Appendix D. Stationarity Tests

To test whether the stochastic variables are stationary, we first perform Augmented Dickey-Fuller unit root tests. Table A2 presents the test results. The MacKinnon Approximate P-values suggest that the majority of these variables are integrated of order 1, $I(1)$. As a matter of fact, most of the tests with one-lag specification overwhelmingly reject the null hypothesis of a unit root for first differences of the variables.

A well known weakness of the Dickey-Fuller style unit root test rests on the failure to account for structural changes. As a result, the test is biased towards the nonrejection of the unit root null in the presence of structural shifts. To overcome this complication, quite a few strategies have been devised to test for unit roots allowing for structural changes. Perron (1989) extends the Augmented Dickey-Fuller procedure by incorporating a single break in the model. In Perron's strategy, the dating of the potential break is predetermined exogenously based on an ex post examination or knowledge of the data. This is questioned by, among others, Zivot and Andrews (1992) who develop a methodology for endogenizing the break point. Their approach allows for a single structural change in the intercept and/or the trend of the series, and selects by a grid search the optimal break point where the t-statistic from the Augmented Dickey-Fuller test of unit root is at a minimum, namely most negative and least favourable to the unit root null hypothesis. The test allowing for a single break point has been extended by, for example, Clemente, Montañés and Reyes (1998) who propose unit root tests that allow for two structural changes in the mean of the series, either additive outliers (the AO model, which captures a sudden change in a series) or innovational outliers (the IO model, allowing for a gradual shift in the mean of the series).

Considering the weakness of Augmented Dickey-Fuller tests, we then perform the Zivot-Andrews routine to test the unit root of first-differenced series, accounting for a single potential structural shift in the variable. As reported in Table A3, tests of most of the series reject the unit root null, except for $\Delta \ln UEm_t$ and $\Delta \ln UEf_t$. We then use the Clemente-Montañés-Reyes unit root test with single mean shift to test the stationarity of $\ln UEm_t$, $\Delta \ln UEm_t$, $\ln UEf_t$ and $\Delta \ln UEf_t$. Test results are shown in Table A4. Despite the structural changes, we are unable to reject the null of a unit root in $\ln UEm_t$

and $\ln UEf_t$. But the tests reject the null of a unit root in $\Delta\ln UEm_t$ and $\Delta\ln UEf_t$. Therefore we conclude that neither $\Delta\ln UEm_t$ nor $\Delta\ln UEf_t$ exhibits a unit root.

Table A1. Rates of Grants and Loans Since 1962

Definition: Full year maximum rates **Key: Grant Rates *Loan Rates***

Year	Parental Home	London	Elsewhere	Oxbridge
	£	£	£	£
1962	240	335	320	345
1963	240	335	320	345
1964	240	335	320	345
1965	275	370	340	370
1966	275	370	340	370
1967	275	370	340	370
1968	290	395	360	400
1969	290	395	360	400
1970	290	420	380	420
1971	345	465	430	465
1972	355	480	445	480
1973	390	520	485	520
Abolition of Oxbridge rate				
1974	475	665	605	
1975	570	810	740	
1976	675	955	875	
1977	785	1145	1010	
1978	870	1315	1100	
1979	985	1485	1245	
1980	1125	1695	1430	
1981	1180	1825	1535	
1982	1225	1900	1595	
1983	1275	1975	1660	
1984	1435	2100	1775	
1985	1480	2165	1830	
1986	1510	2246	1901	
1987	1567	2330	1972	
1988	1630	2425	2050	
1989	1710	2650	2155	
Introduction of mortgage-style student loans				
1990	1795 *330*	2845 *460*	2265	*420*
1991	1795 *460*	2845 *660*	2265	*580*
1992	1795 *570*	2845 *830*	2265	*715*
1993	1795 *670*	2845 *940*	2265	*800*
1994	1615 *915*	2560 *1375*	2040	*1150*
1995	1530 *1065*	2340 *1695*	1885	*1385*

1996	1400	*1260*	2105	*2035*	1710	*1645*
1997	1435	*1290*	2160	*2085*	1755	*1685*

Year	Parental Home	London	Elsewhere	Oxbridge		Parental Home	London	Elsewhere		Parental Home	London	Elsewhere
	£	£	£	£		£	£	£		£	£	£
Introduction of tuition fees (fixed fees) and income-contingent student loans												
	Old: Mandatory Scheme					**New: Student Support Scheme**						
1998/99	1480 *1325*	2225 *2145*	1810	*1735*		480 *2325*	1225 *3145*	810 *2735*				
1999/00	1515 *1360*	2280 *2200*	1855	*1780*		*2875*	*4480*	*3635*				
2000/01	1555 *1395*	2335 *2255*	1900	*1825*		*2950*	*4590*	*3725*				
2001/02	1555 *1395*	2335 *2255*	1900	*1870*		*3020*	*4700*	*3815*				
2002/03	1625 *1465*	2450 *2365*	1990	*1915*		*3090*	*4815*	*3905*				
2003/04	1500 *1500*	2420 *2420*	1960	*1960*		*3165*	*4930*	*4000*				
Introduction of Higher Education Grant												
2004/05	1705 *1535*	2570 *2480*	2090	*2005*		1000 *3240*	1000 *5050*	1000 *4095*				
2005/06	1745 *1535*	2635 *2480*	2140	*2055*		1000 *3320*	1000 *5175*	1000 *4195*				
Introduction of variable fees & Tuition Fees Loan												
						Old: Fixed Fees System				**New: Variable Fees System**		
2006/07	1790 *1615*	2700 *2605*	2195	*2105*		1000 *3415*	1000 *6170*	1000 *4405*		2700 *3415*	2700 *6170*	2700 *4405*
2007/08						1000 *3495*	1000 *6315*	1000 *4510*		2765 *3495*	2765 *6315*	2765 *4510*

Sources: NUS Press Pack 2005-06, 2007-08. http://www.slc.co.uk/statistics/facts_figures.html (last accessed: 1 July 2010)

Table A2. Augmented Dikey-Fuller Unit Root Test – MacKinnon Approximate P-Values

Variable	At Level				At First Difference			
	lags(1)	**lags(2)**	**lags(3)**	**lags(4)**	**lags(1)**	**lags(2)**	**lags(3)**	**lags(4)**
ln UEm_t	0.5963	0.6180	0.8062	0.8307	0.0333	0.0043	0.0051	0.0078
ln UEf_t	0.8667	0.8112	0.8243	0.8498	0.0428	0.0340	0.0182	0.0315
ln Qm_t	0.3166	0.5216	0.6403	0.7843	0.0007	0.0438	0.0733	0.0658
ln Qf_t	0.2885	0.4254	0.5388	0.6346	0.0058	0.0679	0.1883	0.1316
ln Sm_t	0.3920	0.4817	0.5342	0.6302	0.0000	0.0048	0.0083	0.0198
ln Sf_t	0.2698	0.3207	0.4149	0.4949	0.0001	0.0069	0.0236	0.0153
ln $GCSEm_t$	0.9249	0.9308	0.9601	0.9760	0.0005	0.0069	0.0998	0.1782
ln $GCSEf_t$	0.9099	0.8973	0.9276	0.9471	0.0001	0.0194	0.0367	0.0855
ln Um_t	0.5655	0.4203	0.5550	0.5552	0.0000	0.0000	0.0023	0.0196
ln Uf_t	0.4949	0.5800	0.7454	0.4430	0.0000	0.0000	0.0811	0.1920
ln GUm_t	0.1961	0.5161	0.6341	0.6255	0.0000	0.0000	0.0015	0.0039
ln GUf_t	0.0794	0.3776	0.3768	0.5326	0.0000	0.0004	0.0001	0.0019
ln YUm_t	0.5335	0.5941	0.3163	0.3096	0.0000	0.0000	0.0008	0.0265
ln YUf_t	0.5971	0.7067	0.6145	0.4750	0.0000	0.0000	0.0041	0.0716
ln WWm_t	0.9615	0.9648	0.9424	0.9703	0.0002	0.0195	0.0157	0.2242
ln WWf_t	0.7983	0.8117	0.8021	0.9042	0.0001	0.0056	0.0019	0.0643
ln $IRRm_t$	0.1833	0.1609	0.2721	0.1728	0.0000	0.0012	0.1453	0.0172
ln $IRRf_t$	0.0411	0.0753	0.1109	0.0474	0.0000	0.0001	0.0104	0.0255
ln C_t	0.6283	0.7514	0.8200	0.8597	0.0000	0.0008	0.0202	0.1029
ln $ClassRate_t$	0.7813	0.7066	0.6463	0.4355	0.0014	0.0032	0.0412	0.0764
ln $HHIncome_t$	0.6194	0.6657	0.6226	0.6089	0.0000	0.0000	0.0000	0.0014
$\boldsymbol{RCOST_t}$ ***(Def1)***	0.9559	0.9474	0.8862	0.8695	0.0000	0.0034	0.0242	0.0194
$\boldsymbol{RCOST_t}$ ***(Def2)***	0.9337	0.9246	0.8430	0.8209	0.0000	0.0029	0.0225	0.0180
$\boldsymbol{RCOST_t}$ ***(Def3)***	0.8516	0.8437	0.7080	0.6736	0.0000	0.0022	0.0205	0.0164
$\boldsymbol{RCOST_t}$ ***(Def4)***	0.9463	0.9345	0.8566	0.8329	0.0000	0.0043	0.0288	0.0235

To test the stationarity of variables we use ADF unit root test where the null hypothesis of unit root is tested against the stationarity alternative.

Hamilton (1994) describes four different cases to which the ADF test can be applied. We decide which case to be used for each variable according to the pattern over time. Instead of reporting the ADF statistics, we tabulate the MacKinnon Approximate P-values here. The P-values reveal that the majority of variables are $I(1)$. Experiments with different numbers of lag terms yield similar conclusions.

Table A3. Zivot–Andrews Unit Root Test

Variable	At Level						At First Difference					
Allowing for a break in	***Intercept (Critical values: 1%: -5.43, 5%: -4.80)***		***Trend (Critical values: 1%: -4.93, 5%: -4.42)***		***Both (Critical values: 1%: -5.57, 5%: -5.08)***		***Intercept (Critical values: 1%: -5.43, 5%: -4.80)***		***Trend (Critical values: 1%: -4.93, 5%: -4.42)***		***Both (Critical values: 1%: -5.57, 5%: -5.08)***	
	Minimum t-statistic	**Break Point**	**Minimum t-statistic**	**Break Point**	**Minimum t-statistic**	**Break Point**	**Minimum t-statistic**	**Break Point**	**Minimum t-statistic**	**Break Point**	**Minimum t-statistic**	**Break Point**
ln UEm_t	-4.476	1980	-3.710	1968	-4.757	1979	-3.940	1988	-3.629	1968	-4.197	1970
ln UEf_t	-4.134	1981	-3.450	1968	-4.298	1980	-3.432	1988	-2.937	1967	-3.524	1988
ln Qm_t	-3.273	1979	-2.469	1987	-3.146	1992	-9.557***	1988	-8.177***	1974	-9.463***	1988
ln Qf_t	-2.911	1964	-2.463	2002	-2.847	1992	-5.916***	1988	-4.134***	1976	-5.915***	1988
ln Sm_t	-3.061	1974	-2.599	1993	-3.180	1974	-6.912***	1982	-6.663***	1975	-7.010***	1982
ln Sf_t	-3.103	1963	-2.902	1969	-3.002	1974	-7.291***	1988	-6.997***	1975	-7.240***	1988
ln $GCSEm_t$	-3.772	1978	-3.010	1986	-3.403	1978	-6.270***	1988	-5.519***	1976	-6.224***	1988
ln $GCSEf_t$	-4.529	1988	-2.778	198	-4.127	1988	-6.010***	1988	-4.661***	1975	-6.286***	1988
ln Um_t	-3.335	1997	-4.189	1986	-4.425	1980	-8.314***	1956	-8.238***	1958	-8.333***	1982
ln Uf_t	-4.253	1975	-2.435	1985	-4.553	1975	-6.830***	1987	-6.134***	1977	-6.755***	1985
ln GUm_t	-4.010	1996	-3.871	1983	-4.751	1980	-6.662***	1983	-6.171***	2000	-6.571***	1983
ln GUf_t	-3.644	1975	-3.694	1983	-4.207	1979	-6.496***	1983	-5.892***	2001	-6.626***	1966
ln YUm_t	-3.038	1969	-4.432*	1984	-4.574	1980	-8.228***	1984	-7.805***	1968	-8.143***	1984
ln YUf_t	-4.006	1974	-3.308	1982	-4.636	1975	-7.493***	1985	-6.949***	1976	-7.467***	1978
ln WWm_t	-3.101	1967	-4.075	1974	-4.685	1972	-7.721***	1975	-5.955***	2003	-8.465***	1975
ln WWf_t	-3.916	1971	-3.974	1975	-6.091	1971	-8.128***	1975	-6.510***	1989	-8.452***	1975
ln $IRRm_t$	-3.441	1965	-4.167	1973	-4.056	1971	-10.918***	1974	-9.463***	1990	-11.317***	1974
ln $IRRf_t$	-3.751	1991	-3.016	1985	-3.755	1991	-7.155***	1977	-6.738***	1983	-7.156***	1977
ln C_t	-4.659	1974	-3.296	1959	-4.657	1969	-12.635***	1983	-11.784***	2002	-12.711***	1978
ln $ClassRate_t$	-3.599	1967	-3.445	1982	-3.486	1971	-6.994***	1965	-7.307***	1968	-7.762***	1973
ln $HHIncome_t$	-5.052**	1992	-4.799**	1964	-4.997***	1992	-6.809***	1971	-6.461***	2003	-7.210***	1971
$RCOST_t$ (Def1)	-10.806***	1998	-6.558***	1993	-10.427***	1998	-10.771***	1963	-10.534***	1999	-11.774***	1998
$RCOST_t$ (Def2)	-10.369***	1998	-6.576***	1994	-10.245***	1998	-10.879***	1963	-10.613***	1999	-11.814***	1998
$RCOST_t$ (Def3)	-9.231***	1998	-6.577***	1994	-9.668***	1998	-11.058***	1963	-10.731***	1999	-11.837***	1998
$RCOST_t$ (Def4)	-10.665***	1998	-6.272***	1993	-10.430***	1998	-10.636***	1963	-10.521***	1999	-11.905***	1998

*** $p<0.01$, ** $p<0.05$

The Zivot-Andrews test statistic reported is the minimum Augmented Dickey-Fuller statistic calculated across all potential breaks in the data for three cases: 1) a structural change in the intercept of the series is allowed for (and the 1% critical value is -5.43 and the 5% critical value -4.80); 2) a structural change in the trend of the series is allowed for (and the 1% critical value is -4.93 and the 5% critical value -4.42); and 3) a structural change in the intercept and the trend is allowed for (and the 1% critical value is -5.57 and the 5% critical value -5.08). The break point denotes the year when this minimum ADF statistic is obtained.

Table A4. Clemente-Montañés-Reyes Unit Root Test for $\ln UE_t$: AO Model

Test for $\ln UEm_t$ with single mean shift

T = 44 optimal breakpoint: 1994

AR(0)	du1	(rho - 1)	const
Coefficient	0.682	-0.130	2.114
t-statistic	7.944	-2.415	
P-value	0.000	-3.560	(5% crit. value)

Test for $\ln UEf_t$ with single mean shift

T = 44 optimal breakpoint: 1994

AR(0)	du1	(rho - 1)	const
Coefficient	1.382	-0.107	1.525
t-statistic	8.594	-2.111	
P-value	0.000	-3.560	(5% crit. value)

Test for $\Delta \ln UEm_t$ with single mean shift

T = 43 optimal breakpoint: 1994

AR(0)	du1	(rho - 1)	const
Coefficient	-0.004	-0.484	0.029
t-statistic	-0.138	-3.384	
P-value	0.891	-3.560	(5% crit. value)

Test for $\Delta \ln UEf_t$ with single mean shift

T = 43 optimal breakpoint: 1991

AR(0)	du1	(rho - 1)	const
Coefficient	-0.004	-0.549	0.050
t-statistic	-0.203	-3.314	
P-value	0.840	-3.560	(5% crit. value)

Table A5. Structural Break Test and Estimation (Model I): 1958-2008

	Break [95% CI]	$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
		0.030	0.470	0.043	-0.140	0.048	0.090	0.220	-0.086	-0.017	0.128*	0.623	-0.757***	0.040	0.344
	1971	(0.018)	(0.430)	(0.046)	(0.315)	(0.034)	(0.061)	(0.407)	(0.511)	(0.027)	(0.068)	(0.538)	(0.200)	(0.047)	(0.218)
	[1970 1972]	-0.039***	-0.539	0.378***	0.627*	0.003	-0.017	-0.016	-0.037	-0.021	-0.037	0.597	0.335	-0.015	0.655
Male	1987	(0.013)	(0.380)	(0.053)	(0.330)	(0.016)	(0.048)	(0.457)	(0.159)	(0.018)	(0.047)	(0.500)	(0.215)	(0.053)	(0.402)
	[1985 1989]	-0.008	0.861***	0.018	-0.071	0.007	-0.018	0.397	0.758***	0.009	-0.005	0.103	0.117	-0.089**	0.803***
		(0.018)	(0.283)	(0.061)	(0.236)	(0.015)	(0.063)	(0.283)	(0.276)	(0.016)	(0.073)	(0.316)	(0.190)	(0.036)	(0.281)
	N	51				51				51					
	R^2	0.697				0.491				0.591					
	F-Stat	9.776				4.113				4.186					
	Prob > F	0.000				0.000				0.000					

	Break [95% CI]	$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
		0.054**	0.013	0.053	-0.343	0.065*	0.151***	0.010	0.128	0.030	0.125**	0.109	-1.814**	-0.014	0.207
	1973	(0.022)	(0.388)	(0.054)	(0.374)	(0.034)	(0.047)	(0.448)	(0.510)	(0.027)	(0.052)	(0.446)	(0.720)	(0.042)	(0.194)
	[1971 1975]	0.006	0.539**	0.080*	-0.050	0.031*	-0.063	-0.114	0.180	0.041**	-0.157**	-0.627	0.148	-0.078	0.626***
Female	1991	(0.014)	(0.213)	(0.041)	(0.360)	(0.018)	(0.069)	(0.519)	(0.179)	(0.018)	(0.066)	(0.452)	(0.170)	(0.054)	(0.219)
	[1990 1992]	0.002	0.273	0.033	0.058	0.006	-0.071	0.598	0.715*	0.014	0.014	0.199	-0.115	-0.063*	0.862**
		(0.026)	(0.623)	(0.095)	(0.317)	(0.018)	(0.105)	(0.382)	(0.423)	(0.017)	(0.110)	(0.426)	(0.183)	(0.036)	(0.405)
	N	51				51				51					
	R^2	0.426				0.598				0.711					
	F-Stat	3.126				6.462				7.109					
	Prob > F	0.001				0.000				0.000					

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10*

Table A6. Structural Break Test and Estimation (Model II): 1958-2008

	Break	**ΔlnSt**				**ΔlnQt**				**ΔlnUEt**					
	[95% CI]	**Intercept**	**$\Delta lnGCSE_t$**	**ΔlnU_{t-1}**	**$\Delta lnCLASS_t$**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**ΔlnS_{t-2}**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**$\Delta lnIRR_{t-1}$**	**$\Delta COST_t$**	**ΔlnQ_t**
		0.027	0.452	0.044	-0.003	0.071**	0.143**	-1.042*	0.047	0.010	0.126	-0.132	-0.630***	0.022	0.294
	1971	(0.020)	(0.389)	(0.042)	(0.378)	(0.031)	(0.067)	(0.591)	(0.501)	(0.028)	(0.082)	(0.707)	(0.169)	(0.047)	(0.236)
	[1970 1972]	0.007	-1.309***	0.459***	-1.761***	0.022	-0.000	-0.929	-0.072	-0.006	-0.036	-0.231	0.262	-0.007	0.711
Male	1985	(0.015)	(0.447)	(0.055)	(0.571)	(0.017)	(0.049)	(0.684)	(0.156)	(0.022)	(0.054)	(0.935)	(0.224)	(0.057)	(0.471)
	[1984 1986]	-0.013	0.667***	-0.003	0.986**	0.025*	0.050	-0.729	0.758***	0.010	-0.015	0.294	0.158	-0.089**	0.786***
		(0.012)	(0.220)	(0.048)	(0.438)	(0.013)	(0.062)	(0.652)	(0.261)	(0.018)	(0.079)	(0.842)	(0.208)	(0.037)	(0.273)
	N	51				51				51					
	R^2	0.750				0.524				0.574					
	F-Stat	12.814				4.726				3.890					
	Prob > F	0.000				0.000				0.000					
	Break	**ΔlnSt**				**ΔlnQt**				**ΔlnUEt**					
	[95% CI]	**Intercept**	**$\Delta lnGCSE_t$**	**ΔlnU_{t-1}**	**$\Delta lnCLASS_t$**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**ΔlnS_{t-2}**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**$\Delta lnIRR_{t-1}$**	**$\Delta COST_t$**	**ΔlnQ_t**
		0.039	0.083	0.042	0.144	0.097***	0.171***	-1.100**	0.092	0.025	0.106*	0.216	-1.710***	-0.014	0.259
	1972	(0.024)	(0.378)	(0.050)	(0.470)	(0.028)	(0.042)	(0.512)	(0.426)	(0.027)	(0.055)	(0.561)	(0.621)	(0.038)	(0.198)
	[1971 1973]	-0.019	0.430*	0.151***	0.464	0.043***	0.002	-1.517**	0.059	0.028	-0.148**	-0.047	0.261	-0.090*	0.236
Female	1988	(0.018)	(0.232)	(0.044)	(0.593)	(0.016)	(0.052)	(0.666)	(0.154)	(0.023)	(0.059)	(0.884)	(0.174)	(0.054)	(0.394)
	[1986 1990]	-0.023	0.731**	-0.047	1.104**	0.030**	-0.006	-0.806	1.158***	0.015	0.044	-0.208	-0.160	-0.064**	1.027***
		(0.017)	(0.302)	(0.059)	(0.549)	(0.014)	(0.080)	(0.666)	(0.331)	(0.017)	(0.087)	(0.676)	(0.166)	(0.032)	(0.229)
	N	51				51				51					
	R^2	0.523				0.698				0.728					
	F-Stat	4.662				9.924				7.866					
	Prob > F	0.000				0.000				0.000					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A7. Structural Break Test and Estimation (Model III): 1958-2008

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
		0.019	0.643*	0.011	-0.018	0.064**	0.166**	-1.190**	0.167	0.008	0.145*	-0.247	-0.541***	0.005	0.316
	1972	(0.021)	(0.383)	(0.025)	(0.398)	(0.031)	(0.065)	(0.581)	(0.490)	(0.028)	(0.084)	(0.727)	(0.169)	(0.048)	(0.243)
	[1971 1973]	0.019	-0.602	0.292***	-1.732***	0.021	-0.001	-0.889	-0.052	-0.003	-0.038	-0.225	0.289	-0.029	0.671
Male	1987	(0.015)	(0.419)	(0.037)	(0.630)	(0.017)	(0.048)	(0.713)	(0.156)	(0.023)	(0.053)	(0.974)	(0.253)	(0.060)	(0.475)
	[19861988]	-0.019	0.798***	-0.024	0.959**	0.026*	0.044	-0.631	0.741***	0.010	-0.011	0.209	0.135	-0.088**	0.790***
		(0.013)	(0.264)	(0.039)	(0.484)	(0.014)	(0.066)	(0.704)	(0.268)	(0.019)	(0.087)	(0.952)	(0.227)	(0.038)	(0.290)
	N	51				51				51					
	R^2	0.727				0.514				0.542					
	F-Stat	11.338				4.583				3.332					
	Prob > F	0				5.47e-06				4.91e-05					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
		0.037	0.115	0.026	0.124	0.097***	0.171***	-1.100**	0.092	0.025	0.106*	0.217	-1.709***	-0.015	0.259
	1972	(0.023)	(0.358)	(0.029)	(0.447)	(0.028)	(0.043)	(0.513)	(0.427)	(0.027)	(0.055)	(0.561)	(0.621)	(0.038)	(0.198)
	[1971 1973]	-0.013	0.486**	0.143***	0.115	0.043***	0.002	-1.524**	0.049	0.029	-0.148**	-0.052	0.261	-0.091*	0.232
Female	1988	(0.016)	(0.221)	(0.033)	(0.552)	(0.016)	(0.052)	(0.666)	(0.154)	(0.023)	(0.059)	(0.884)	(0.174)	(0.054)	(0.394)
	[1987 1989]	-0.019	0.708**	-0.034	1.182**	0.030**	-0.004	-0.816	1.159***	0.015	0.044	-0.209	-0.160	-0.065**	1.026***
		(0.015)	(0.288)	(0.043)	(0.543)	(0.014)	(0.080)	(0.666)	(0.332)	(0.017)	(0.087)	(0.676)	(0.166)	(0.032)	(0.229)
	N	51				51				51					
	R^2	0.573				0.698				0.728					
	F-Stat	5.678				9.918				7.867					
	Prob > F	1.54e-07				0				0					

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table A8. Structural Break Test and Estimation (Model I): 1977-2008

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Male	1988 [1987 1989]	-0.071**	0.379	0.386***	1.632**	-0.033*	0.019	0.909*	0.317**	-0.009	-0.100	0.085	0.076	-0.039	0.674*
		(0.028)	(0.262)	(0.103)	(0.639)	(0.020)	(0.051)	(0.478)	(0.147)	(0.024)	(0.065)	(0.632)	(0.442)	(0.045)	(0.374)
		-0.016	1.013***	0.006	-0.001	0.006	-0.022	0.388*	0.767***	0.007	-0.010	0.115	0.121	-0.086***	0.875***
		(0.020)	(0.329)	(0.063)	(0.247)	(0.010)	(0.043)	(0.197)	(0.180)	(0.012)	(0.059)	(0.253)	(0.143)	(0.028)	(0.212)
	N	32				32				32					
	R^2	0.602				0.655				0.654					
	F-Stat	6.002				7.956				5.487					
	Prob > F	8.06e-06				1.70e-07				1.94e-06					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Female	1988 [1987 1989]	0.075**	0.260	-0.196**	-1.223*	-0.026	-0.006	1.037*	0.310**	0.027	-0.198*	-0.171	0.121	-0.104	0.308
		(0.032)	(0.189)	(0.086)	(0.644)	(0.021)	(0.057)	(0.536)	(0.137)	(0.035)	(0.106)	(0.898)	(0.226)	(0.065)	(0.355)
		0.004	0.648**	0.028	-0.219	0.013	-0.093*	0.367*	1.079***	0.006	0.043	0.025	-0.179	-0.054*	1.116***
		(0.014)	(0.248)	(0.053)	(0.235)	(0.010)	(0.052)	(0.196)	(0.221)	(0.016)	(0.085)	(0.296)	(0.169)	(0.032)	(0.235)
	N	32				32				32					
	R^2	0.435				0.743				0.697					
	F-Stat	3.312				12.15				6.935					
	Prob > F	0.00298				1.32e-10				5.18e-08					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A9. Structural Break Test and Estimation (Model II): 1977-2008

	Break	ΔlnSt				ΔlnQt				ΔlnUEt					
	[95% CI]	Intercept	ΔlnGCSE$_t$	ΔlnU$_{t-1}$	ΔlnCLASS$_t$	Intercept	ΔlnGU$_{t-1}$	ΔlnCLASS$_t$	ΔlnS$_{t-2}$	Intercept	ΔlnGU$_{t-1}$	ΔlnCLASS$_t$	ΔlnIRR$_{t-1}$	ΔCOST$_t$	ΔlnQ$_t$
Male	1988	0.006	0.391	0.210***	-0.712	0.011	-0.016	-0.645	0.183	-0.015	-0.131*	0.602	0.036	-0.054	0.770**
		(0.015)	(0.291)	(0.068)	(0.617)	(0.016)	(0.052)	(0.740)	(0.159)	(0.018)	(0.068)	(0.961)	(0.438)	(0.048)	(0.382)
	[1985 1991]	-0.022	0.902***	-0.012	0.833*	0.024**	0.043	-0.598	0.734***	0.007	-0.017	0.270	0.155	-0.087***	0.877***
		(0.016)	(0.324)	(0.052)	(0.485)	(0.010)	(0.047)	(0.499)	(0.189)	(0.013)	(0.065)	(0.685)	(0.163)	(0.028)	(0.210)
	N	32				32				32					
	R^2	0.576				0.618				0.655					
	F-Stat	5.531				6.596				5.419					
	Prob > F	2.16e-05				2.40e-06				2.32e-06					

	Break	ΔlnSt				ΔlnQt				ΔlnUEt					
	[95% CI]	Intercept	ΔlnGCSE$_t$	ΔlnU$_{t-1}$	ΔlnCLASS$_t$	Intercept	ΔlnGU$_{t-1}$	ΔlnCLASS$_t$	ΔlnS$_{t-2}$	Intercept	ΔlnGU$_{t-1}$	ΔlnCLASS$_t$	ΔlnIRR$_{t-1}$	ΔCOST$_t$	ΔlnQ$_t$
Female	1988	0.013	0.289	-0.030	-0.012	0.036**	-0.040	-1.381**	0.134	0.024	-0.181**	-0.170	0.111	-0.100*	0.247
		(0.016)	(0.188)	(0.053)	(0.546)	(0.014)	(0.046)	(0.587)	(0.138)	(0.025)	(0.074)	(1.028)	(0.223)	(0.058)	(0.413)
	[1987 1989]	-0.020	0.716***	-0.018	1.069**	0.029***	-0.012	-0.796*	1.177***	0.008	0.050	-0.138	-0.176	-0.054*	1.120***
		(0.014)	(0.239)	(0.046)	(0.456)	(0.010)	(0.053)	(0.464)	(0.221)	(0.017)	(0.088)	(0.685)	(0.165)	(0.032)	(0.230)
	N	32				32				32					
	R^2	0.486				0.758				0.699					
	F-Stat	3.692				13.15				7.003					
	Prob > F	0.00125				0				4.41e-08					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A10. Structural Break Test and Estimation (Model III): 1977-2008

		$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	**Intercept**	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	**Intercept**	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Male		-0.008 (0.011)	0.732*** (0.216)	0.027 (0.038)	0.414 (0.430)	0.022** (0.010)	0.028 (0.041)	-0.597 (0.486)	0.424*** (0.135)	-0.005 (0.011)	-0.071 (0.046)	0.511 (0.553)	0.175 (0.153)	-0.085*** (0.023)	0.987*** (0.172)
	N	32				32				32					
	R^2	0.446				0.447				0.601					
	F-Stat	6.103				6.766				9.009					
	Prob > F	0.000238				9.33e-05				1.48e-07					
		$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	**Intercept**	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	**Intercept**	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Female		-0.003 (0.010)	0.432*** (0.156)	-0.014 (0.030)	0.652* (0.374)	0.037*** (0.010)	-0.015 (0.045)	-0.818* (0.460)	0.435*** (0.150)	0.012 (0.015)	-0.065 (0.060)	0.155 (0.608)	-0.003 (0.148)	-0.064** (0.029)	0.904*** (0.198)
	N	32				32				32					
	R^2	0.430				0.583				0.621					
	F-Stat	5.368				10.89				9.059					
	Prob > F	0.000687				3.97e-07				1.36e-07					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A11. Structural Break Test and Estimation (Model IV): 1977-2008

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Male	1991 [1988 1994]	0.025	0.740***	0.025	-0.544	0.008	-0.027	-0.026	0.316*	0.010	-0.092	-0.412	-0.060	-0.049	1.063***
		(0.016)	(0.242)	(0.046)	(0.355)	(0.017)	(0.050)	(0.430)	(0.160)	(0.019)	(0.064)	(0.479)	(0.314)	(0.044)	(0.265)
		0.001	0.232	0.102	-0.016	-0.002	-0.067	0.631**	0.720***	-0.003	-0.128	0.616*	0.213	-0.102***	0.692***
		(0.022)	(0.483)	(0.073)	(0.289)	(0.013)	(0.066)	(0.289)	(0.208)	(0.013)	(0.097)	(0.362)	(0.174)	(0.032)	(0.235)
	N	32				32				32					
	R^2	0.536				0.577				0.665					
	F-Stat	4.558				5.768				5.658					
	Prob > F	0.000178				1.31e-05				1.24e-06					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_t
Female	1991 [1990 1992]	0.042***	0.249	-0.071	-0.714**	0.042**	-0.143**	-0.599	0.329*	0.046	-0.212*	-0.943	0.017	-0.095	0.665**
		(0.015)	(0.173)	(0.043)	(0.321)	(0.019)	(0.062)	(0.493)	(0.168)	(0.033)	(0.110)	(0.774)	(0.229)	(0.069)	(0.282)
		-0.003	0.374	0.047	0.020	0.006	-0.078	0.601**	0.753**	0.015	0.030	0.199	-0.132	-0.059	0.833*
		(0.015)	(0.427)	(0.046)	(0.228)	(0.013)	(0.074)	(0.276)	(0.303)	(0.018)	(0.114)	(0.442)	(0.189)	(0.038)	(0.419)
	N	32				32				32					
	R^2	0.503				0.657				0.669					
	F-Stat	3.928				7.847				5.761					
	Prob > F	0.000728				2.08e-07				9.52e-07					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A12. Structural Break Test and Estimation (Model I): Robustness Check

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
Male		0.027	0.595	0.023	-0.244	0.038	0.107	0.105	0.070	0.039	0.130*	-0.009	-0.428**	0.018	-0.309
	1972	(0.022)	(0.506)	(0.055)	(0.383)	(0.037)	(0.067)	(0.442)	(0.548)	(0.030)	(0.074)	(0.520)	(0.199)	(0.041)	(0.220)
	[1968 1976]	-0.001	0.694***	0.159***	-0.024	0.012	0.020	0.308	0.163	-0.005	-0.011	0.403	0.176	-0.048	0.644***
		(0.011)	(0.223)	(0.041)	(0.227)	(0.011)	(0.038)	(0.254)	(0.134)	(0.012)	(0.039)	(0.267)	(0.150)	(0.029)	(0.201)
	N	51				51				51					
	R^2	0.510				0.373				0.511					
	F-Stat	6.572				3.733				4.553					
	Prob > F	3.84e-07				0.000601				4.54e-06					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	ΔlnU_{t-1}	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
Female		0.057**	-0.039	0.065	-0.359	0.066*	0.152***	0.005	0.111	0.077***	0.122**	-0.171	-1.187	-0.021	-0.240
	1973	(0.022)	(0.378)	(0.053)	(0.373)	(0.034)	(0.047)	(0.448)	(0.506)	(0.028)	(0.048)	(0.451)	(0.769)	(0.032)	(0.162)
	[1971 1975]	0.006	0.524**	0.077*	-0.046	0.031*	-0.064	-0.122	0.172	0.056***	-0.219***	-0.686	0.184	-0.111**	0.308
	1991	(0.014)	(0.205)	(0.040)	(0.359)	(0.018)	(0.069)	(0.518)	(0.176)	(0.017)	(0.057)	(0.446)	(0.150)	(0.046)	(0.198)
	[1988 1994]	0.005	0.166	0.036	0.072	0.008	-0.064	0.620	0.595	-0.007	0.118	0.179	-0.152	-0.016	1.152***
		(0.026)	(0.607)	(0.095)	(0.316)	(0.018)	(0.105)	(0.382)	(0.418)	(0.017)	(0.104)	(0.359)	(0.161)	(0.032)	(0.282)
	N	51				51				51					
	R^2	0.422				0.598				0.733					
	F-Stat	3.164				6.391				8.411					
	Prob > F	0.000657				1.62e-08				0					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A13. Structural Break Test and Estimation (Model II): Robustness Check

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	**$\Delta lnGCSE_t$**	**ΔlnU_{t-1}**	**$\Delta lnCLASS_t$**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**ΔlnS_{t-2}**	**Intercept**	**$\Delta lnGU_{t-1}$**	**$\Delta lnCLASS_t$**	**$\Delta lnIRR_{t-1}$**	**$\Delta COST_t$**	**ΔlnQ_{t-1}**
Male	1972	0.022	0.559	0.023	-0.029	0.063*	0.163**	-1.177*	0.181	0.053*	0.161**	-0.627	-0.447**	0.019	-0.295
	[1968 1976]	(0.027)	(0.516)	(0.056)	(0.530)	(0.033)	(0.070)	(0.632)	(0.525)	(0.027)	(0.079)	(0.703)	(0.180)	(0.041)	(0.220)
		-0.007	0.734***	0.150***	0.280	0.032***	0.050	-0.854	0.173	0.010	0.001	-0.316	0.184	-0.051*	0.668***
		(0.012)	(0.231)	(0.042)	(0.450)	(0.011)	(0.040)	(0.521)	(0.128)	(0.013)	(0.046)	(0.596)	(0.156)	(0.029)	(0.202)
	N	51				51				51					
	R^2	0.510				0.424				0.500					
	F-Stat	6.558				4.625				4.307					
	Prob > F	3.98e-07				5.75e-05				1.06e-05					
Female	1972	0.039	0.081	0.044	0.143	0.097***	0.170***	-1.100**	0.101	0.073***	0.118**	0.012	-1.278**	-0.012	-0.244
	[1971 1973]	(0.024)	(0.369)	(0.048)	(0.459)	(0.028)	(0.042)	(0.512)	(0.425)	(0.022)	(0.047)	(0.502)	(0.638)	(0.032)	(0.159)
	1986	-0.020	-0.247	0.193***	0.404	0.038**	0.027	-1.565**	0.083	0.040**	-0.223***	0.070	0.461**	-0.121**	-0.047
	[1984 1988]	(0.018)	(0.492)	(0.049)	(0.581)	(0.017)	(0.057)	(0.680)	(0.157)	(0.016)	(0.070)	(0.717)	(0.195)	(0.052)	(0.283)
		-0.013	0.493**	-0.043	1.111**	0.035**	-0.022	-0.642	0.955***	0.027*	0.023	-1.021	-0.034	-0.055*	0.960***
		(0.015)	(0.207)	(0.057)	(0.533)	(0.014)	(0.073)	(0.631)	(0.324)	(0.015)	(0.070)	(0.620)	(0.144)	(0.029)	(0.207)
	N	51				51				51					
	R^2	0.545				0.698				0.754					
	F-Stat	5.045				9.707				8.709					
	Prob > F	1.19e-06				0				0					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A14. Structural Break Test and Estimation (Model III): Robustness Check

	Break [95% CI]	$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
Male		0.032	0.203	0.036	0.272	0.069*	0.145*	-1.088	0.100	0.040	0.140*	0.449	-0.532***	0.029	-0.310
	1970	(0.029)	(0.583)	(0.036)	(0.642)	(0.035)	(0.074)	(0.770)	(0.542)	(0.027)	(0.076)	(0.782)	(0.170)	(0.039)	(0.204)
	[1967 1973]	-0.008	0.702***	0.118***	-0.051	0.030***	0.053	-0.695	0.193	0.009	0.001	-0.283	0.219	-0.049*	0.679***
		(0.012)	(0.228)	(0.032)	(0.396)	(0.011)	(0.040)	(0.449)	(0.126)	(0.012)	(0.042)	(0.488)	(0.138)	(0.027)	(0.185)
	N	51				51				51					
	R^2	0.528				0.421				0.574					
	F-Stat	7.077				4.559				5.891					
	Prob > F	1.09e-07				6.84e-05				4.86e-08					

	Break [95% CI]	$\Delta lnSt$				$\Delta lnQt$				$\Delta lnUEt$					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	$\Delta lnCLASS_t$	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	$\Delta lnCLASS_t$	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
Female		0.036	0.120	0.026	0.125	0.097***	0.170***	-1.100**	0.098	0.073***	0.118**	0.013	-1.278**	-0.012	-0.244
	1972	(0.023)	(0.350)	(0.028)	(0.438)	(0.028)	(0.043)	(0.512)	(0.426)	(0.022)	(0.047)	(0.502)	(0.638)	(0.032)	(0.159)
	[1971 1973]	-0.013	0.048	0.164***	0.002	0.038**	0.027	-1.569**	0.078	0.040**	-0.223***	0.075	0.464**	-0.123**	-0.046
	1986	(0.016)	(0.442)	(0.035)	(0.548)	(0.017)	(0.057)	(0.680)	(0.158)	(0.016)	(0.069)	(0.717)	(0.195)	(0.052)	(0.283)
	[1984 1988]	-0.011	0.486**	-0.033	1.181**	0.035**	-0.020	-0.651	0.961***	0.028*	0.024	-1.023	-0.034	-0.056*	0.955***
		(0.013)	(0.200)	(0.042)	(0.525)	(0.014)	(0.073)	(0.631)	(0.325)	(0.015)	(0.070)	(0.620)	(0.144)	(0.029)	(0.207)
	N	51				51				51					
	R^2	0.590				0.698				0.754					
	F-Stat	6.060				9.707				8.715					
	Prob > F	4.56e-08				0				0					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

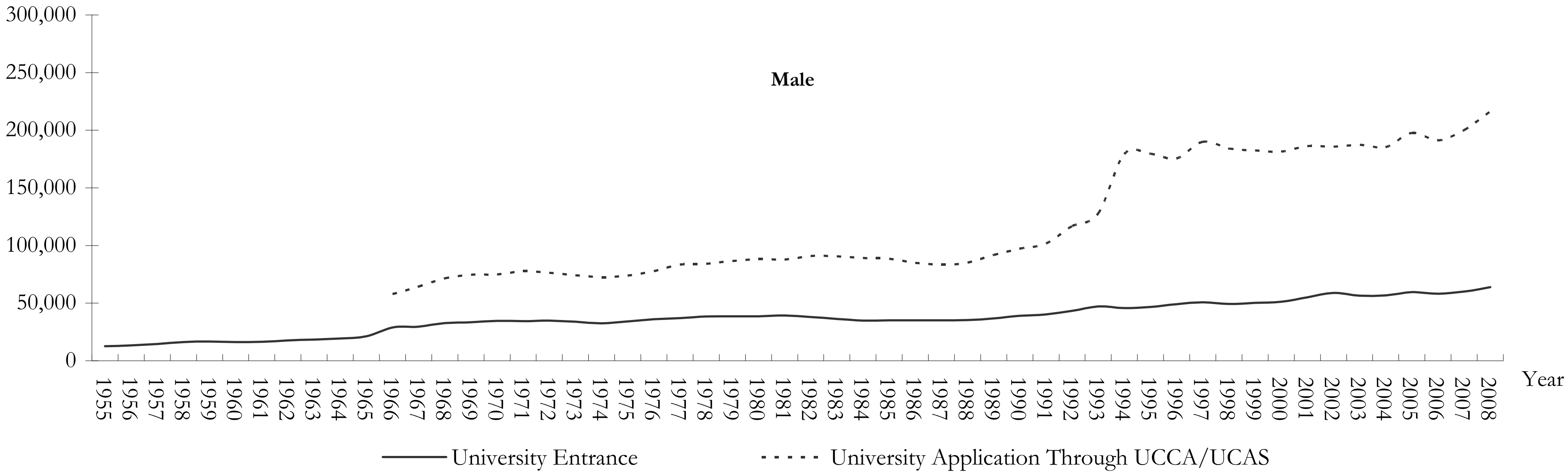
Table A15. Structural Break Test and Estimation (Model IV): Robustness Check

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
		0.027	0.572	0.014	-0.226	0.037	0.106*	0.105	0.077	0.040	0.129*	-0.015	-0.425**	0.016	-0.311
	1972	(0.020)	(0.459)	(0.030)	(0.349)	(0.035)	(0.063)	(0.419)	(0.521)	(0.030)	(0.074)	(0.519)	(0.199)	(0.041)	(0.220)
	[1969 1975]	-0.009	0.964***	0.168***	0.185	0.018	-0.014	-0.136	0.027	-0.002	-0.016	0.207	0.155	-0.032	0.522
Male	1991	(0.013)	(0.239)	(0.033)	(0.324)	(0.015)	(0.048)	(0.426)	(0.153)	(0.018)	(0.050)	(0.486)	(0.220)	(0.057)	(0.361)
	[1986 1996]	-0.004	0.350	0.076	0.048	0.000	-0.058	0.624	0.608**	-0.009	-0.056	0.571	0.228	-0.061	0.703**
		(0.026)	(0.564)	(0.086)	(0.336)	(0.018)	(0.097)	(0.419)	(0.296)	(0.020)	(0.145)	(0.538)	(0.238)	(0.047)	(0.304)
	N	51				51				51					
	R^2	0.596				0.436				0.511					
	F-Stat	6.195				3.221				3.096					
	Prob > F	2.99e-08				0.000542				0.000138					

	Break [95% CI]	ΔlnSt				ΔlnQt				ΔlnUEt					
		Intercept	$\Delta lnGCSE_t$	$\Delta lnYU_{t-1}$	ΔlnC_t	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	ΔlnS_{t-2}	Intercept	$\Delta lnGU_{t-1}$	ΔlnC_t	$\Delta lnIRR_{t-1}$	$\Delta COST_t$	ΔlnQ_{t-1}
		0.049**	0.075	0.037	-0.201	0.070**	0.142***	0.052	0.070	0.081***	0.107**	-0.094	-1.220	-0.015	-0.283
	1971	(0.020)	(0.358)	(0.031)	(0.336)	(0.033)	(0.047)	(0.425)	(0.486)	(0.029)	(0.051)	(0.475)	(0.817)	(0.034)	(0.171)
	[1970 1972]	-0.022	-0.043	0.151***	0.365	-0.005	0.019	0.604	0.118	0.040**	-0.202***	0.102	0.422**	-0.127***	-0.234
Female	1985	(0.015)	(0.443)	(0.035)	(0.406)	(0.019)	(0.064)	(0.596)	(0.174)	(0.018)	(0.062)	(0.546)	(0.191)	(0.048)	(0.291)
	[1983 1987]	0.006	0.516**	0.005	-0.167	0.015	-0.062	0.346	1.009***	0.004	-0.018	0.464*	-0.107	-0.045	0.888***
		(0.012)	(0.202)	(0.042)	(0.228)	(0.015)	(0.076)	(0.267)	(0.329)	(0.016)	(0.069)	(0.248)	(0.151)	(0.028)	(0.196)
	N	51				51				51					
	R^2	0.560				0.653				0.756					
	F-Stat	5.408				7.937				8.708					
	Prob > F	3.65e-07				1.56e-10				0					

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Fig. A1. University Entrance and University Application through UCCA/UCAS



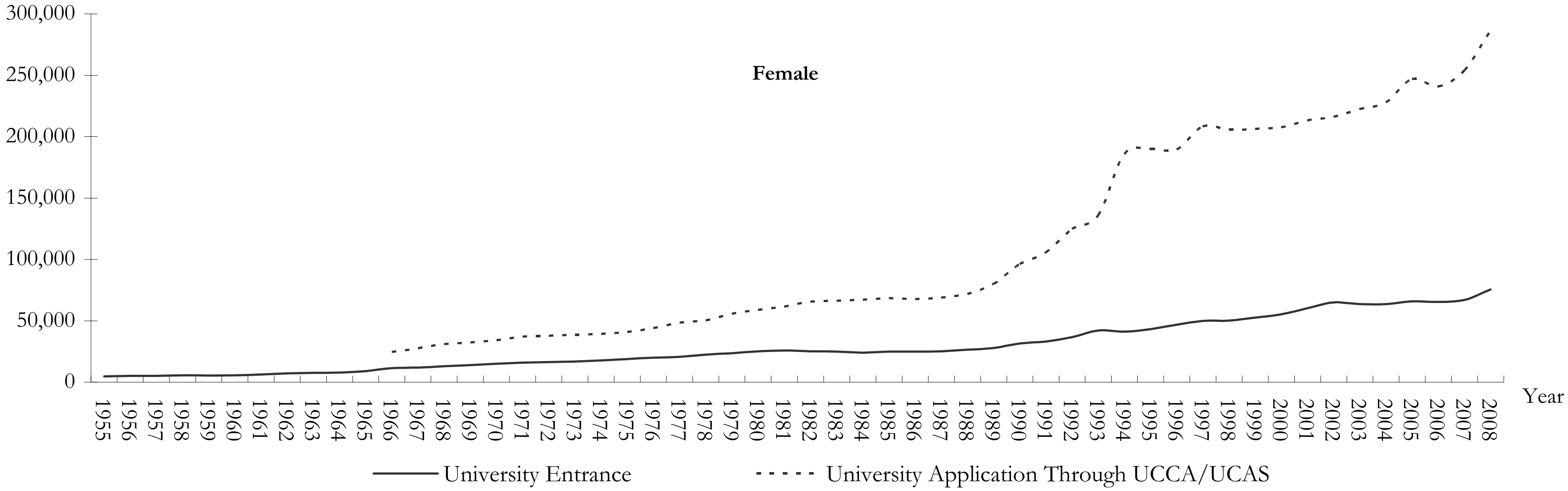

Female
300,000
250,000
200,000
150,000
100,000
50,000
0
1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year
University Entrance
University Application Through UCCA/UCAS

Fig. A2. Fraction of Applicants Who Gain Entrance to University

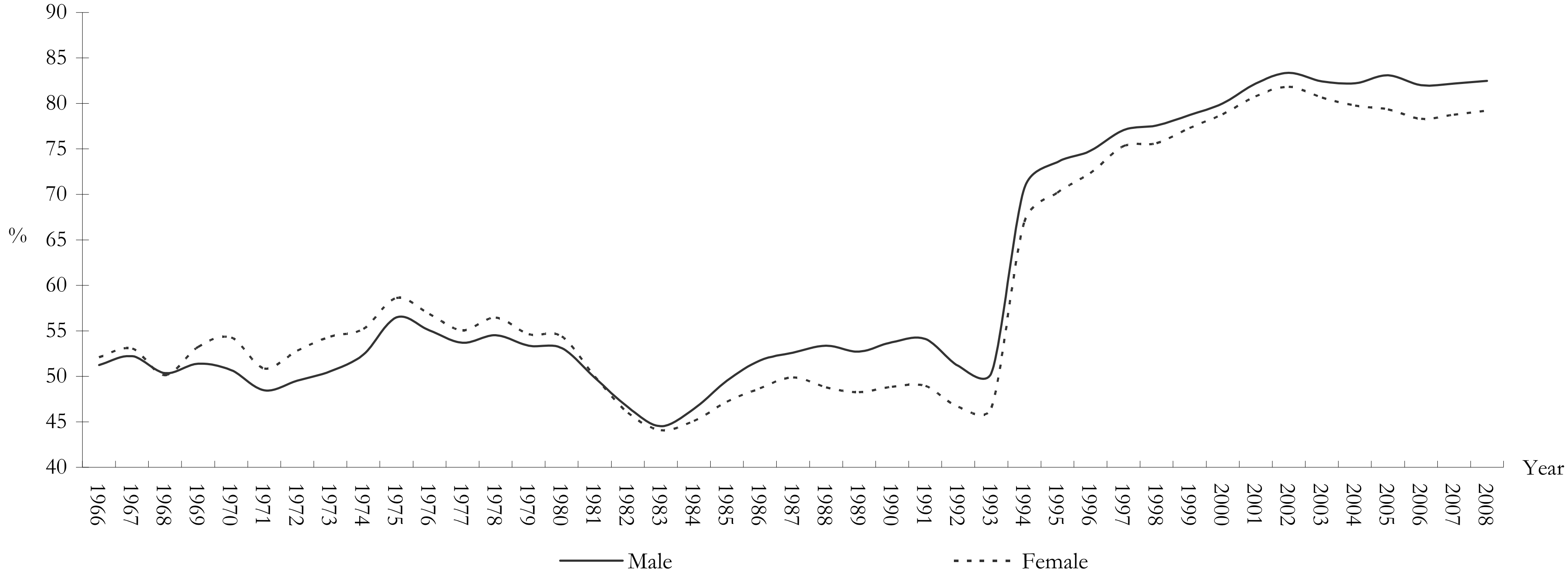
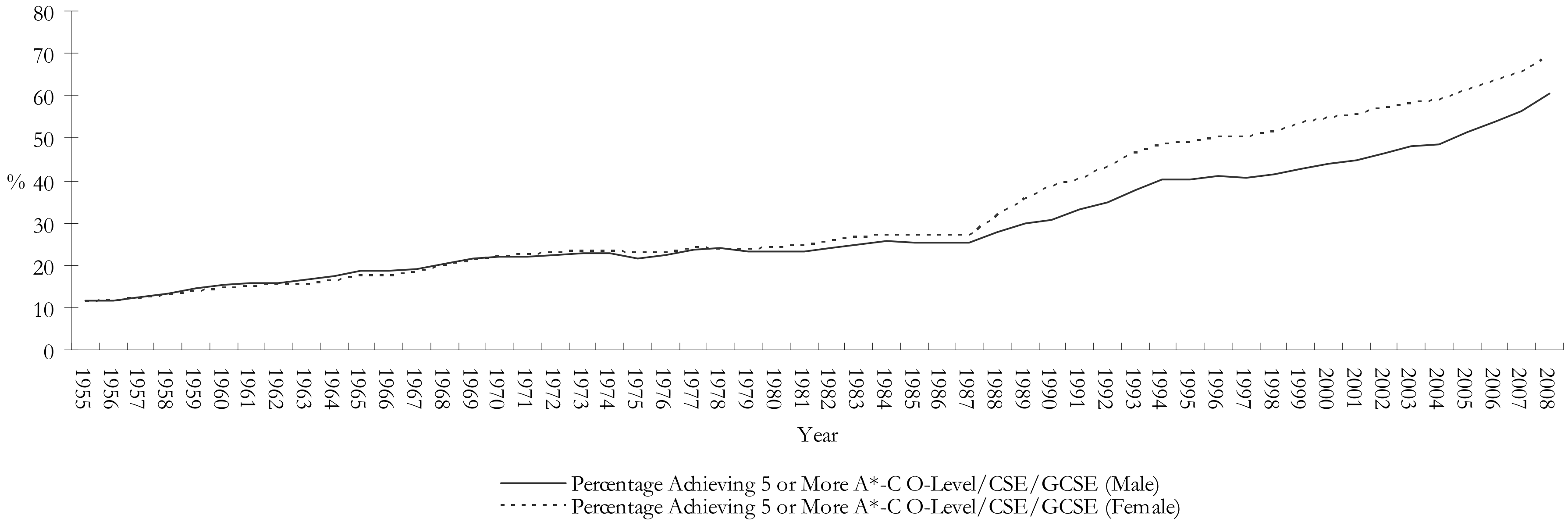


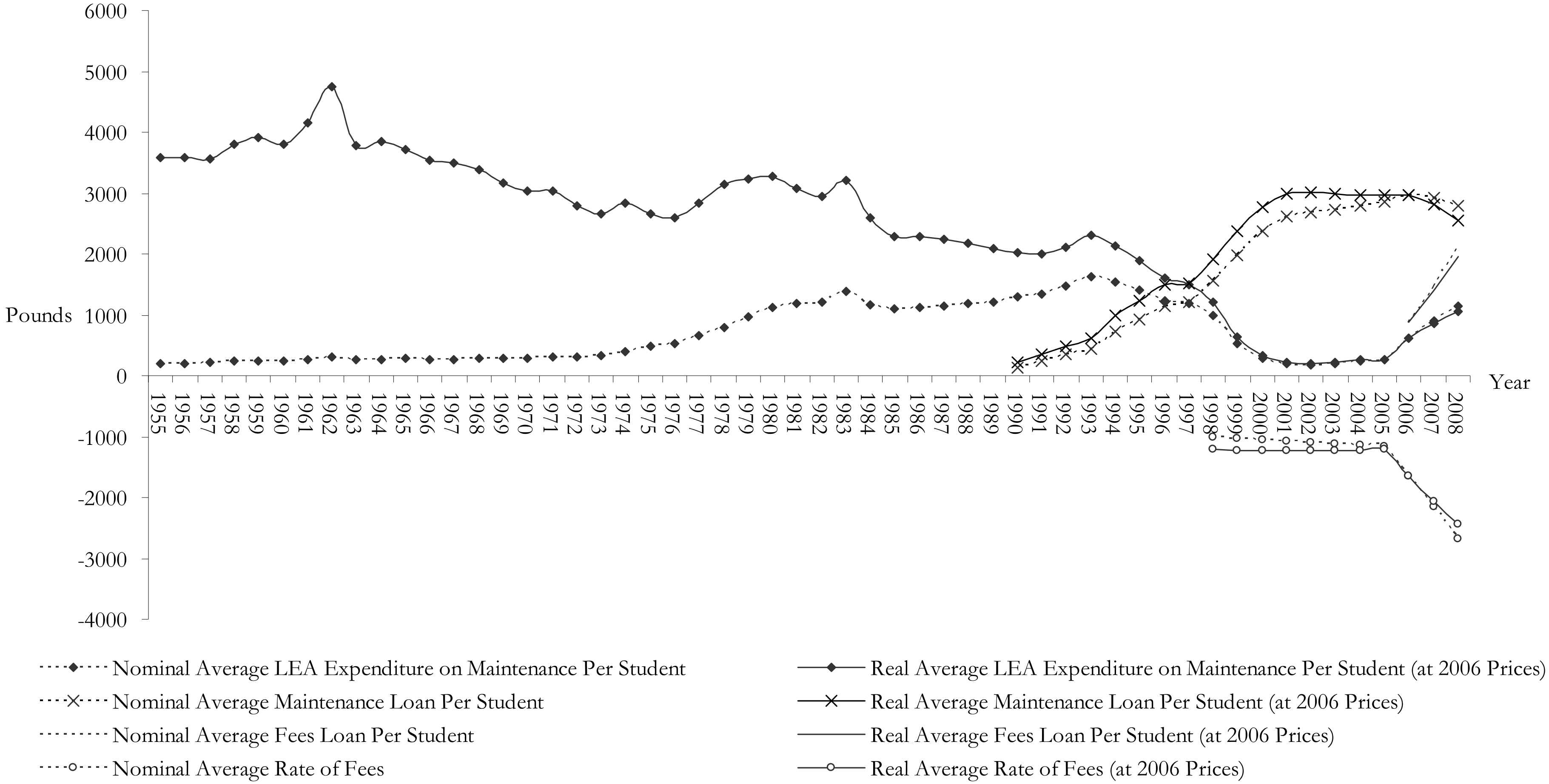
Fig. A3. GCSE Results



Sources: Statistics of Education

Statistical First Releases (Department for Children, Schools, and Families)

Fig. A4. Student Grants, Loans, and Fees



Sources: Statistics of Education
Statistical First Releases (Department for Children, Schools, and Families)
Statistical First Releases (Student Loans Company)

Fig. A5(i). Youth Unemployment Rate

Fig. A5(ii). Adult Unemployment Rate

Fig. A5(iii). Graduate Unemployment Rate

Fig. A6. Internal Rate of Return

Sources: Wilson (1980, 1983, 1985)

Author's calculation based on data from NES and LFS.

Fig. A7(i) Average Fees, Grants, Loans (Definition 1)

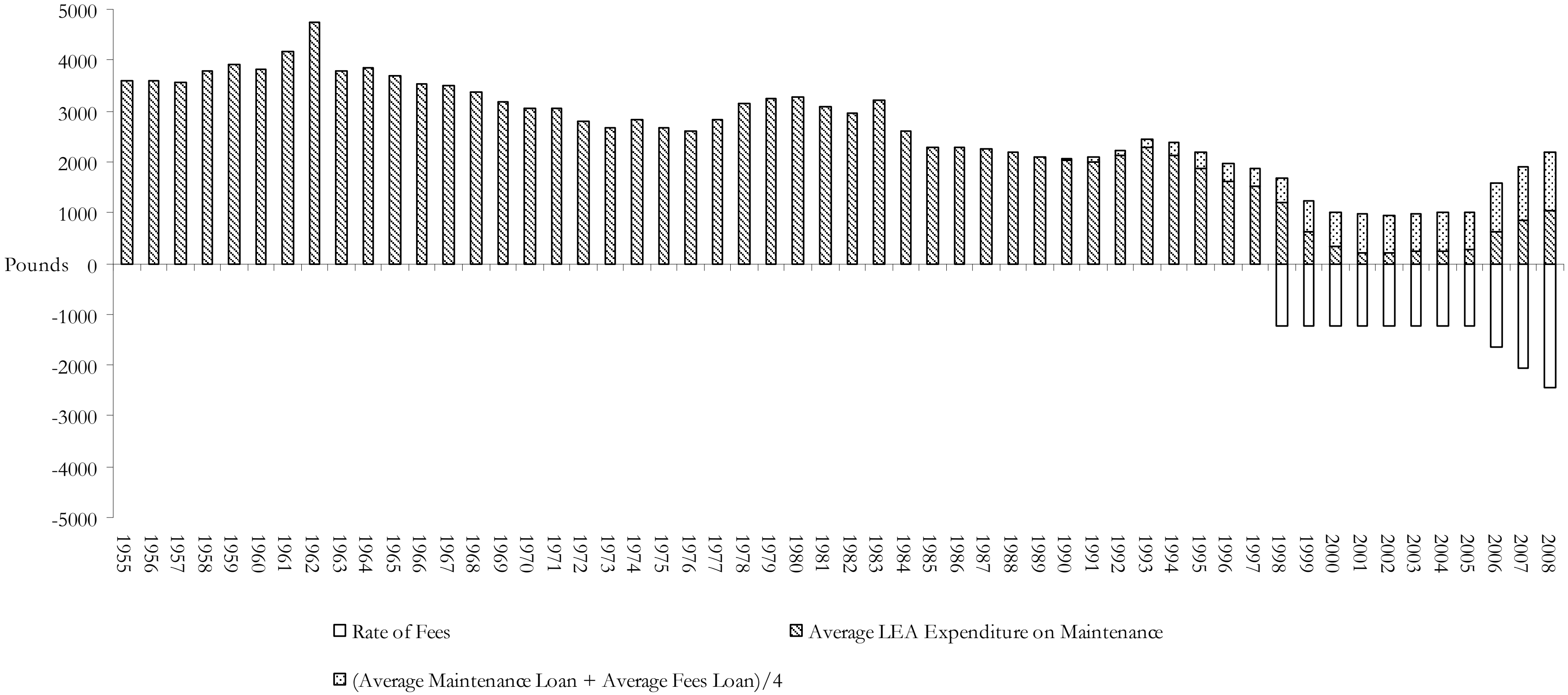


Fig. A7(ii) Average Fees, Grants, Loans (Definition 2)

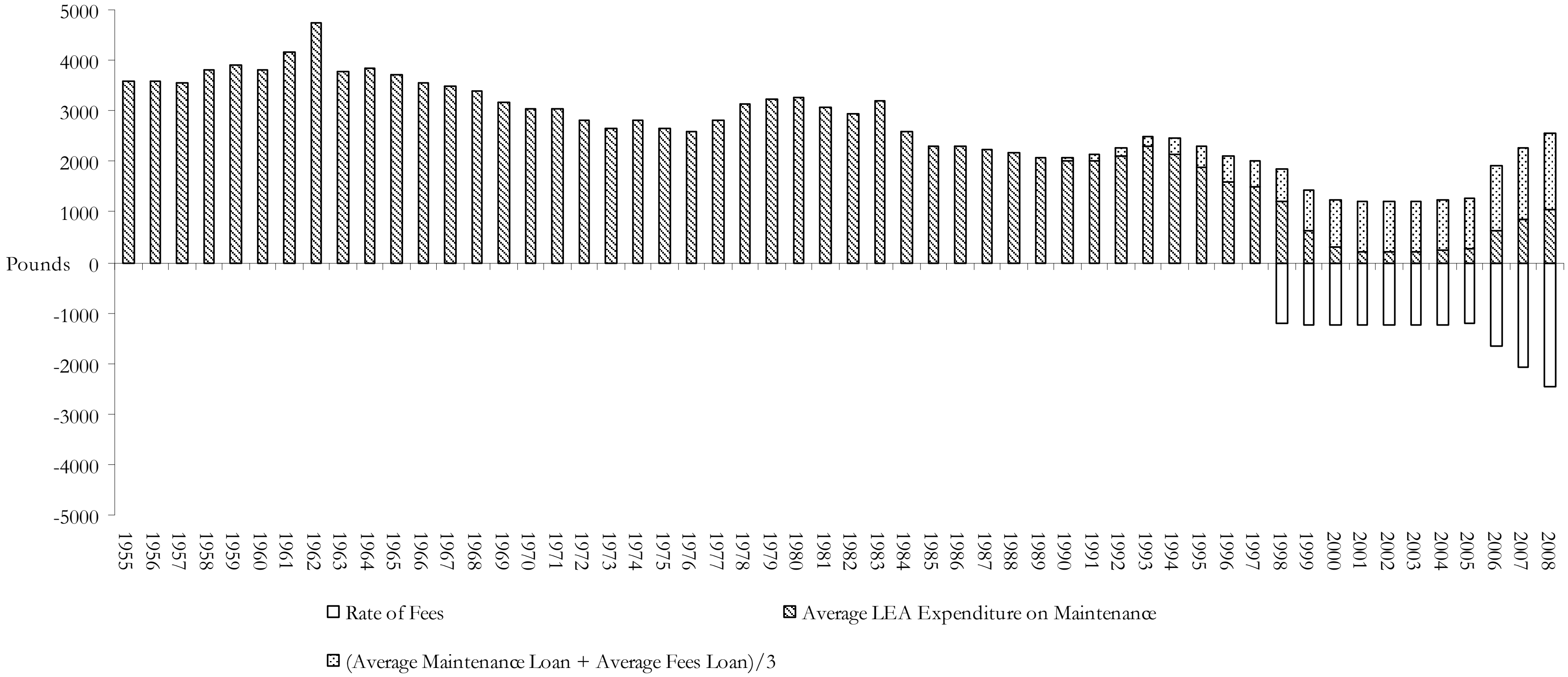


Fig. A7(iii) Average Fees, Grants, Loans (Definition 3)

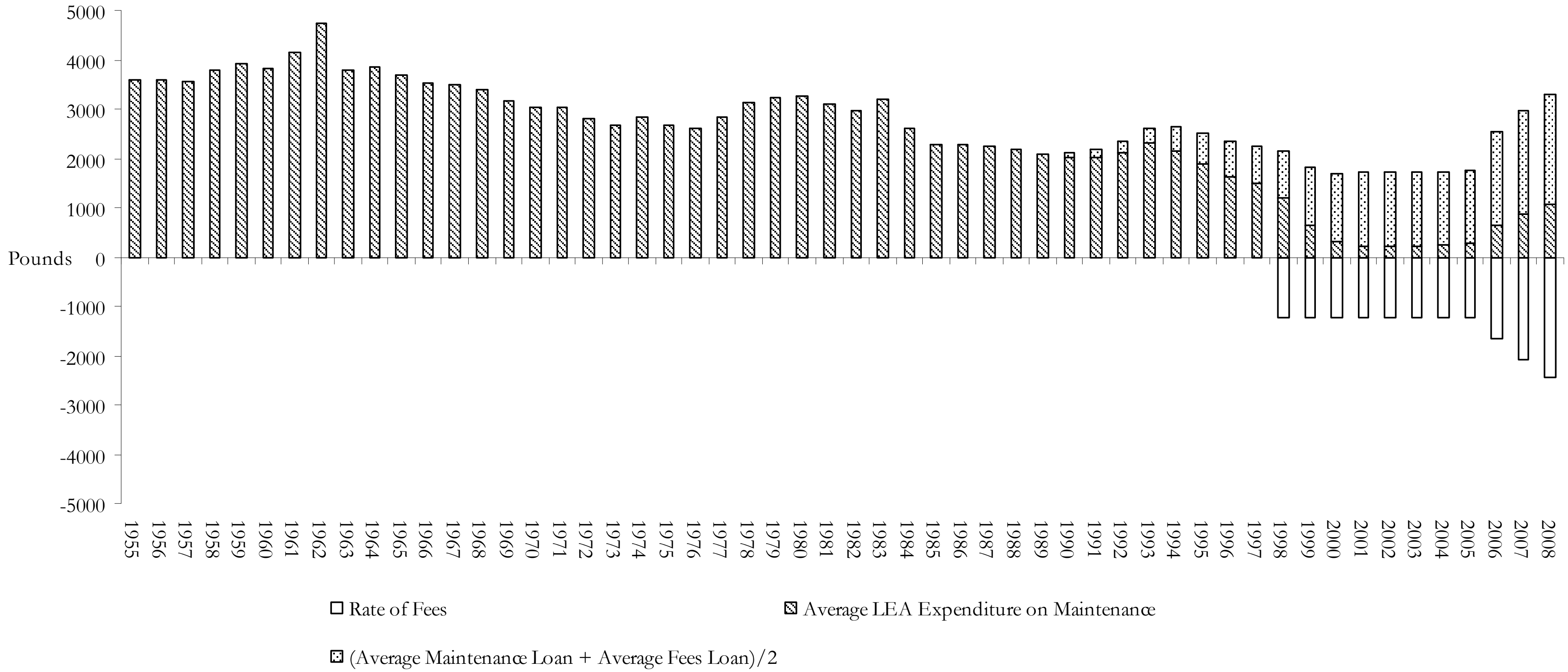


Fig. A7(iv) Average Fees, Grants, Loans (Definition 4)