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Educational Effects of Widening Access to the Academic Track: A Natural Experiment

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Forschungsinstitut
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Institute for the Study
of Labor

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ABSTRACT

Educational Effects of Widening Access to the Academic Track: A Natural Experiment*

It is difficult to know whether widening access to schools which provide a more academically oriented general education makes a difference to average educational achievement. We make use of reforms affecting admission to the 'high ability' track in Northern Ireland, but not England. The comparison of educational outcomes between Northern Ireland and England before and after the reform identifies the net effect of expanding the academic track to accommodate more students. This is composed of the direct effect of the more academic track on individual performance and the indirect effect arising on account of the change in peer group composition. Our paper is relevant to debate on the consequences of ability tracking and of expanding access to the academic track.

JEL Classification: I2

Keywords: education, tracking, selection

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I. Introduction

In the post-war period, there has been a gradual shift in many OECD countries towards more comprehensive school systems where an increasing proportion of students are given the opportunity to pursue education in more academically oriented schools (Meyer et al. 1977). The consequences of these reforms (both in terms of efficiency and equity) are still hotly disputed. As discussed by Meghir and Palme (2005), it is very difficult to disentangle their effect from the effects of other macro-economic or institutional changes because often they have been implemented nationwide simultaneously and in conjunction with other important educational reforms.

Reforms involving an increase in access to an 'academic track' provoke opposing views because it is not clear whether or not all pupils benefit from academically oriented, general education. For example, those of lower ability may be better suited to education with a more vocational orientation. The pace and content of teaching may become more difficult to tailor to level of each ability group as the heterogeneity of pupils admitted to the academic track increases. Contenders argue that reforms involving an increase in access to the 'academic' track harm the quality of both tracks (through contextual effects) without improving the prospects of those enabled to attend the more academic track. Despite very rich data and many studies, there is still little convincing evidence on these issues (see Manning and Pischke, 2006, Figlio and Page, 2002). In particular, it has not yet been possible to identify the net effect of widening access to schools which provide a more academically oriented, general education on overall educational outcomes. This is the substantive question that this paper helps to address.

We make use of a unique natural experiment where widening access to the more academic track applies within one specific province (Northern Ireland) at a particular point in time. This is the only differential change that happens across the regions considered –

England and Northern Ireland – which otherwise have a similar curriculum with the same national examination for students at age 16 and 18. Unlike other studies, the reform modifies the proportion of students allowed to pursue a more academically-orientated education in the treatment area rather than change the entire educational system. Specifically, the reform enabled a very significant increase in the number of Northern Irish pupils who could attend the more academic track ('grammar schools') at the end of primary school, between the pre-reform (born in 1978) and post-reform cohort (1979). This natural experiment makes it possible to identify the effect of widening access to the more academic track on overall educational attainment, by comparing educational outcomes in Northern Ireland and England, before and after the reform.

We use administrative data to examine the impact of this reform on entry flows to grammar school and the outcomes of affected cohorts. There is a clear discontinuity in the inflows to grammar school around the time of this reform – the number of students entering grammar school increased by about 15 percentage points between the 1978 and 1979 birth cohorts whereas it was reasonably stable for the four preceding and four subsequent cohorts. Interestingly, this discontinuity is reflected in outcome measures. For example, the number of students achieving high-school graduation (i.e. in the English context, obtaining at least 1 A-level) increased by about 12 percentage points over the same period whereas it followed the same stable trend as the number attending grammar school in the four preceding and subsequent cohorts.[2] The increase is also reflected in the national examination taken by all pupils at age 16 (prior to the end of compulsory schooling).[3] Using a 'difference-in-difference' analysis, it can be seen that this 'open enrolment' reform has been accompanied by a clear impact in Northern Ireland relative to England. This suggests a strong causal effect of expanding the more academic track on overall educational attainment.

[2] As discussed below, A-levels are a very important qualification in a UK context. For example, they are an essential requirement for entry to university.
[3] GCSE examinations (General Certificate of Secondary Education)

Just before the 'open enrolment' reform, there was a change affecting admissions in a qualitative way. Up to 1988, girls and boys were assessed in different categories such that the same percentage of entrants to the admission test would obtain a given grade (determining whether or not they could be admitted to grammar school). Following a high court ruling in June 1988, this practice was discontinued and from then on, girls and boys were assessed together (which affected grammar school intakes in 1989, i.e. the 1978 cohort). This change was to the advantage of girls since they outperformed boys on the 'verbal reasoning' tests that were the basis of selection at this time. The comparison of cohorts born after and before 1978 by gender confirms that the increase in grammar school attendance was stronger for girls than for boys. Also we find a stronger effect of the reforms on girls' subsequent educational attainment than on boys'. The increase in the relative proportion of girls attending the more academic track has been followed by an increase in their relative educational achievement. Thus, our paper provides evidence that the specific design of an educational system influences the extent to which early differences between boys and girls contributes to later differences in educational achievement.[4]

Our data also allow us to compare the effects of the reform on pupils coming from a poor family background (i.e. as defined by eligibility to receive free school meals – about 25% of a given cohort) and on pupils coming from a more advantaged background (i.e. not eligible to receive free school meals). As in most countries, pupils from a poor family background have lower cognitive outcomes at age 10 or 11 and are thus less likely to be selected for the academic track than pupils from other backgrounds. A very controversial issue is whether being denied access to the academic track has a causal impact on their relatively poor educational achievement. The reform enables us to address this question. We see that it had an equally large (positive) impact on pupils from a disadvantaged and more

[4] Pekkarinen (2005) and Machin and McNally (2005) also provide evidence on this point.

advantaged background. Furthermore, it produced gains of a similar magnitude in terms of educational performance. This finding suggests that any restriction on relative access to the academic track for poor students actually diminishes their relative educational achievement.

The remainder of the paper is as follows. In Section II we briefly discuss the relevant literature. In Section III, we describe the institutional context. We briefly describe relevant aspects of the education system in Northern Ireland and in England, before discussing the reforms of interest in more detail. In Section IV, we discuss a conceptual model for considering the impact of these reforms. We then describe available data. We provide estimates of the effect of attending grammar school on educational qualifications using administrative data. We conclude in Section V.

II. Existing Literature

There are several strands of the UK and international literature on 'tracking' which are of relevance to our study. In a UK context, of most relevance are studies that compare the outcomes of students living in areas with a selective educational system to those of students who live in areas with a comprehensive system. Within Great Britain, regional variation in the exposure to a 'selective system' existed at a time when the system was being transformed (in the 1960s and 1970s) because the transition to a comprehensive system only occurred gradually. Galindo-Rueda and Vignoles (2004) and Kerkhoff et al. (1996) use this variation to estimate the effect of exposure to a selective or tracked system on educational outcomes (regardless of the school type actually attended by an individual). Atkinson et al. (2004) use more recent administrative data to perform a similar analysis in a contemporary setting (the 'selective school' system was retained in a small number of areas in Great Britain). Manning and Pischke (2006) use the same data as that used by Galindo-Rueda and Vignoles (2004) and

Kerkhoff et al. (1996). They argue that the measure of exposure to a tracked or selective system is unclear. Furthermore, the abolition of the grammar school system was not random across areas. Comprehensive areas were systematically poorer and had students with lower prior achievement than selective areas. Manning and Pischke suggest that such studies are unlikely to eliminate selection bias. They find that strategies relying on local variation in the degree of selectivity of the school system produce the same results regardless of whether the dependent variable is after the 'treatment' (i.e. age 16 test scores) or before the 'treatment' (age 11 scores) and conclude that caution is required in drawing strong conclusions from this data set and in any study that uses a research design which essentially mirrors that adopted by such studies. The same critique is applied to studies that attempt to estimate the effect of attending the academic track on 'treated' individuals (i.e. those who went to grammar school).[5]

The difficult of dealing with selection bias also applies to studies that attempt to evaluate the impact of 'within school' tracking. Figlio and Page (2002) discuss problems in this literature and attempt to circumvent the selection issue by using variation in tracking between schools (rather than within schools) to identify the effect of tracking.

Hanushek and Wößmann (2006) have tried to get away from the difficult selection problems that arise when trying to evaluate the effects of 'tracking' within particular countries. They use international data sets that are administered to students in secondary school and primary school. They identify the effect of tracking by comparing performance differences between primary and secondary schools across tracked and non-tracked systems, where each country's own primary school outcome is used as a control for its secondary-school outcome. They find mixed evidence about possible efficiency gains from tracking. However, these findings have been challenged by Waldinger (2006) who shows that results

[5] Examples of this approach include Dearden et al. (2002) and Harmon and Walker (2000). In the same spirit, Gallagher and Smith (2000) undertake a value added analysis of grammar schools in Northern Ireland for pupils in a small sample of schools after taking account of the transfer grade obtained in the selection test.

are not stable to using different tracking measures and to restricting the sample to OECD countries.[6]

Our study is different from all of the studies discussed above because we compare two regions before and after a reform that only affects one region. This approach has an advantage over the cross-country approach because we do not have to make comparisons across countries with very different institutions.

In these respects, our study is more similar to Meghir and Palme (2005). They study the impact of a series of reforms that took place in the 1950s in Sweden but that were not implemented at exactly the same time across the country. However, there were several components to this reform, including de-tracking and an increase in the compulsory school-leaving age. Hence, outcomes cannot be attributed to the specific effect of de-tracking.[7] The attractiveness of the 'Northern Ireland' experiment is that the 'de-tracking' reform is the only differential change that occurred in the treatment region relative to the control region during the time period of interest. Another distinguishing feature of our study is that the 'natural experiment' has not modified the nature of the school system but only modified the intensity of selection. To identify the effect of widening access to the academic track on average outcomes, we mainly rely on comparisons between children who go to school in the same educational system (i.e. a selective system), where reforms are made to that system rather than involving conversion to a different type of system. Our analysis can therefore be interpreted as showing the overall effect of allowing entry to an elite institution (or the 'academic track') for a group that was previously only at the margin of being admitted.

[6] The focus of Waldinger's (2006) paper is different (though related) to that in Hanushek and Wößmann (2006). He is interested in whether the importance of family background is weaker or stronger in countries that differ in the extent to which they track pupils at an early age.

[7] Oreopoulos (2006) uses quasi-experimental evidence to show that the benefits of additional years of compulsory schooling are very large whether or not these laws have an impact on a majority or minority of those exposed. His findings are based on estimates in the UK, the US and Canada.

Another dimension of our analysis is that we look at the effect of a qualitative change to admissions on the probability of entry to the academic track for boys and girls, and the effect this has on subsequent outcomes. This part of our analysis has similarities to Pekkarinen (2005), who also uses quasi-experimental evidence to evaluate the effect of a reform to the educational system on the relative outcomes of boys and girls. In his case, the experiment is a postponement in the age of tracking (from 10/11 to 15/16) at the time of the Finnish comprehensive school reform. He shows that girls benefited differentially from this reform and interprets this as arising on account of the timing of puberty (which works to the benefit of girls). Our results are consistent with the broader implication – that features of the education system matter greatly for the relative outcomes of boys and girls.

III The Institutional Context

A. The education system

In a number of key respects, the education system in Northern Ireland is almost the same as that in England and Wales. They operate under a similar legislative framework[8]; they have a similar National Curriculum; and they have the same system of public examinations.[9] However, in Northern Ireland, there is a selective system of education whereas England and Wales largely converted to the comprehensive model in the 1960s and 1970s.[10] This change

[8] Important Acts are the 1944 Education Act for England and Wales and the 1947 Act for Northern Ireland; the 1988 Education Reform Act in England and Wales and the Education Reform (Northern Ireland) Order 1989.

[9] There are 6 examining groups in England, Wales and Northern Ireland. Comparability studies of the grading of papers by different examining groups are produced regularly (for particular subjects at GCSE and at A-level). We thank Angus Alton from the Qualifications and Curriculum Authority for providing us with these comparability studies dating from the early-mid 1990s for certain subjects. Although reports do occasionally highlight discrepancies between boards for specific grade boundaries (in a given subject), the overall impression is that boards are broadly consistent in their practices.

[10] Other important differences are religious segregation in the education system of Northern Ireland: most Catholics attend schools under Catholic management ('maintained') whereas most Protestants attend other state

almost happened in Northern Ireland as well but plans were halted following the election of the Conservative government in 1979. Unlike the comprehensive system (where schools are not allowed to select on the basis of academic ability), the selective system involves a test at age 11 which determines the type of secondary school a child will attend: grammar schools (for the more academically able) or other secondary schools.[11] The key difference between grammar and other secondary schools is in their pupil composition in terms of ability – along with the consequences this has for the teaching environment and the ethos of the school. Gallagher and Smith (2000) suggest that the 'grammar school effect' is explained by a combination of the clear academic mission of schools, high expectations for academic success on the part of teachers and the learning environment created by a pupil peer group which is selected on academic grounds.[12] All of these factors combine to make the education experience very different in grammar schools than in other secondary schools, even though they operate under the same National Curriculum and implement the same public examinations (discussed below). However, as argued above, it is difficult to separate out the influence of pupil composition and any 'grammar school effect', even in value-added studies.

Between 1981 and 1994 (i.e. cohorts born in 1970 and 1983), the transfer test was based on two tests of the verbal reasoning type with some questions designed to test specific aspects of English and mathematics (Sutherland, 1993).[13] The tests are 'norm-referenced': they identify a pre-determined percentage of the cohort who are considered to be the most suitable pupils to fill the available grammar school places. Up to the time of the reforms (discussed below) about 31% of a cohort entered grammar schools, whereas this increased to

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schools. Also, there are many more single sex schools in Northern Ireland – 25% compared to 16% in England. Of single sex schools, about 45% are grammar schools (i.e. those that select the more academically able).

[11] Up to 1990, a small number of fee-paying places were available in some grammar schools. This has been prohibited since 1990, except in the case of boarders.

[12] There is no suggestion in the literature that this effect could be explained by differences in funding between sectors. Since 1990, funding to schools in both sectors has been based on formula funding (largely determined by pupil numbers). However, some grammar schools solicit voluntary contributions from parents. Also, they have more autonomy over a larger proportion of their budget than is the case for other secondary schools.

[13] In 1993/94, the transfer tests were changed from a verbal reasoning to a curriculum orientated format. This affects cohorts born from 1983 onwards.

about 35% of a cohort following the reform enabling an expansion of admissions ('open enrolment').

All schools are expected to apply the National Curriculum. As discussed by Morgan (1993), this was an important change to education as the National Curriculum prescribes in detail the range of subjects pupils at all levels in compulsory education must study; the relative allocation of time to different areas of the curriculum; and the actual content of the courses in individual subjects. While grammar schools and other secondary schools operate under this same framework, in practice, there is some evidence of heterogeneity in the curricula actually implemented by schools, with pupils in a sample of grammar schools spending more time at academic subjects (particularly languages) than their counterparts in a sample of other secondary schools (Harland *et al*., 2002).

The same public examinations are taken in both school types. At the end of compulsory education (age 16), students take GCSE examinations (the General Certification of Secondary Education). If the student decides to pursue academic education beyond this point, this involves studying for A-level exams (which normally requires an extra two years of study). In all grammar schools and in many other secondary schools, it is possible to stay on for 2 extra years.[14] Although school type is highly correlated with the probability of obtaining A-levels (reflecting the selection process as well as any genuine 'school' effect), there is no automatic relationship between entering grammar school and achieving A-levels or entering other secondary school and failing to achieve them. Thus, if we look at a cohort before the reform to admissions – 1977 – 84 per cent of those attending grammar school and 8 per cent of those attending other secondary schools achieved 1 or more A-level.

[14] It is also possible to study for A-levels in colleges of further education. However, the majority of students in Northern Ireland who obtain A-levels do so when at school.

With regard to the public examination taken by all pupils at age 16, an important indicator is the percentage of pupils who achieve 5 or more GCSEs at grades A*-C.[15] Candidates taking A-levels normally take up to 3 A-levels. For both GCSE and A-levels, examinations are externally set and graded. Both examinations are extremely important, with A-levels being an essential requirement for university.[16] In the UK, most researchers looking at the returns to education prefer to use qualification-based measures of educational attainment rather than years of education, given the fact that there are different returns to education for the same years of academic and vocational qualifications (Blundell *et al.* 2005). Compared with leaving school at 16 without qualifications, Blundell *et al.* (2005) find an average return to achieving O-levels of about 18 per cent (i.e. the examination predating GCSEs for those aged 16) and an average return to achieving A-levels of about 24 per cent.

We consider whether reforms to grammar school admissions had any influence on the proportion of relevant cohorts achieving 5 or more GCSEs at grades A*-C and 1 or more A-levels.[17] We restrict attention to years in which there were no major reforms to A-levels, the age 16 examination or to the transfer tests determining entry to grammar school.[18]

[15] There are also equivalent vocational qualifications, which are included in the 'GCSE' measure.

[16] The common examination taken in Northern Ireland and England is also extremely important as students are competing to get into the same universities. About 40 percent of Northern Irish entrants to higher education enter university in Great Britain.

[17] Similar results are obtained for other outcome measures – for example, if we use 2 or more A-levels as the outcome measure at age 18 and 5 or more passes at GCSE as the outcome measure at age 16. Results are available on request.

[18] Reforms to the A-level system have taken place in 1987/88 (affecting cohorts from 1972 onwards) and in 2000 (affecting cohorts from 1984 onwards). Reforms to the examination taken at age 16 by all pupils (GCSE – formerly O-levels) took place in 1988 (affecting cohorts from 1972 onwards). The Universities and Colleges Admission Service (UCAS) provide a detailed account of these reforms; what the examinations consist of and procedures for quality assurance.
http://www.ucas.ac.uk/candq/ukquals/eng/gen.html

B. Reforms to admissions in Northern Ireland

As discussed above, it was a political accident that Northern Ireland did not abolish 'selective schooling' at the same time as the rest of the UK in the 1960s and 1970s. As a consequence, the system of very early tracking (i.e. at age 11) has been maintained in Northern Ireland up to the present day, whereas in other respects the education system has remained similar to that in other parts of the UK. However, an important reform to grammar school admission has been implemented in Northern-Ireland in the late 1980s. This involved a rise in the level of quotas applied to grammar school intakes. Following the Education Reform (Northern Ireland) Order 1989 (implemented from 1990 and affecting cohorts born from 1979), grammar schools were required to accept pupils, on parental request, up to a new (larger) admission number determined by the Department of Education and based on physical capacity only. This 'open enrolment' reform was in the spirit of making the education system more amenable to parental choice. Just before that time, there was a qualitative change in admissions: the rules changed regarding the assessment of boys and girls (in June 1988 – affecting cohorts born from 1978 onwards).

The raising of quotas on grammar school intakes was controversial because of the fear that grammar schools would 'cream-skim' the highest ability students from other secondary schools and that all would suffer as a result. A concern voiced by the Northern Ireland Economic Council (1995) was that the reform could undermine the selective system: 'The educational impact of allowing the grammar school sector to expand needs to be questioned. The fundamental point of such a system is that educating the more academically able is seen as being of benefit to both the more and least able. By definition, it would seem that allowing students who previously would have entered a secondary environment to attend a grammar

school must inevitably dilute the perceived value of selective education...' Our evidence allows us to consider what reducing selectivity did to educational credentials in the overall population.

Sutherland (1993) provides useful information about the court ruling which affected the gender composition of entry to grammar schools. She discusses how girls' higher relative performance in the verbal reasoning tests at age 11 was seen as temporary, analogous to their earlier physical maturity. Therefore, the selection tests were processed by gender, such that a given proportion of each group obtained each transfer grade. However, this practice became harder to defend when girls started out-performing boys in public examinations at age 16 (i.e. the gender differential was not so temporary). In June 1988, the Equal Opportunities Commission and the parents of four girls who had failed to win grammar school places won a case in the High Court against the Department of Education (DENI). After this verdict, the practice of treating boys and girls as separate populations in the Transfer tests came to an end. As shown by Gallagher and Smith (2000), this change had a pronounced effect on the proportion of girls and boys achieving the top grade (Figure 1).[19]

IV The Effect of Reforms on Educational Attainment

In this section, we assess the effect of widening access to grammar schools on overall educational attainment, by comparing educational outcomes in Northern Ireland and England, before and after the reform. As discussed in the following subsection, the interpretation of the shift in exam performance in Northern Ireland vis-à-vis England is that this is the combination of three effects: the effect of attending an elite school on the group of pupils who would otherwise have entered a non-elite school; the effect of losing more able peers on the group of

[19] A change in the transfer test from a verbal reasoning format to a curriculum orientated format occurred in 1993/94 (affecting cohorts born from 1983 onwards). This change seems to have benefited boys differentially. This reform is too recent for us to be able to consider its impact using the available data.

students entering non-elite schools after the reform; the effect of having less able peers on the group of students who would have entered the elite school even in the absence of the reform.

A. A conceptual framework

Let us denote G a dummy indicating whether a pupil attends a grammar school (G=1) or another secondary school (G=0) and C a dummy indicating whether he/she was in a birth cohort going through school before the reform (C=0) or after the reform (C=1).

We assume that a pupil attends grammar school if and only if his/her ability u is greater than a threshold s_c which increases with the selectivity of these schools. Specifically, G=1 for a pupil of cohort c if and only if

$$u > s_c$$

Given that the reform under consideration has been followed by a decrease in the selectivity of grammar schools, we have $s_1 < s_0$.

We denote pupils' educational outcome as y and assume the y depends on u, the type of school (grammar or other secondary) and the selectivity of the system as captured by cohort C (before or after the reform). Specifically, we assume

$$y = y_{GC}(u) \qquad (1)$$

Within this framework, the reform defines three different groups of pupils and three potentially different effects. Firstly, there is a group of pupils who attend grammar school after the reform, but who would have attended another secondary school had the reform not taken place. This group satisfies $s_1<u<s_0$, i.e. they were at the margin of attending grammar school before the reform. The effect of the reform on these pupils is given by $\Delta_{01}(u) = y_{11}(u)-y_{00}(u)$ and is potentially very important since such pupils are exposed to a radically different schooling context than that which they would have faced in the absence of the reform.

Secondly, there is a group of relatively low ability pupils who attend other secondary schools both before and after the reform (they satisfy $s_1>u$) and who are affected by the change in the composition of these schools. Because the best pupils who would have gone to other secondary schools in the absence of the reform now go to grammar school, this group may be significantly affected. Using our notation, the effect of the reform on this group is $\Delta_{00}(u) = y_{01}(u)-y_{00}(u)$. It captures the effect of losing one's best peers. Analogously, there is a group of relatively high ability pupils who would have entered grammar school even in the absence of the reform (they satisfy $s_0<u$) and who are affected by differences in the ability composition of their peers. The effect of the reform on this group is given by $\Delta_{11}(\mathrm{u}) = y_{11}(u) - y_{10}(u)$. This captures the effect of having a different group of peers, with relatively lower ability, than what would have been the case in the absence of the reform.

The issue is to identify aspects of the distribution of the effects $\Delta_{00}(u)$, $\Delta_{01}(u)$ and $\Delta_{11}(u)$ across the population of pupils with different ability levels u. This is clearly a complex question since a child is never observed in mutually exclusive schooling contexts. To address this issue, we assume that the distribution of ability across individuals (where the cumulative density function is denoted F_u) does not vary across the set of cohorts under consideration. Under this identifying assumption, the average outcome of pupils before the reform can be decomposed into three terms:

$$E(y \mid C=0) = P_{00}E(y_{00}(u) \mid u < s_1) + P_{01}E(y_{00}(\mathrm{u}) \mid s_1<u<s_0) + P_{11}E(y_{10}(u) \mid s_0<u)$$

where $P_{00}=F_u(s_1)$ is the proportion attending other secondary schools after the reform whereas $P_{01}=F_u(s_0)-F_u(s_1)$ is the increase in the proportion attending grammar school after the reform. $P_{11}=1-F_u(s_0)$ is the proportion attending grammar school before the reform. Similarly, the average outcome after the reform can be written as follows:

$$E(y \mid C=1) = P_{00}E(y_{01}(u)|u<s_0)+P_{01}E(y_{11}(u)|s_1<u<s_0)+P_{11}E(y_{11}(u)|s_1<u)$$

Hence, the variation in pupils' average outcomes $E(y|C=0) - E(y|C=1)$ is the weighted average of three local effects:

$\Delta = E(y \mid C=0) - E(y \mid C=1) = P_{00}E(\Delta_{00}(u) \mid u < s_1) + P_{01}E(\Delta_{01}(u) \mid s_1<u<s_0)$

$+ P_{11}E(\Delta_{11}(u) \mid s_0<u)$

$E(\Delta_{01}(u) \mid s_1<u<s_0)$ is the average effect of the reform on the group of pupils who do not attend the same type of school before and after the reform. $E(\Delta_{00}(u) \mid u < s_0)$ is the average effect of the reform on those who attend another secondary school before and after the reform. Such schools may be affected because they have lost the best of their potential intake after the reform. Finally, $E(\Delta_{11}(u) \mid s_1<u)$ is the average effect on the group of students who attend grammar school before and after the reform. They may be affected because the composition of the grammar school intake has changed due to the relaxation of selectivity.

Up to now, we have assumed that the only difference between cohort 0 and cohort 1 is the degree of selectivity of grammar schools. However, if there is an exogenous trend in educational outcomes across cohorts, the simple differences approach outlined above does not isolate the effect attributable to selectivity. To address this issue, it is necessary to identify a group of pupils that is affected by the same exogenous trend, but not by the reform (i.e. there is no variation in the ability composition of schools in this group) – for example in two regions with the same examination system but where the reform is only experienced in one region. Within this framework, let us denote P, a dummy indicating whether the pupil is in the region affected by the reform and assume that the educational outcome is given by the following generalisation of equation 1

$$y = y_{GCP}(u) + \theta C \qquad (2)$$

where the parameter θ captures the exogenous trend in outcomes. Within this framework, the simple difference discussed above identifies $\Delta + \theta$ in the group affected by the reform and θ in

the non-affected group. The cross-regional difference-in-differences captures Δ, the pure effect of the relaxation of selectivity in the affected region.

B. Data

We use administrative data that covers the entire relevant population of England and Northern Ireland. The data were obtained from the Department of Education in both countries. The great advantage of the data is that it enables us to observe examination outcomes that are free of sampling error by gender, school type and cohort.

The data for Northern Ireland consists of school-level data on the number of boys and girls entering each year group[20] and (from a separate source), the School Leaver's Survey. The latter covers all school leavers from post-primary schools except those in special or independent schools or pupils who transfer to another school. In Northern Ireland only a small percentage of pupils attend independent schools (less than 1 per cent) and this has not changed over time period of interest to us. The School Leavers Survey is available within cells defined by year group, gender and school.[21] Since grade repetition is not a feature of the school system in the UK, it is possible to derive birth cohort using information on year group (or grade) at a specific time. The data contains information on when students left school, qualifications attained and destinations after compulsory education. All the school-level information can be merged with information from the school census on school type (e.g. whether the school is a grammar school or not). To measure cohort size, we make use of mid-year estimates from the General Register Office (Northern Ireland Statistics and Research

[20] We use data on inflows to year 12 rather than year 8 (i.e. the first year of post-primary education) to measure entry to grammar school. This allows us to extend the series back by several cohorts (inflows to year 8 can only be observed back to the 1977 cohort). Trends in the entry flow to grammar school are almost the same irrespective of the year group chosen (i.e. there is little mobility out of the grammar school system for those who can enter). This is confirmed by a study of mobility patterns by Gallagher and Smith (2000).

[21] For a shorter period, we also have results available in cells defined by 'Free School Meal' status of students (a key measure of disadvantage). We use this data when discussing distributional effects of the reforms.

Agency). We use these data to construct relevant variables by cohort for a time period in which there was no major reform to public examinations or to the nature of the transfer test.

The data for England are pupil-level information on A-levels, where there is also information on year group and gender. The data, which gives comprehensive coverage of the results of all students taking A-levels in England, is available from 1993 onwards (enabling us to consider outcomes from the 1975 cohort). With regard to GCSEs, we have used school-level information from the School Performance Tables that is available from 1992 onwards. The birth cohort is easily derived from the year in which GCSE examinations are taken as this happens at the same time for all pupils - just before they leave the compulsory phase of education at age 16. Hence we can consider cohorts from 1976 onwards. We have pupil-level information on GCSEs from 1993 onwards. This enables us to consider outcomes by gender for English pupils (from the 1977 cohort onwards).[22] Similarly to our data for Northern Ireland, we also have mid-year estimates of cohort size (from the Office for National Statistics).

C. The Overall Effect of the Reforms

Figures 2-4 show the effect of the reforms on grammar school attendance in Northern Ireland. In Fig. 2, this is presented as the number of entrants to grammar school. In Fig. 3, the trend in the number of entrants is shown alongside the evolution of cohort size. Fig. 4 shows the proportion of the cohort attending grammar school. Whether one looks at numbers or proportions, there is a clear discontinuity for the first cohort to be affected by the 'open enrolment' reform in 1988 (i.e. the 1979 cohort). The reform generated a 15 percentage point increase in the number of students enabled to attend grammar school, for a time period in

[22] The pupil-level information on GCSEs is more problematic than that for A-levels. For instance, there were difficulties in merging the data with school-level files. Hence, we do not remove 'special schools' and 'independent schools' from these files.

which cohort size was relatively stable (between 1977 and 1979). Taking the longer time series into account (cohorts 1974-82), there are some fluctuations in cohort size. This explains why the pre-policy and post-policy trends in grammar school attendance (i.e. 1974-77) and (1979-82) are not the same when looking at trends for the number of entrants to grammar school (Fig 2) and the probability of attending grammar school (Fig 3). However, the discontinuity around the reform period is the same. For example, Fig 3 shows that there was a 3.5 percentage point increase in the probability of attending grammar school between the 1978 and 1979 cohorts, whereas this probability was fairly stable immediately before the policy (1976-78) and immediately afterwards (1979-81).

Figure 5 shows the trend in the number achieving at least 1 A-level in Northern Ireland for the same cohorts. This bears a close resemblance to the trend in the number of entrants to grammar school (Fig. 2) over the entire period of interest to us. Again, there is a marked discontinuity around the time of the 'open enrolment' reform. This reform was followed by a 12 percentage point increase in the number of persons achieving 1 or more A-level – thus, an increase that is almost as large as the increase in grammar school attendance.

In Figures 6 and 7, we show the difference between England and Northern Ireland in the probability of achieving at least 1 A-level. The trends are very similar in the pre-policy period and in the period immediately post-policy (1979-80 cohorts). The really marked divergence between England and Northern Ireland coincides exactly with the timing of the 'open enrolment' reform. The probability of achieving 1+ A-level became about 2.4 percentage points higher in Northern Ireland.

We can also consider the impact of the reforms on the probability of achieving good qualifications in an examination that everyone takes before leaving compulsory education at age 16. Figure 8 shows the trend in the number of students achieving 5 or more GCSEs at A*-C in Northern Ireland for cohorts born between 1974 and 1982. There is stronger trend growth

in this measure of academic achievement than for A-levels. However, again there is a marked discontinuity at exactly the time of the 'open enrolment' reform. Between the 1978 and 1979 cohorts, the number achieving 5+GCSEs at A*-C increased by 17 percentage points. This compares to a difference of 8 percentage points in 1976-76, 7 percentage points in 1976-77 and 2 percentage points in 1977-78. Similarly, the post-reform increases are much smaller: 4 percentage points in 1979-80 and very little change in 1980-81 or 1981-82.

Figures 9 shows a comparison between Northern Ireland and England in the probability of achieving 5 or more GCSEs at A*-C. The pre- and post-reform trends in this measure of educational achievement are fairly similar. However, the discontinuity happens at the time of the 'open enrolment' reform in Northern Ireland and suggests an important impact of the reform: there was a 4.6 percentage point increase in this measure of academic achievement relative to England. Results are very similar if we consider a lower-level outcome measure.[23] Given that the examination system is exactly the same in the two countries, the evidence points to the reform in Northern Ireland being the causal factor behind this divergence.

It is possible to use these numbers to derive an estimation of the effect of a 1 percentage point increase in the proportion of pupils enabled to attend grammar schools on the overall probability of success at national examinations. As discussed above, a 1 percentage point increase in the number of students attending grammar schools not only affects the 1 percent of the population of pupils who are given the opportunity to attend grammar schools, but also the 99 percent who attend the same schools before and after the relaxation, but whose schooling context is nonetheless affected. In such a context, the response to a 1 percent increase in the number of pupils admitted to grammar schools is not bound to lie between 0 and 1 percentage point. If the relaxation of selectivity positive affects

[23] The discontinuity is very similar for the percentage of students with (at least) 5 or more passes at GCSE (i.e. grades A*-G). In contrast, there is no discontinuity around the reform if we look at the percentage of students with no passes at GCSE.

the schooling contexts of the 99% who do not change schools, the response may well be a big increase in the proportion of successful pupils, i.e. an increase greater than 1 percentage point. As a matter of fact, the estimate shown in Table 1 suggests a strong effect of attending grammar school – the implied elasticity is 0.69 in the case of A-levels and 1.31 in the case of GCSEs. This can be interpreted as a 'social effect' because it incorporates the effect of the reforms on all students (whether they were affected directly or indirectly by the reform).

D. Effects of the Reforms by Gender

As discussed above, the reform involving expansion of access to grammar schools ('open enrolment') was preceded by a reform in the previous year which had implications for the gender composition of students attending grammar school. As described above, up until 1988, boys and girls were evaluated separately in the entrance exam for grammar schools ('the 11 Plus'), such that a given proportion of each cohort entering the examination received each transfer grade. From the time of the High Court ruling in 1988, boys and girls were assessed together. This had the effect of improving the entrance probability of girls because they performed better in the 11 Plus examination at this time (which was based on verbal reasoning tests). Interestingly, the reform was not applied at the same time as the reform involving the expansion of access to grammar schools, but one year before. This one year gap has generated significant upward and downward shifts in the relative proportion of girls enabled to attend grammar school across cohorts 1977-1980. We show that these shifts have been followed by parallel shifts in girls' subsequent relative outcomes at age 16 and 18. This confirms the considerable effect of grammar school entry on educational outcomes using a different source of identification to that used in the preceding section since we are comparing two subgroups

within Northern Ireland (boys and girls) rather than two different regions (Northern Ireland and England).[24]

Table 2 shows changes in the probability of going to grammar school and achieving educational outcomes (1+ A-level; 5+ GCSEs at A*-C) for cohorts born between 1977 and 1978 (i.e. 'gender' reform); cohorts born between 1978 and 1979 (i.e. 'open enrolment' reform); and cohorts born between 1979 and 1980 (i.e. post reform). In each of these time periods, changes in the probability of achieving these outcomes are shown for girls and boys respectively and also the difference between girls and boys (i.e. the difference-in-differences).

The specific effect of the 'gender' reform is not quantitatively very important but there is a clear impact. Between the 1977 and 1978 cohort, the probability of admission to grammar school increased very slightly for girls (+0.2%) but decreased by about 0.7% for boys.[25] These impacts are reflected in the relative outcomes of examinations taken at age 16 (GCSE) and age 18 (A-levels). Comparing changes between boys and girls (i.e. the difference-in-differences) shows that the relative gain in grammar school attendance for girls (+0.9%) was followed by a relative gain in the probability of achieving 5+ GCSEs at A*-C (+1.4%) and in the probability of achieving 1+ A-level (+2.4%). Interestingly, this pattern is not only in terms of relative outcomes, but is also apparent for absolute outcomes. Thus, there is a reduction in the percentage of boys achieving these educational outcomes (at age 16 and 18) which mirrors their lower probability of entering grammar school.

Regarding the period of the second reform (i.e. affecting the change in outcomes for cohorts born between 1978 and 1979), the increase in admission to grammar schools was strong for both boy and girls. The probability of going to grammar school rose by 2.9 and 4.2

[24] The focus on variations in gender differences across cohorts within Northern Ireland enables to identify the effect of grammar school attendance without assuming common cohort trends in Northern Ireland and England. Analysing changes in these variations across pairs of cohorts (i.e., triple difference) allows to further differentiate out potential gender-specific trends.

[25] In terms of numbers, the change for girls and boys between the 1977 and 1978 cohort was +1% and -3% respectively.

percent for girls and boys respectively. The larger change for boys enabled them to make up for the previous reform to admissions. However, this proved to be only temporary as the relative increase for girls returned to almost the same level between the 1979 and 1980 cohorts (i.e. 1 percentage point) as it had been between the 1977 and 1978 cohorts.

What is of interest is that gender differences in the change in the probability of going to grammar school continue to be reflected in the change in the probability of examination success. Comparing cohorts 1978-1979, the lower change for girls compared to boys in terms of entry to grammar school (-1.4%) is reflected in a lower change in the probability of achieving 1 or more A-level (-1.3%) and equal changes with regard to GCSE (whereas previously girls' grades increased faster than boys'). Comparing cohorts born between 1979 and 1980, the higher relative change in terms of girls' probability of entry to grammar school (+1%) is reflected in the probability of achieving 1 or more A-levels (+2.8%) and the probability of achieving 5 or more grades A*-C at GCSE (+1%). Thus, when one analyses variation in the educational outcomes of cohorts born between 1977 and 1980, one sees that relative changes between boys and girls in the probability of entering grammar school are accompanied by shifts in the same direction with regard to educational outcomes. The parallel shifts in the relative probability of attending grammar school and achieving high educational outcomes (which go down as well as up) could not be explained by a general trend in the academic performance by gender. The findings are consistent with the expected effects of the reforms.

We now consider our identification strategy which involves comparing girls and boys (separately) between England and Northern Ireland. The results of this longer-term analysis are shown graphically in Figures 10-16. Figure 10 shows the evolution of cohort size and the number entering grammar school for males. Figure 11 shows the proportion of males entering grammar school. This illustrates the small effect of the first reform (for the 1978 cohort) and

the much larger shift following 'open enrolment'. Figures 12 and 13 show that these changes are reflected in examination performance both in A-levels (Figure 12) and GCSE results (Figure 13) when one compares males in Northern Ireland to their counter-parts in England. There is a relative fall for the 1978 cohort in Northern Ireland and a very strong relative increase for the 1979 cohort. Between the 1977 and 1979 cohort, the probability of attending grammar school increased by 3.4 percentage points for boys and this led to a 2 percentage point increase in their relative achievement in A-levels and a 2.4 percentage point increase in their relative achievement for GCSEs.

This analysis is replicated for females in Figures 14 to 17. Figure 14 shows the evolution in the number attending grammar school and cohort size. Figure 15 shows the proportion of the cohort attending grammar school. Figures 16 and 17 compare girls in Northern Ireland and England in terms of the probability of achieving 1 or more A-levels (Figure 16) and 5 or more GCSEs at A*-C (Figure 17). The effect of the reform influencing the gender composition of grammar school intake are less clear for females than for males – there is a stronger pre-policy trend. For the relevant cohort (1978), there is only a small upward shift in the probability of attending grammar school. However, the effect of the 'open enrolment' reform is much more evident: there is a marked discontinuity for the 1979 cohort, where the probability of attending grammar school increases by just less than 3 percentage points. This is also reflected in outcomes, where marked divergence happens between the 1978 and 1979 cohort for both outcome variables. The relative increase in the probability achieving 1 or more A-level and 5 or more GCSEs (A*-C) increases by about 1.5% and 3.4% respectively.

Thus, whether we compare girls and boys within Northern Ireland or make comparisons by gender between Northern Ireland and England, it is clear that grammar school reforms have a strong impact on educational outcomes and that the design of the educational

system (in this case, the mechanism of entry into grammar school) has consequences for gender differences in educational outcomes.

E. Effects of the Reform by Free School Meal Status

We are able to analyse the effect of the reforms according to whether children are eligible for free school meals (FSM), though we have fewer 'pre-reform' cohorts in this case.[26] FSM is an important measure of socio-economic disadvantage and corresponds to 25% of families sending their children to post-primary school in the early-mid 1990s (i.e. the bottom quartile of families in terms of income).[27] As in other contexts, students from disadvantaged backgrounds are less likely to perform well in the entrance test for grammar school. In the pre-reform period, only about 14% of such children entered grammar school as compared to 42% of children from more advantaged backgrounds. Relatively low educational outcomes are also observed later on in their schooling career. In the pre-reform period, only 23% of FSM children achieved 5 or more GCSEs at A*-C and only 13% achieved 1 or more A-level. This compares unfavourably to non-FSM children who had much higher success rates in these examinations - 53% and 38% for GCSEs and A-levels respectively.

Thus, both entry into grammar school and educational outcomes in Northern Ireland suggest strong inequalities according to social background. In Northern Ireland as elsewhere, the heart of the debate about having separate tracks for more able pupils is not so much focused on the efficiency of the system but the inequalities that it generates. It is argued that such a selective system is a contributory factor to the observed inequalities in later

[26] In this case, the 'pre-reform' cohort is 1976 as this is the first cohort for which we observe the FSM status of pupils.

[27] Administrative data shows that in 1992/93 (the first year in which this information was collected), the percentage of children attending post-primary school who were eligible to receive FSM was 24.2%. By 1995/96, it was 25%. Hence the percentage of children eligible to receive FSM appears to be fairly stable around the time of interest to us.

educational outcomes. While students from lower social backgrounds are less successful than others, does it follow that the selective system widens pre-existing gaps?

An analysis of the data suggests no evidence that the reform has had a significant impact on the relative proportion of FSM pupils within grammar schools. This proportion exhibits some fluctuations for available cohorts (between 1976 and 1982). However, just after the reform (the 1979 cohort) or at the end of the series (the 1982 cohort), the proportion of grammar school entrants who are from a FSM background is the same as it was at the beginning of our series (i.e. about 8.4%).

When we compare cohorts born before and after the open enrolment reform, we observe the same clear increase in the number of FSM pupils attending grammar school (about +20% between 1978 and 1979) as for the number of non-FSM pupils attending grammar schools (about +17%). Interestingly, these shifts in grammar school attendance have been followed by parallel shifts in educational attainment for both FSM and non-FSM pupils. For example we observe a +11% increase in the number non-FSM students with 1+ A-level between the 1978 and 1979 cohorts and a +13% increase in the number of FSM students with +1 A-level. This is shown in Figures 18 and 19.

Regardless of whether we compare cohorts born in 1978 and 1979 or pre-reform cohorts (1976-1977) and post-reform cohorts (1979-1982), we obtain an elasticity of the number of 1+ A-levels to the number of pupils attending grammar school which is as large for non-FSM as for FSM pupils (about 0.6).

Thus, grammar school attendance has no less effect on relatively poor pupils as on more advantaged pupils. However, the former are much less likely to attend grammar school. Hence the barriers that make it difficult for FSM children to enter into grammar schools in the first place (e.g. lower test scores at age 11 because of lower parental resources) is an important source of inequality of opportunity in this education system. Part of the large

differential in educational outcomes between these socio-economic groups is directly attributed to the lower probability of children from poor family backgrounds entering into grammar schools.

V. Conclusion

Some form of ability tracking is a common phenomenon in OECD countries. In some countries, this separation is within school (via grouping practices) whereas others take a more stringent approach, educating children in different schools according to ability. In the latter context (and perhaps also in the former), it is not only the peer group composition that differs between tracks – but the teaching and learning environment and more generally the whole ethos and orientation of the schooling experience. Generally, the more academic (or elite) track is seen as the route further educational progress (in university) and ultimately to labour market success.

Reforms influencing the degree of selectivity in the education system have occurred in many countries. The effects of such reforms are hotly disputed: proponents of selection argue that tracking is to the benefit of low and high ability groups; whereas advocates of 'comprehensive schooling' argue that selection discriminates against certain groups in the population (especially the economically disadvantaged) and leads to inefficiency because a significant group do not achieve their full academic potential.

The overall effects of 'de-tracking' reforms are difficult to analyse empirically because they often happen at the same time as other educational reforms. In this context, the reform examined in this paper is particularly interesting: a reform affecting tracking occurred in Northern Ireland whereas in other respects, there was no differential change between England and Northern Ireland (which have similar educational systems and the same system of public

examinations). Specifically, there was a large quantitative change in the number of pupils admitted to grammar school. Just before that time, there was a qualitative change to admissions which influenced the gender composition of the intake. Using a difference-in-difference analysis, we show that the net effect of the de-tracking reform was to increase examination results at the end of compulsory schooling (i.e. GCSEs, age 16) and 'high school' (i.e. A-levels, age 18). The improvement in examination performance was comparable to the magnitude of the increase in the number of admissions to the more academic track. This effect encompasses not only the direct effect of attending grammar school for the marginal entrants, but also the indirect effect arising through contextual impacts (i.e. at grammar and non-grammar schools).

The results are verified when we analyse results separately by gender and also when we compare the relative intake of boys and girls to the academic track and their relative academic performance both at age 16 and 18. Furthermore, our analyses according to gender and socio-economic background (indicated by whether the pupil is eligible to receive free school meals) show that inequalities in access to the more academic track produces inequalities later on in pupils' educational careers (and therefore into the labour market).

Clearly, this paper cannot be interpreted as evaluating the overall effects of a comprehensive or selective/'tracked' system of education. However it is an example of where widening access to the more 'academic track' has generated positive net effects. It illustrates the high price individuals pay from being excluded from the 'academic' track, even when they are someway down the ability distribution within the cohort. Also, this study provides clear quasi-experimental evidence that selection into the more academic track really has a causal impact – it is not simply an artefact of the selection process.

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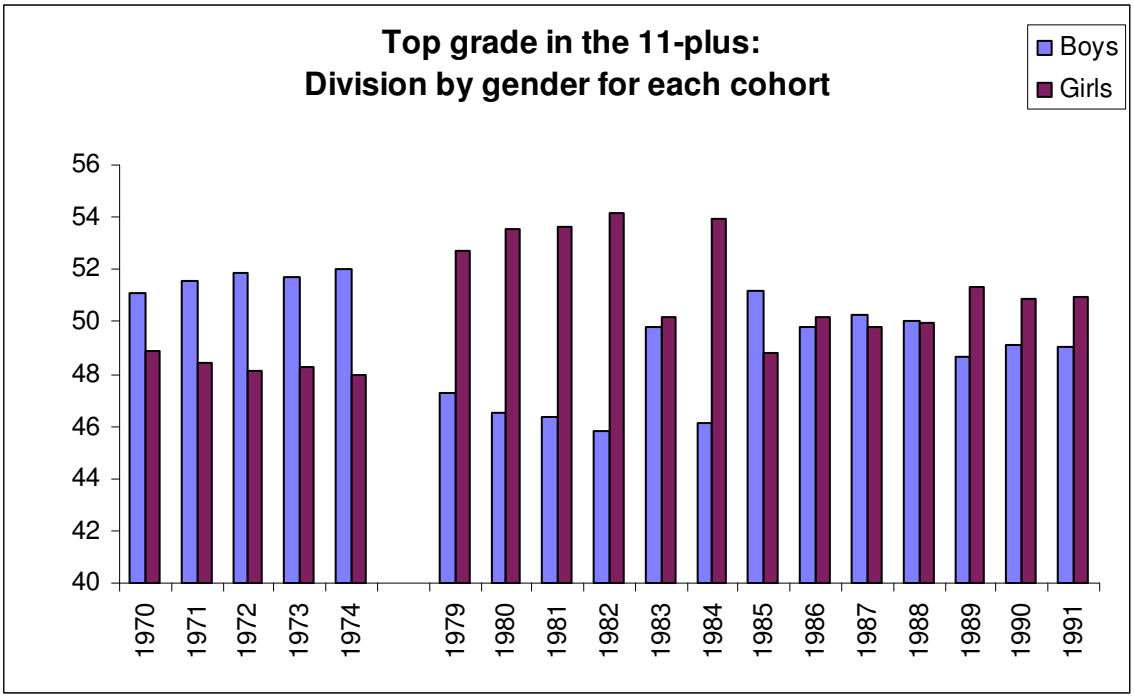
Figure 1



Source: Gallagher and Smith (2000); Department of Education, Northern Ireland

Figure 2: Number of Entrants to Grammar School

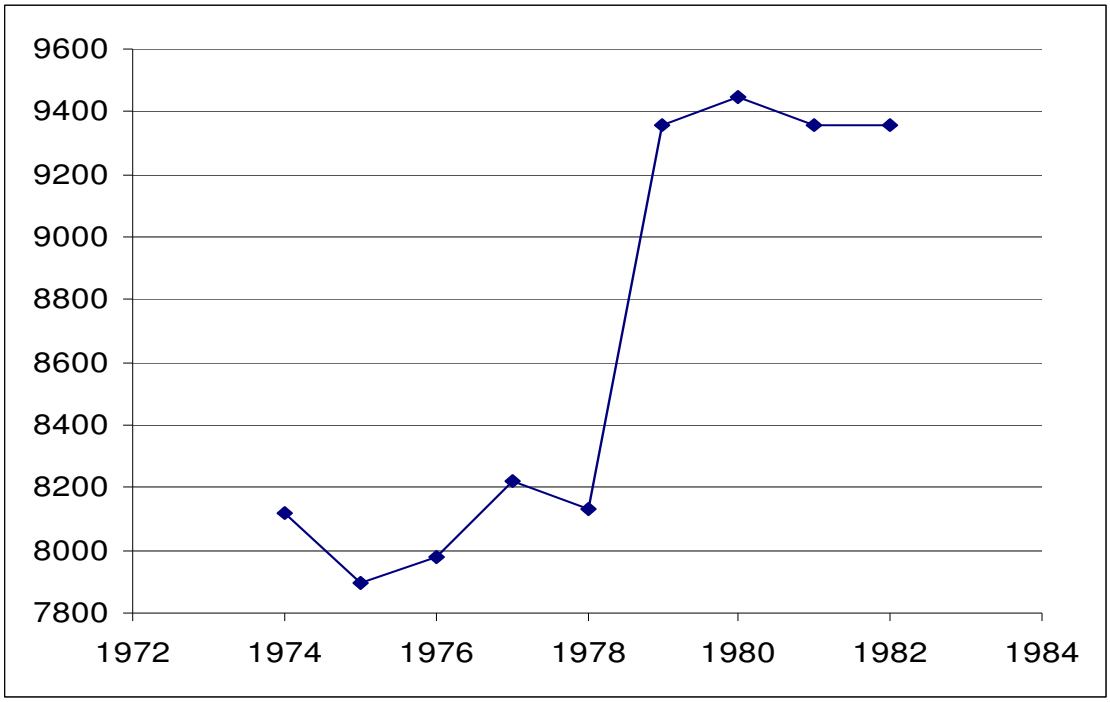


Figure 3: Evolution of Cohort Size and Number of Entrants to Grammar School
(1974=1)

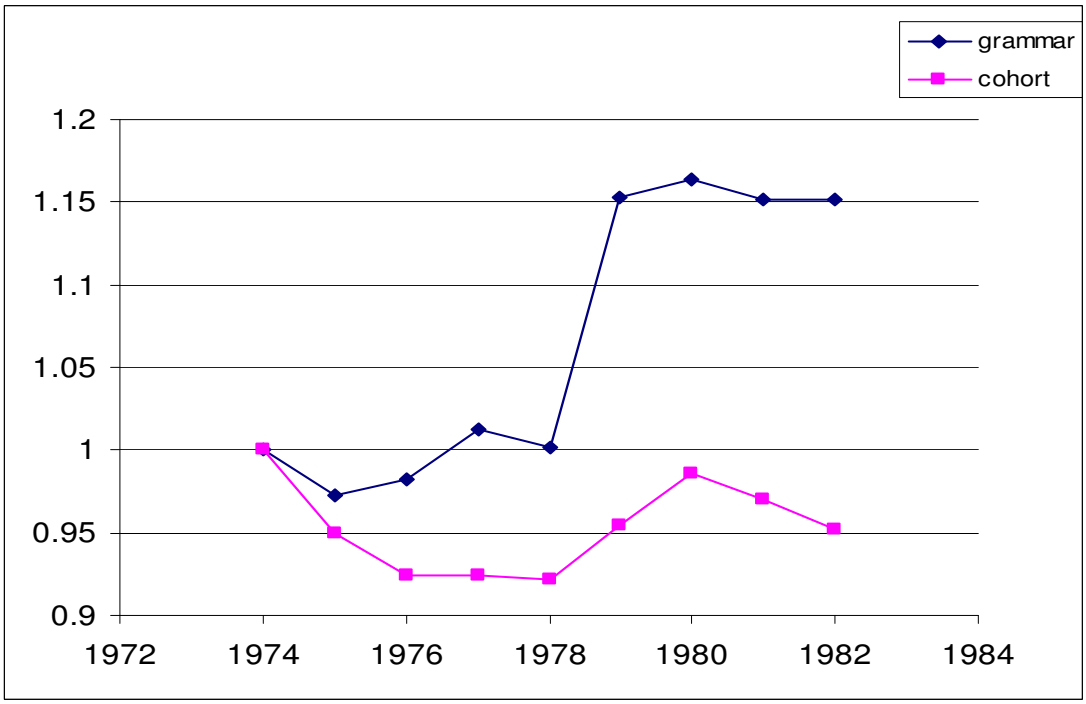


Figure 4: Probability of Attending Grammar School in Northern Ireland

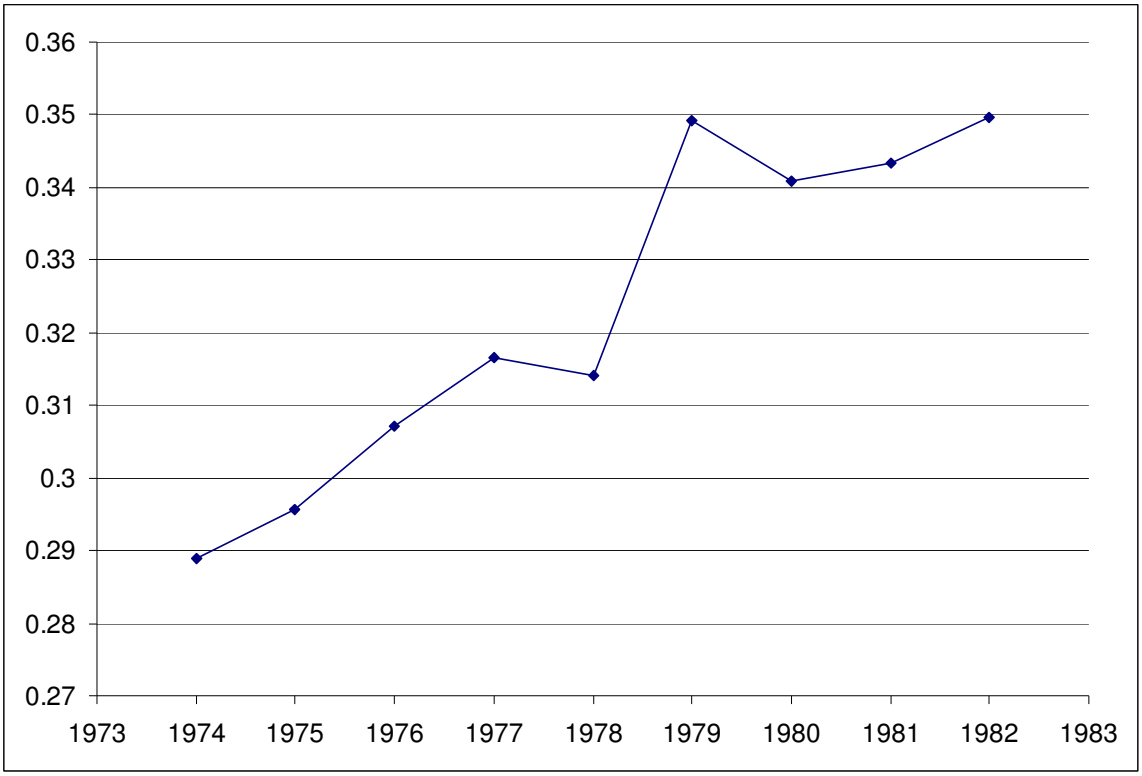


Figure 5: Number Achieving 1+ A-level in Northern Ireland

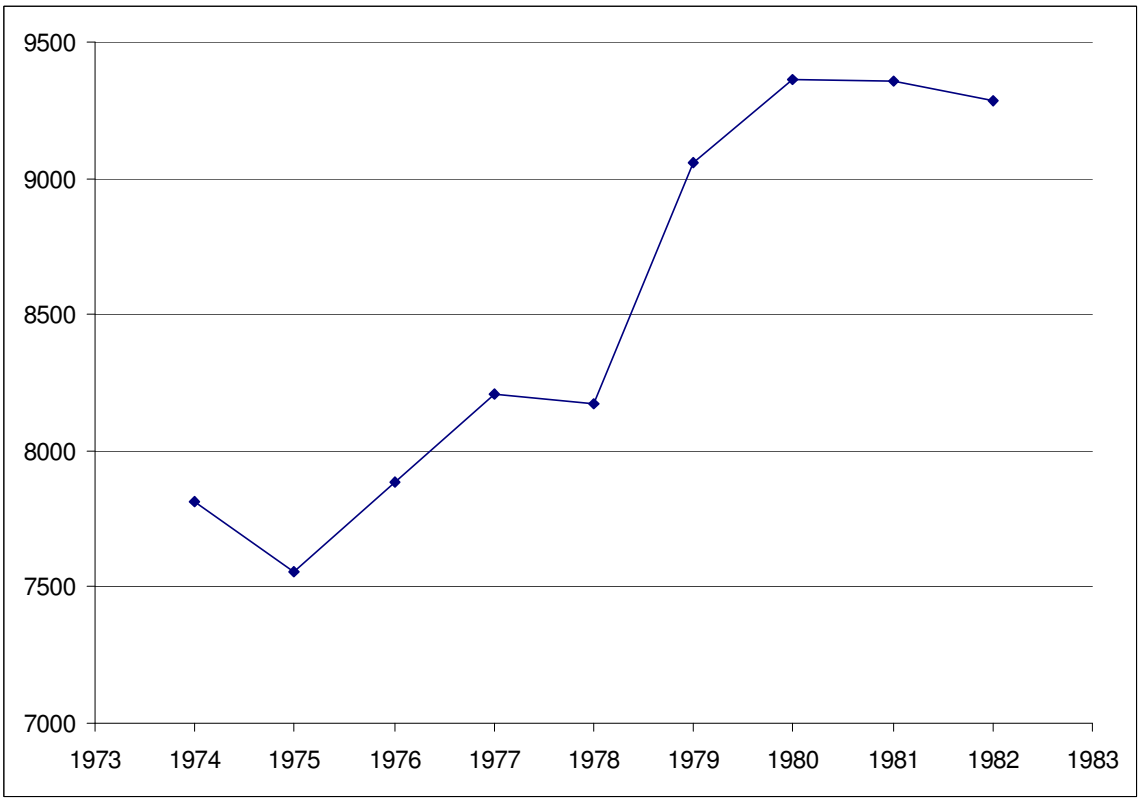


Figure 6: Probability of Achieving 1+ A-level in England and Northern Ireland

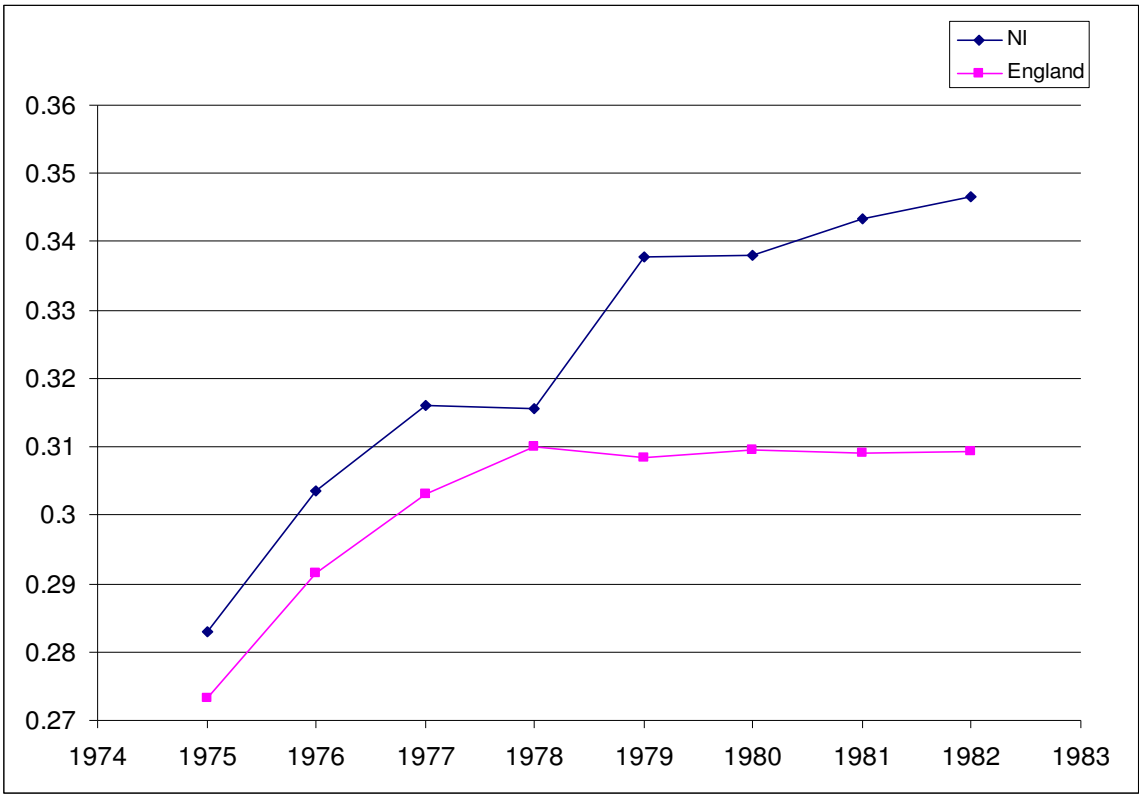


Figure 7: NI and England: Difference in the Probability of Achieving 1+ A-level

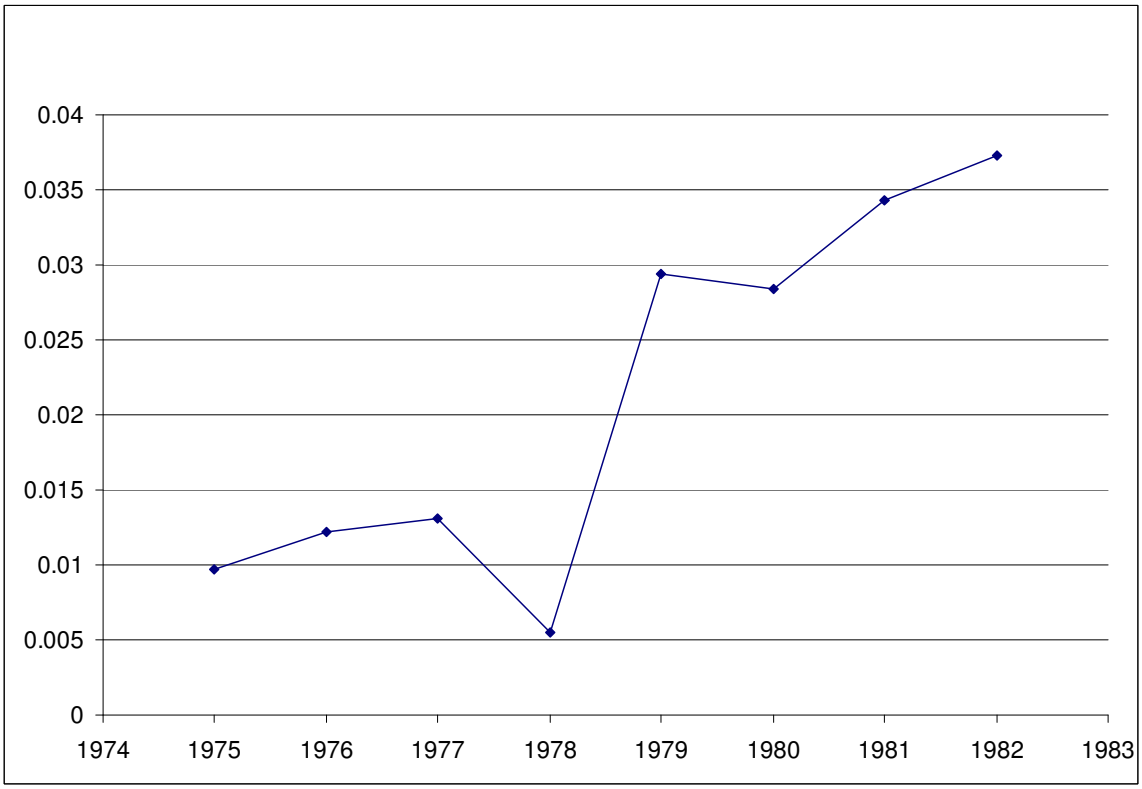


Figure 8: Number Achieving 5+ GCSEs at A*-C in Northern Ireland

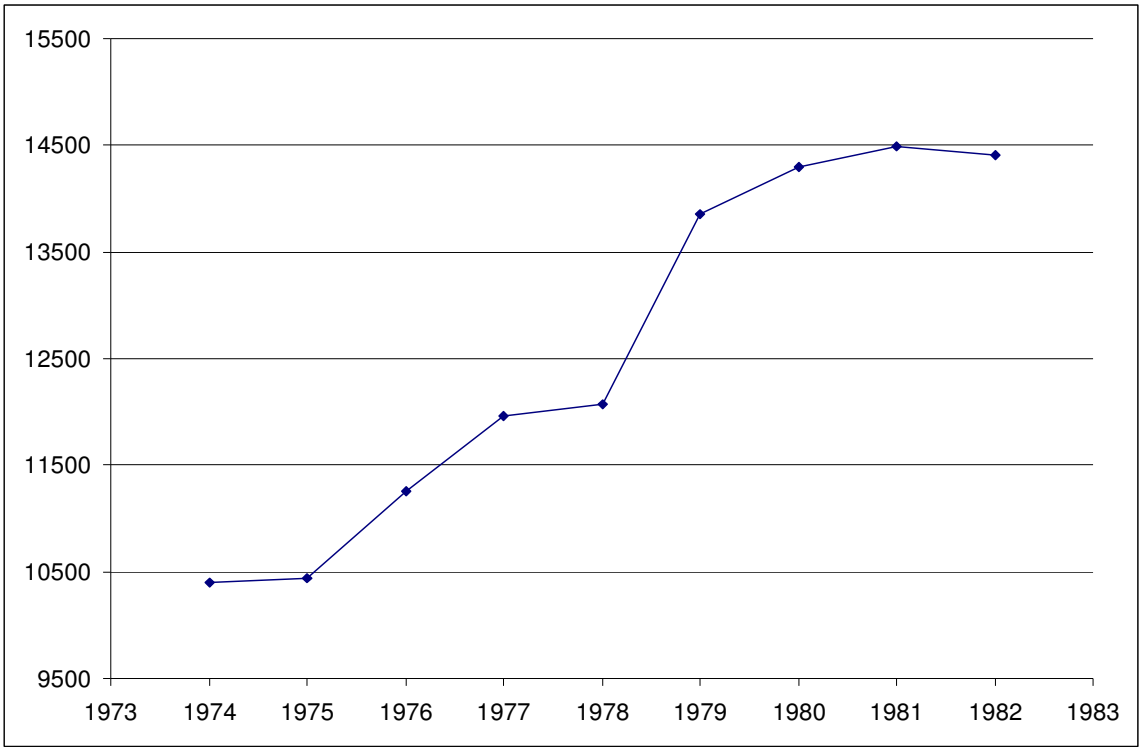


Figure 9: Increase in the Probability of Achieving 5+ GCSEs at A*-C in England and Northern Ireland

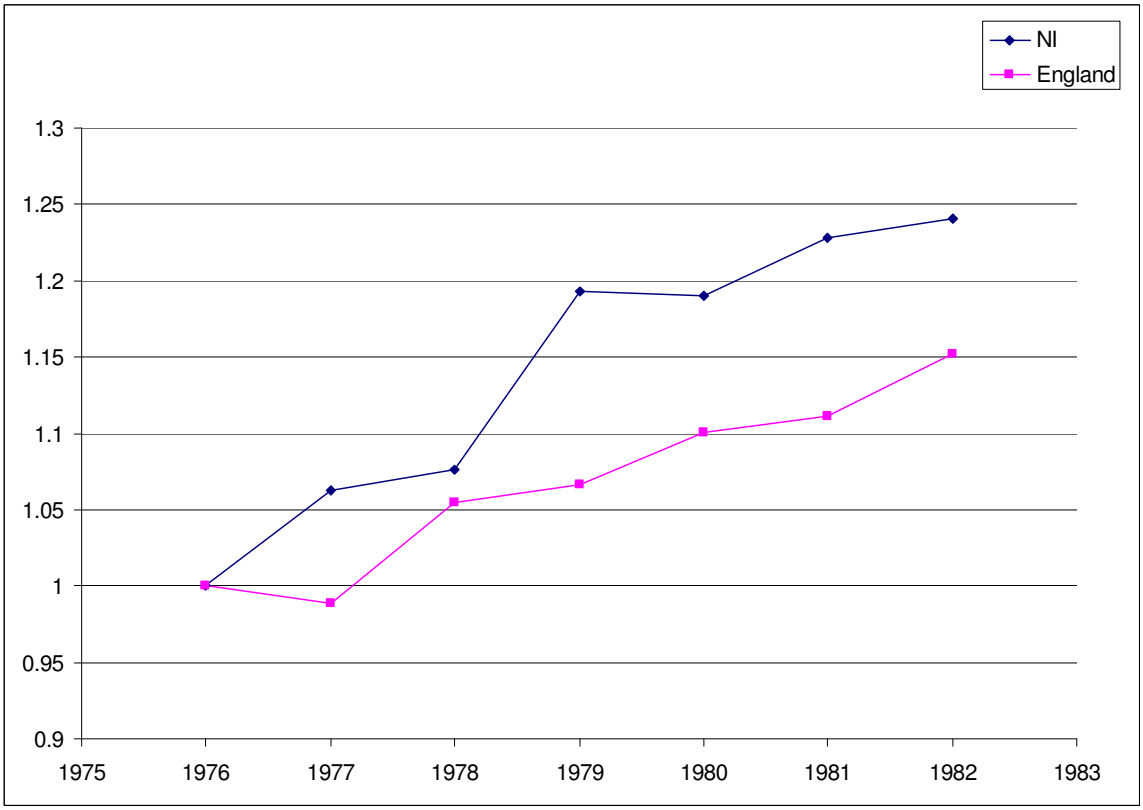


Table 1: Estimated Effects of Increasing Grammar School Attendance on Average Educational Outcomes

	Country	Post-Reform – Pre-Reform (1979-1978)	Implied Elasticity
Grammar School Attendance	NI	+3.5	--
1+ A-level	NI – England	+2.4	0.69 (2.4/3.5)
%+ GCSEs at A*-C	NI - England	+4.6	1.31 (4.6/3.5)

Table 2: Variation in the Probability of Grammar School Attendance, A-levels and 5+ GCSE at A*-C, for boys and girls, across cohorts born between 1977 and 1979.

	Variation observed between birth cohorts (%)								
	1977 and 78			1978 and 1979			1979 and 1980		
	Girls	Boys	*Diff. (G-B)*	Girls	Boys	*Diff. (G-B)*	Girls	Boys	*Diff. (G-B)*
Grammar	+0.2	-0.7	*+0.9*	+2.8	+4.2	*-1.4*	-0.3	-1.3	*+1.0*
A-level	+1.1	-1.3	*+2.4*	+1.6	+2.9	*-1.3*	+1.5	-1.3	*+2.8*
5+ GCSE at A*-C	+1.3	-0.1	*+1.4*	+5.0	+5.0	*0*	+0.5	-0.5	*+1.0*

Figure 10: Male – Evolution of Cohort Size and Number Entering Grammar School

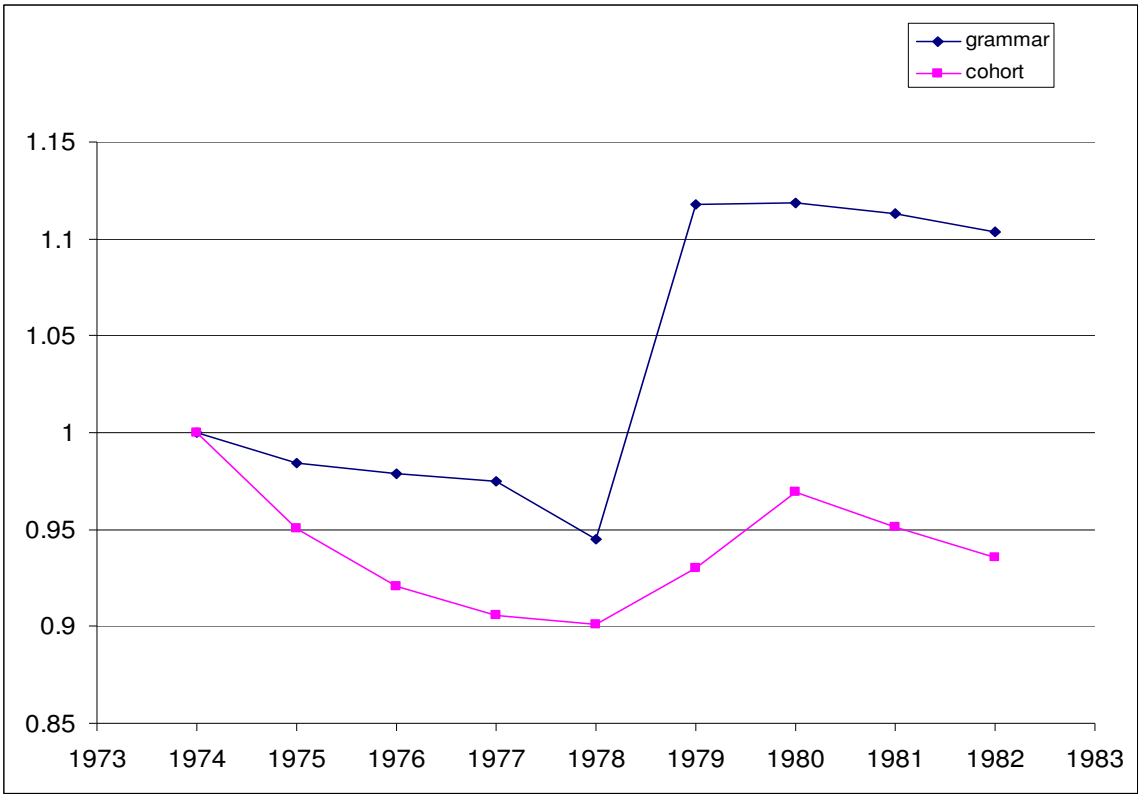


Figure 11: Male – Proportion Attending Grammar School

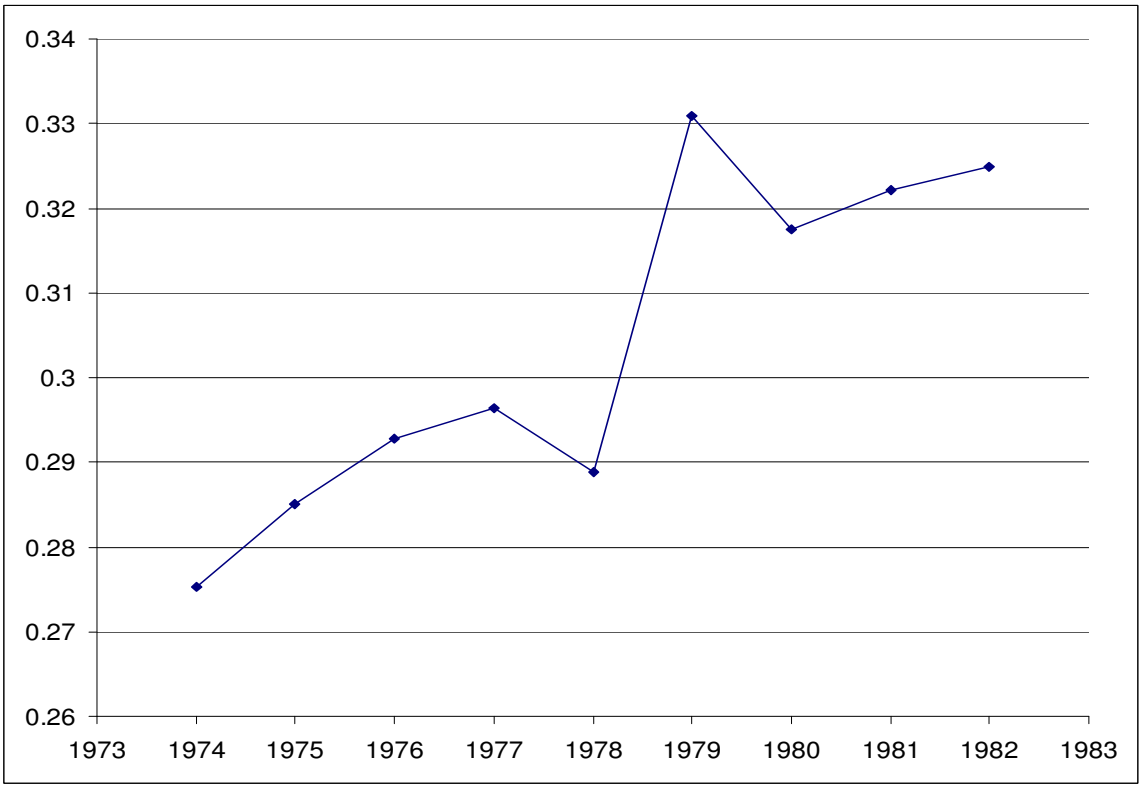


Figure 12: NI and England. Male – proportion of cohort with 1+ A-level

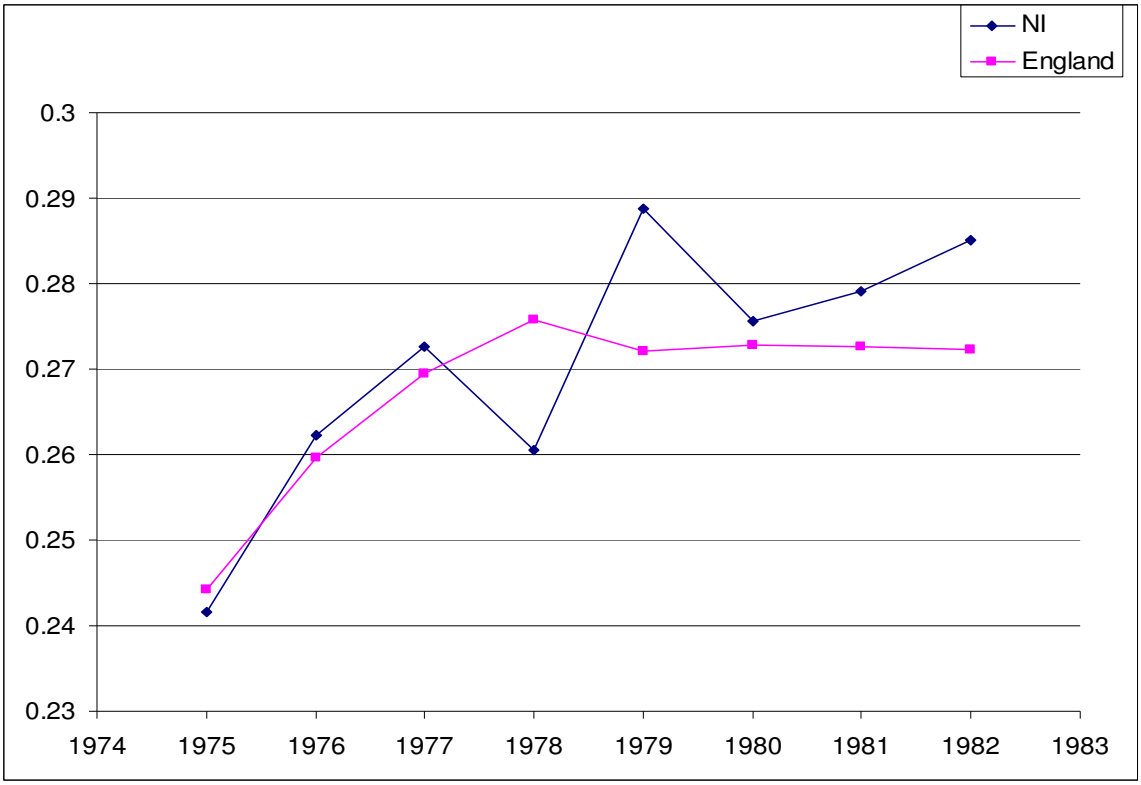


Figure 13: NI and England. Male – proportion of cohort with 5+ GCSEs at A*-C

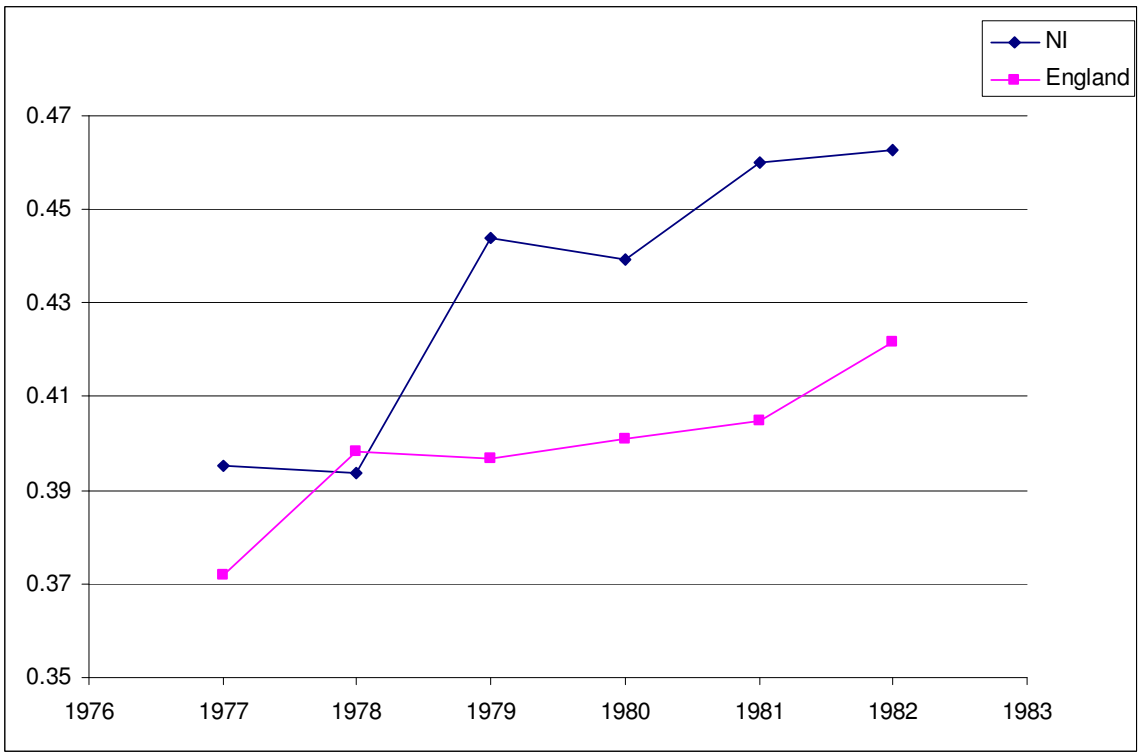


Figure 14: Female, Evolution of Cohort Size, Number Entering Grammar School

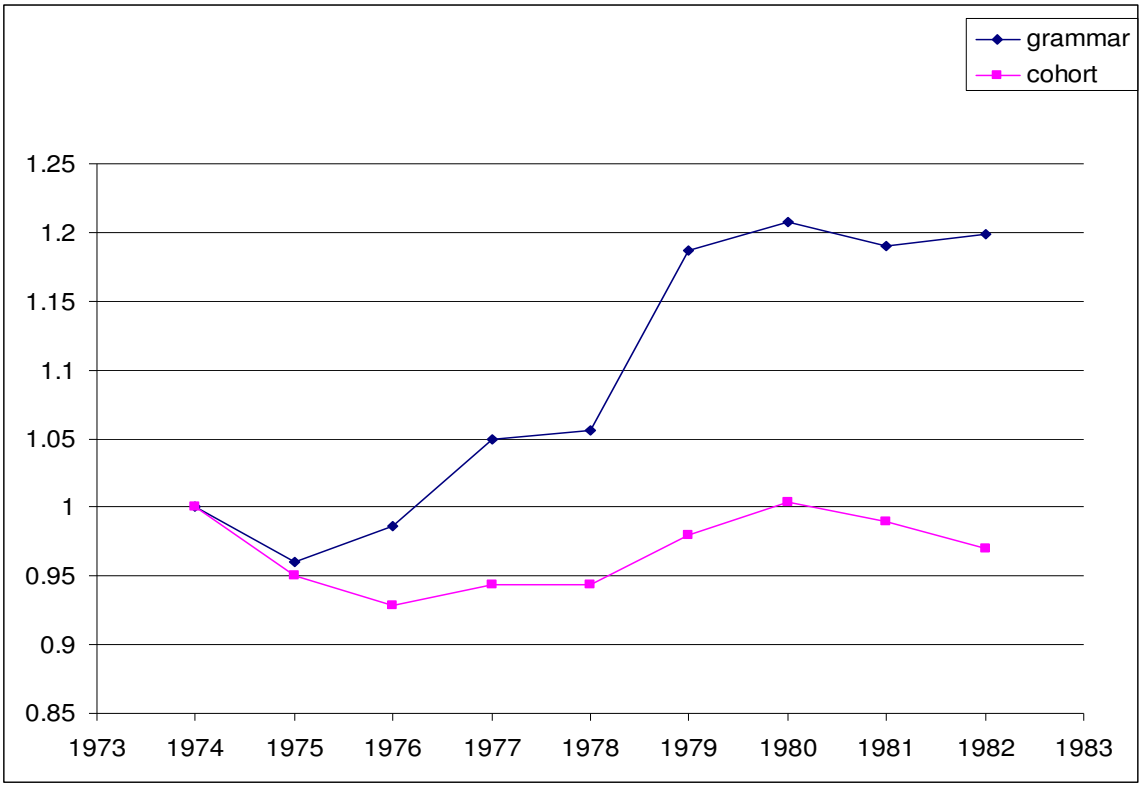


Figure 15: Female – Proportion Attending Grammar School

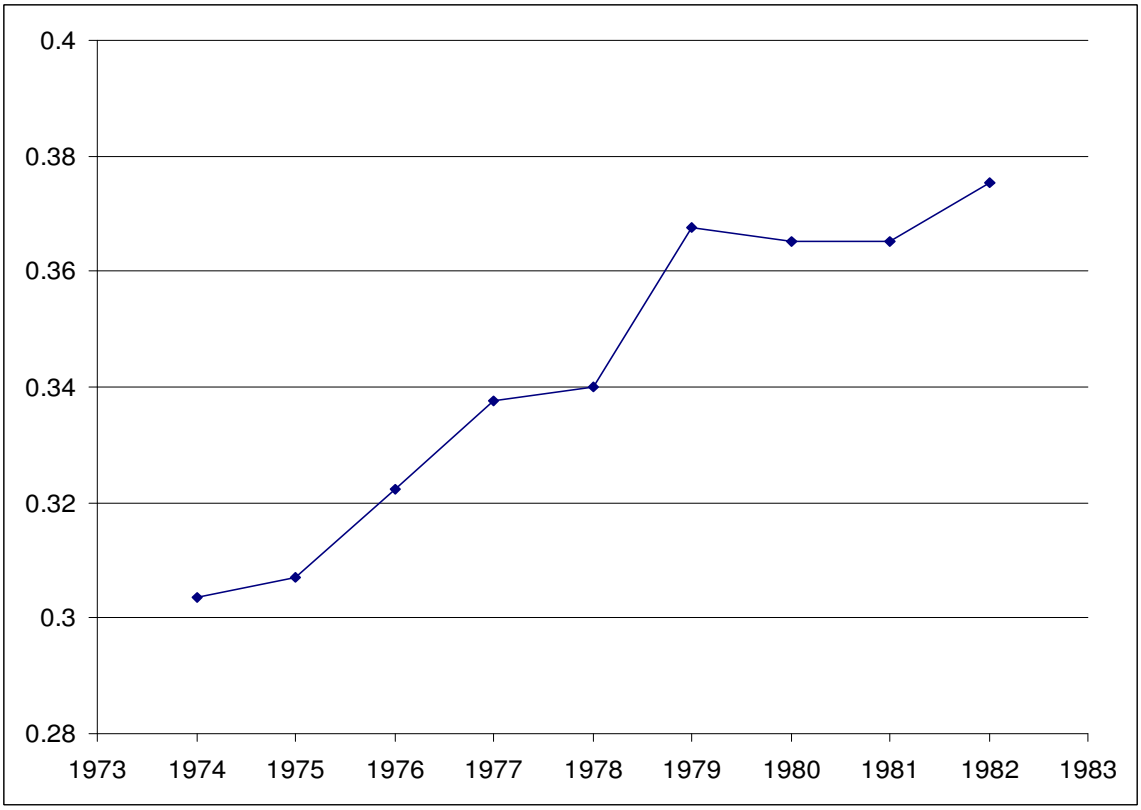


Figure 16: Female, Proportion with 1+ A-level

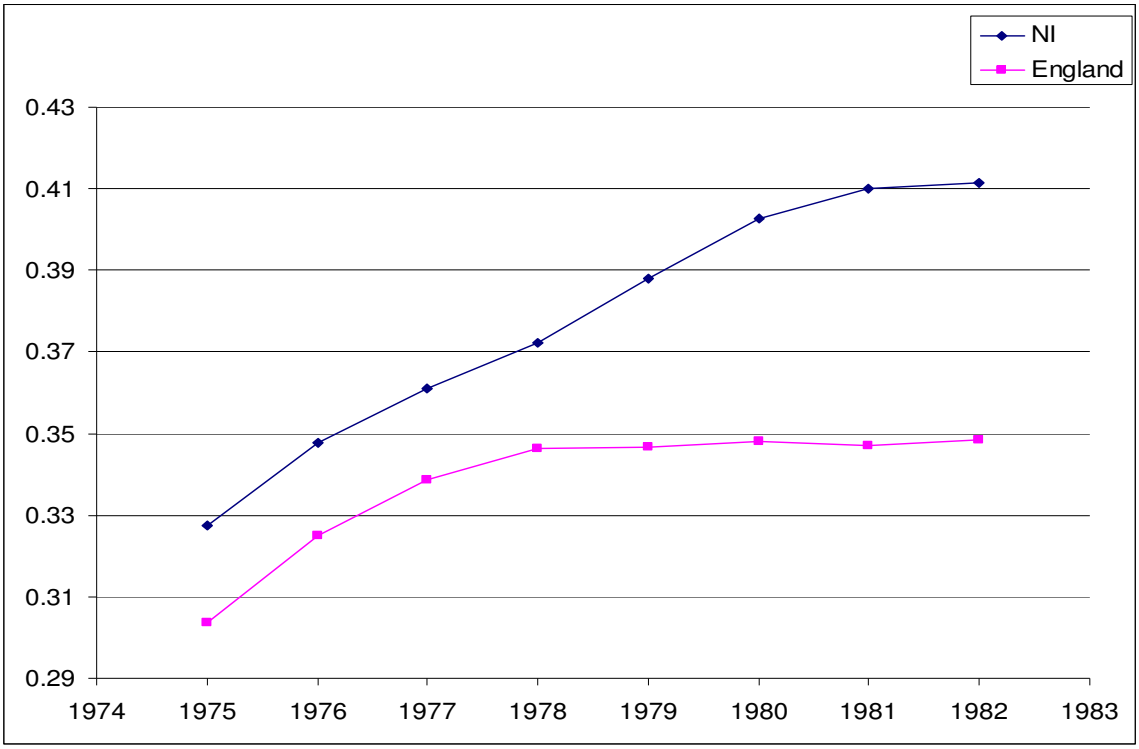


Figure 17: Female, Proportion with 5+ GCSEs at A*-C

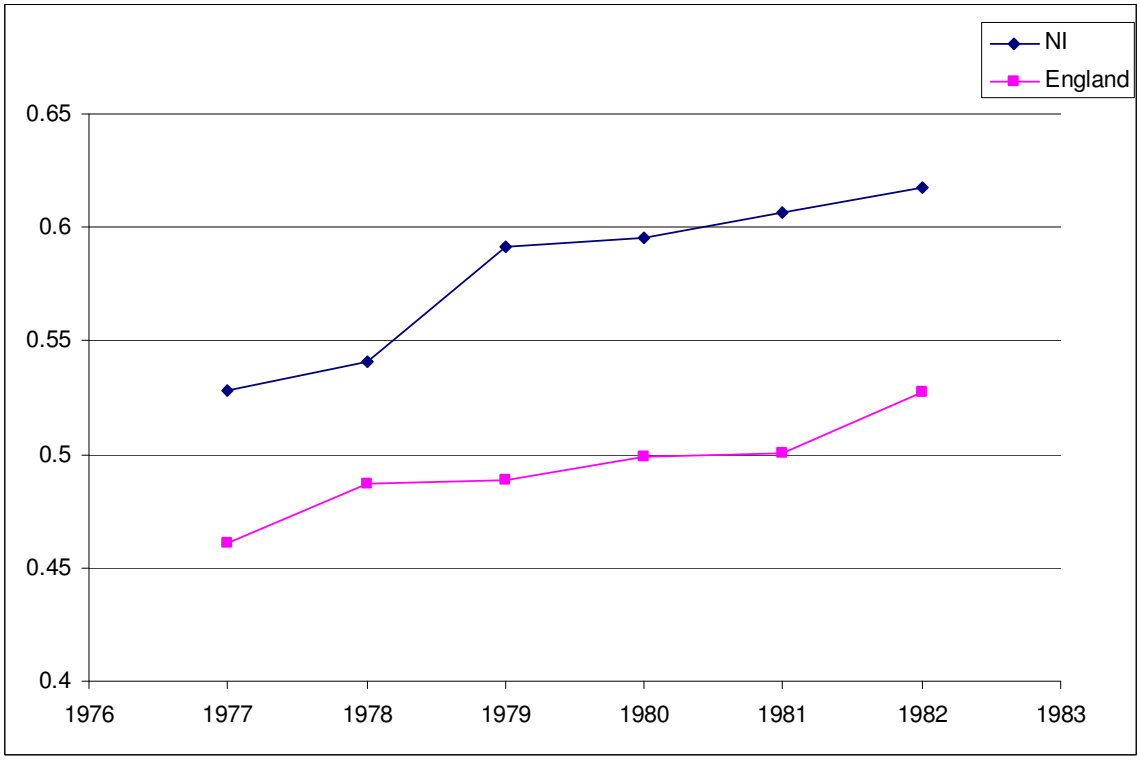


Figure 18: Number of non-FSM pupils attending grammar schools and achieving 1+ A level.

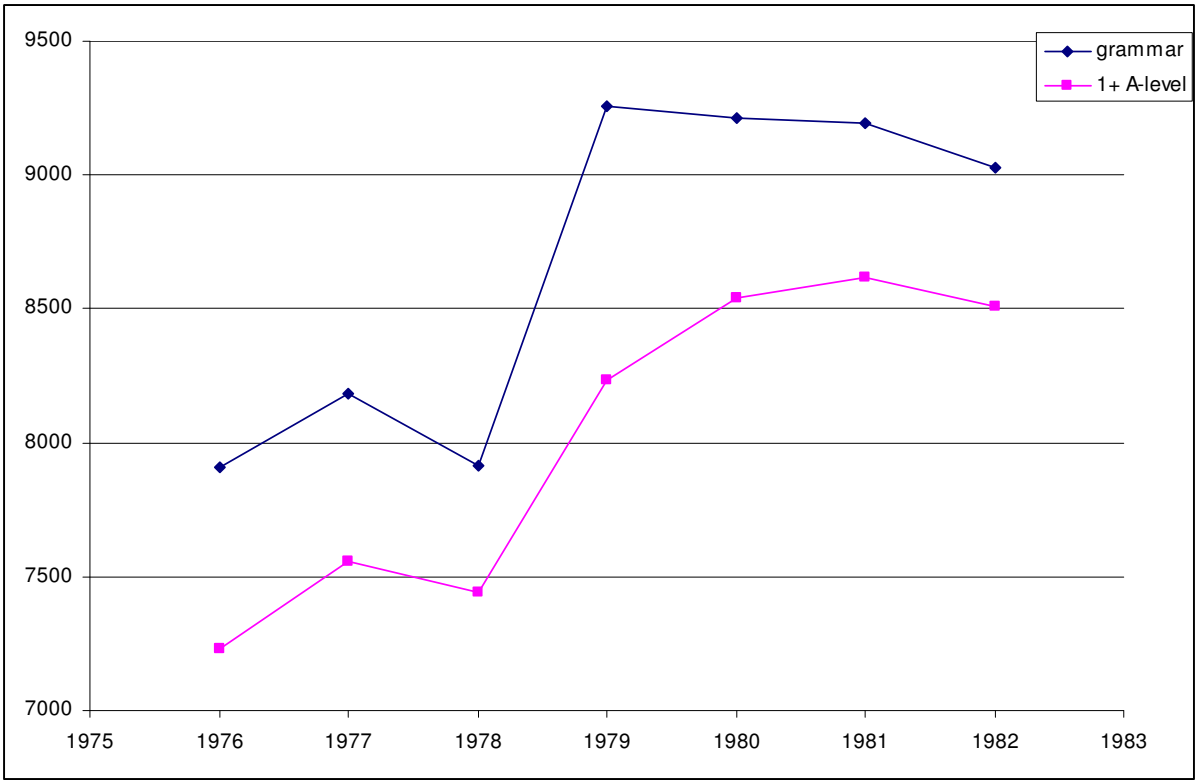
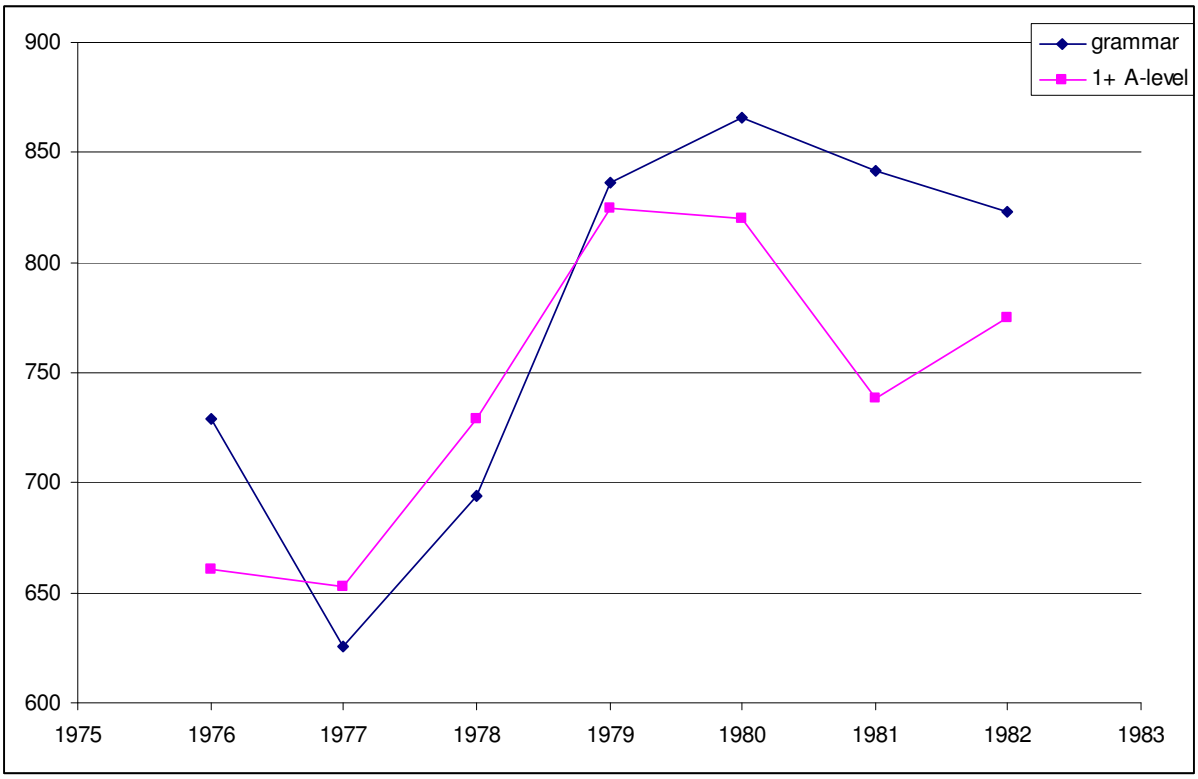



Figure 19: Number of FSM pupils attending grammar schools and achieving 1+ A level.