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BORN TO BE WILD? THE EFFECT OF BIRTH ORDER, FAMILIES AND SCHOOLS ON TRUANCY

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Born to be wild? The effect of birth order, families and schools on truancy

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Abstract

This paper models the probability of 15-year-old children missing school or being late. The paper sets out to uncover the effects of family background and birth order on attendance. Looking at birth order effects allows one to test Sulloway's "Born to Rebel" hypothesis that older siblings are more compliant than their younger siblings. Using data from the Programme for International Student Assessment (PISA) for Germany, Korea, Ireland, Mexico, Russia and the United States, the evidence here provides little support for the hypothesis in general. The paper finds, somewhat surprisingly, that the socio-economic background of the teenagers has very little effect either. Those from single parent households are however more likely to have poor attendance. However students who feel positively about their teachers are less likely to have bad attendance. Similarly where students feel there is a good disciplinary climate in the class they are also less likely to have poor attendance. In some cases private schools are associated with better attendance.

Key words: truancy, birth order, school, family

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1 Introduction

Missing school, skipping classes or turning up late for school has interested a range of scholars, educators, educationalists not to mention students themselves. Such behaviour may indicate underlying problems with the individual or the school and it generates a waste of resources. The academic literature on the subject mostly draws on psychological and sociological perspectives 'though there is also a small economics literature that touches on it. That there are so many different possible perspectives on the phenomenon renders it difficult to summarize, however briefly, the literature.

Psychologists focus on personality and cognitive characteristics of the individual students. For example Rayner and Riding (1996) find a role for learning or cognitive style: students at the Wholist end of the Wholist-Analytic style dimension being more likely to miss school[1]. `Wholists' tend to be more intuitive, more non-conformist and more likely to engage in lateral reasoning while those at the other, `Analytic' pole, tend to be more compliant, prefer structured approaches to reasoning, and the use of systematic methods of investigation. Kee (2001) finds that attributional style of students has an impact on truancy. Bimler and Kirkland (2001) consider no less than 73 motives for truancy. In a more sociological vien, McNeal (1999) uses the notions of cultural and social capital to develop a theoretical framework for understanding the impact of parental involvement on truancy. He shows, *inter alia*, that the positive effects of parental involvement only hold for those from some, more economically, advantaged backgrounds.

Economists view an individual's decision to miss school (or indeed to drop out) as based on comparing the expected costs and benefits in a rational choice framework. The benefits are the returns from further investment in human capital. The costs include *opportunity costs* of truancy: the value of what they are missing out by attending school, see for example Mora (2001). Outside labour market opportunities are likely to be an important part of the opportunity cost of schooling. Dustmann, Rajah and Smith (1997) measure how British teenagers divide their time between school and work taking into

[1] These two cognitive styles are sometimes associated with the right and left hemisphere of the brain respectively 'though this "split-brain" approach is something of an over-simplification.

account the incentives to work including the economic circumstances of the parents. Bacon (1997) argues that NAFTA has had a major effect on truancy in Mexico (one of the countries studied here) through its impact on the local labour market. The question of outside labour market opportunities would be particularly important in less developed countries (LDC's) and hence the research literature on child labour provides an alternative perspective. For example Jacoby and Skoufias (1997) consider seasonal variation in school attendance (and hence child labour) in rural India as a form of self-insurance with little overall effect on human capital acquisition.

From the very brief overview above it is clear that there are many and varied perspectives on the causes of poor school attendance. No single model will be able to capture all dimensions of the problem not least because it is extremely unlikely that any dataset would be rich enough to allow to empirically examine these dimensions. In what follows I first focus on the potential importance of birth order effects since these shed light on wider scientific questions. However the paper also examines the rôle of family effects since the familial environment would be expected to have a range of economic and other influences on children[2] and school effects since these are obviously likely to be relevant.

2 Birth order effects

Frank Sulloway's monograph "Born to rebel" argued that birth order played a central rôle in the determination of temperament and hence was instrumental in how individuals subsequently behaved as adults in particular their propensity to be radical or conservative. Sulloway's arguments are both complex and subtle and no attempt to do justice to his arguments can be made here. Briefly, he argued that first-borns were more likely to be conservative and later-borns were more likely to be radical. Evidence from a range of `revolutions' both political and scientific was provided to support the hypothesis. His argument is motivated by Darwinian psychology whereby children compete for parental resources. First-borns, it is argued, tend to be conservative with and are more likely to be content with the status quo. Last-borns, by contrast, lack the advantages of their first-born siblings in terms of access to parental resources and therefore are more likely to create their own niches within the family using a number of strategies including

[2] For data reasons we are unable to consider issues of temperament, personality or other psychological variables.

rebelliousness. The book assembles an impressive mixture of quantitative and historical research to support the thesis.

While Sulloway's book has gained much attention in the academic world and indeed elsewhere his results are somewhat controversial and have failed to receive wide support in the academic literature. Steelman and Powell (1985) find some effects of birth order on personality and leadership skills though not on academic performance. More recently Freese, Powell and Steelman (1999) and Steelman, Powell, Werum and Carter(2002) have cast doubt on Sulloway's general hypothesis. An alternative perspective appears in Saroglou and Fiasse(2003) who argue using Belgian data on a sample of three sibling families that it is the middle-borns who are most rebellious and impulsive. It is argued that first and last borns occupy similar niches by displaying conformity with their parents. Using a sample of 20 students, Zweigenhaft and Von Ammon(2000) find that last-borns are more likely to participate in civil disobedience (specifically, a strike at a K-Mart store) consistent with the Sulloway hypothesis. However it seems doubtful that one can generalize much from such a sample.

This paper attempts to shed light on the Sulloway hypothesis by looking at the effects of birth order on whether teenagers are well behaved at school, specifically whether they arrive late or miss school. While this does not directly analyse personality traits it seems very plausible that the rebelliousness implied by the theory would generate poorer behaviour at school by teenagers such as missing school or being late[3]. Herbst and McCrae (1998) point out that Sulloway, contrary to recent evidence, assumes that birth order effects continue into adulthood. By looking at teenagers (15 year olds) this paper provides a strong test of the theory since if one does not find evidence of rebelliousness at 15 years one is even less likely to find it in adulthood.

It needs to be borne in mind that "birth order" by itself is not an unambiguous concept. Sulloway emphasize the importance of *functional* birth order, a second born raised by grandparents would be functionally a first born. Similarly if there is large gap in time between the birth of a second and third born then the latter, it could be argued, is more likely to behave like first born. A similar distinction is made by Adler(1956) who emphasizes the importance of *psychological birth order*[4].

[3] Obviously this is my interpretation of Sulloway's arguments, not necessarily his.
[4] See White, Campbell, Stewart, Davies and Pilkington(1997) for a recent application.

In this paper, largely for data reasons, only biological birth order is considered. However it can be argued that it has the advantage of being objective and unambiguous and is not contingent on other concepts or interpretations.

3 Families and schools

It is hardly surprising that the role of family structure and of schools in influencing behaviour has been widely studied. Mora (1997) finds that in modelling attendance at the school level that a large number of school characteristics have an impact. In particular she shows that many proxies for school or teacher quality (e.g. teachers salaries, the provision of vocational counselling) have the expected positive effect on attendance. School size has the opposite effect. Ginther and Pollak (2003) analyse in some detail the effect of family structure on both behavioural measures and academic performance using data on US High School students. Their main concern is with the distinction between children reared in traditional nuclear families and those reared in other structures whether single parent families or blended families (one biological parent and a step parent. In terms of academic outcomes there is a well determined penalty associated with being from a single parent or blended family. Birth order effects are virtually non-existence though there is some negative effect from having many siblings, most likely reflecting a dilution of parental resources. When they consider the impact on an index of behavioural problems there are no significant effects of family structure. Carlson and Corcoran (2001) also use the NLSY to look at behavioural problems using an index based on mothers reports and find substantial evidence of arrange of family effects. Most interestingly from the point of view of this paper they find that first borns are *less* likely to have behavioural problems. This is, arguably, consistent with Sulloway type arguments.

Powell and Steelman(1990) go beyond considering the number of siblings to consider sibling density (the number of siblings closely spaced versus widely spaced) as well as the sex composition of siblings, Using data for the USA they find that the negative effect of sibship size on academic performance is stronger when the siblings are close together in age.

4 Data & methods

Most of the data on which the current literature on birth-order effects is American. However the essence of the Sulloway hypothesis would suggest that these mechanisms should work in all societies since the underlying mechanisms are universal. It is therefore important to consider testing using data from a much wider range of countries. Finding data which is comparable across countries is not usually easy; however the Program for International Student Assessment (PISA) compiled by the Organisation for Economic Cooperation and Development (OECD) allows this. There are thirty countries in the data but to allow one to analyse results in more detail I choose to test the theory on just six countries: Germany, Ireland, Korea, Mexico, Russian and the USA with a total population of approximately 675 million people. The choice of these six is somewhat arbitrary but they are chosen on the basis of them being a reasonably diverse set of countries.

The reason for collecting this data is to compare student abilities in reading, science and mathematics across countries. However a wide range of other information both on the individual student, their families and their schools is available. The outcomes that are analysed here are students' (self reported) incidence of missing school, missing classes or being late for school. Each student was asked how many times in the previous two weeks did they (a) miss school (b) skip classes and (c) arrive late for school. There were four possible answers to each (i) none, (ii) once or twice, (iii) three of four times (iv) five times or more.

In general the vast majority of responses fell into the first two categories so the last three categories were combined into one[5]. So for each of the three questions, one has a binary variable indicating simply whether they did or did not miss class etc in the last two weeks. In analysing the three possible outcomes it is implausible that they are independent: children who do one are more likely to do another. Hence simultaneous estimation is required. Estimating a tri-variate probit is computationally difficult since it involves evaluating three-dimensional Normal integrals in the likelihood function. While it is possible to do this using the Geweke-Hajivassiliou-Keane (GHK) simulated maximum likelihood estimator[6], a disadvantage of this is that its unclear how one can estimate the marginal effects: that is the estimated impact of the covariates on the

[5] See Table 1.

probability of the outcomes of interest as distinct from the usual probit coefficients. Since the former are far more interesting than the usual probit coefficients I simplify the model further by combining outcomes (a) and (b), defined as *Truancy*, indicating whether the individual either missed school *or* skipped class or did neither. The other outcome of interest, *Lateness*, is simply (c) above: whether they ever report being late for school. Hence we estimate a bivariate probit using standard maximum likelihood methods.

Table 1 contains descriptive statistics on the three variables on which the two dependant variables are based as well the dependent variables themselves.

5 Empirical specification

As independent covariates I pick, in addition to indicators of birth order, a range of variables pertaining to the individual and their school which are likely to influence school conduct. Since children who have more older siblings necessarily have more siblings, other things *ceteris paribus*, the number of siblings is included as a control. This could be of interest in its own right since parents may find it more difficult to exercise control in larger families. I use the same covariate for both the outcomes (Truancy and Lateness) since there are no obvious exclusions restrictions and to ensure comparability the same specification is used for each country.

One variable that is *not* included in the specification is any measure of the student's academic ability or performance. This is not because it is absent from the data (the main purpose of the data was to collect measures of ability in reading, mathematics and science) but because it is far from clear which way the causal relationship lies: does poor performance at school cause bad attendance or vice-versa? One could, in principle, address using some two-step methods to control for endogeneity of ability[7]. However this requires estimating a structural model and it is not clear what exclusion restrictions can be plausibly made to ensure identification of the parameters of interest.

One should be clear that there are many other possible covariates that could be analysed, the PISA data contains an embarrassment of riches in terms of school and individual characteristics and the paper has also not explored interactions between variables. The number of possible specifications is virtually infinite however the

[6] A procedure in Stata, due to Cappellari and Jenkins (2003) allows this. See Greene(2003) for an introduction to simulated maximum likelihood estimation.
[7] See Bosworth (1994) for an analysis of the effect of truancy on school performance.

specification was chosen after some experimentation to try capture the most likely determinants of the outcomes.

6 Results

(i) Birth order effects

The underlying hypothesis in this paper is that rebelliousness in the sense of Sulloway is consistent with poor attendance at school whether it is being late, skipping classes or missing school. So the results from the estimation of the bivariate probits allow us several tests of the hypothesis for each country. I define H1 as the hypothesis that the eldest is less likely to have poor attendance, H2 that the youngest is more likely and H3 that the more older siblings there are, the more likely they are. H4 is the test that birth order effects are not jointly statistically significant for the two outcomes. Tests for the joint significance of the three birth order variables in each of the two equations separately will be presented.

The H1 hypothesis can be examined by simply considering the coefficient on "oldest" for the 12 outcomes and doing a standard (one tailed) test for a negative coefficient. A 5% significance level gives a critical value of 1.65. Looking across Table 4, two of the coefficients conform to the theory: Korea for the truancy outcome and Russia for lateness. In the former case if the individual is the oldest they are about 5.5% less likely to miss school. This might seem very small but from Table 1 one can see that only 20% report positive levels of truancy (predominantly missing days of school rather than skipping classes) so the proportionate effect is sizeable. The corresponding marginal effect for Russia is just over 4% but this is small given that being late is much more common there (36%). Overall however only two out of twelve of the results conform to the theory.

To examine H2, we carry out a similar one tailed test on the coefficient on "youngest". Only in Mexico, where we cannot reject the hypothesis that the coefficient for being late is positive, do the results conform to the theory. Interestingly several of the coefficients pass a one tailed test for being *negative* (truancy in Korea and in Russia).

To examine H3 we test whether the coefficient on the number of older siblings is positive. Only in Russia does the coefficient for truancy conform to theory where curiously we saw that being youngest has the "wrong sign". In effect as one moves down

the birth order (i.e. as one has more older siblings) one conforms to the theory but this effect is reversed for the individual who is youngest. This is somewhat consistent with the result found in Saroglou and Fiasse (2003) where it is middle-borns who are born to rebel. The more older siblings one has the more competition there is for familial resources but an advantage accrues to the youngest perhaps the parents can devote any "residual" effort to them since there is no one younger.

Our final hypothesis, H4, simply tests, for each country, for the joint significance of all three birth order variables for each equation separately and for all six in each country's system of two equations using standard Wald tests. Since these are two tailed tests one is testing whether birth order matters in general rather in the manner specified by the theory. These results in Table 3 essentially bear out the individual tests discussed above. At the 95% level, only in Russia are the birth order effects jointly significant for the system of equations 'though at lower levels, the coefficients in Korea and Mexico kick in (88% and 93% respectively). At the level of the individual outcome there is somewhat more evidence of birth order effects i.e. for Truancy in Korea.

So what is one to conclude? Overall there is some evidence on favour of the hypothesis that birth order affects school attendance in the manner that one would expect from Sulloway's arguments but for the most part one can reject these arguments. It is of course possible that birth order effects become *more* pronounced as individuals reach adulthood but there is no *a priori* reason for doing so and the opposite pattern seems more plausible. So these results add to the existing corpus of research casting doubt on the Sulloway hypothesis.

(ii) Family background effects

The probit models contain an array of indicators of family background. There is no data on parental or household income but parental education and a standard index of the parents' occupational status. A common finding in much of the literature on children's educational and social development is the existence of a penalty due to not living in a nuclear family. The argument is complicated by the fact that there are clearly a variety of alternatives to living with both biological parents. McLanahan and Sandefur (1994) argue that living with a step-parent (and a biological parent) generated similar outcomes to living with one parent only, a finding recently contradicted by Ginther and

Pollak (2003). A further complication largely ignored in the literature is the presence of dynamic effects. That is family circumstances change and it may be the length of a child's "exposure" to a particular situation that determines the outcome. However typically cross section data available do not permit an analysis of this issue. The PISA data has relatively detailed questions on family structure so it is possible to distinguish between the presence of biological and step-parents. However in the analysis only one variable, for living in a single parent household, is included as other outcomes were not statistically significant.

From Table 4 one can see that there is a positive effect on truancy arising from being in a single parent family for Germany, Ireland and Mexico but not otherwise. This seems surprising since one might expect single parents (around 90% of which are female) to be less in a position to exercise control or influence over their children's behaviour. In a similar vein it might be thought that working mothers would have less control over their children's school attendance but when this was included it was statistically significant in only 1 of the 12 outcomes (on truancy in Korea) hence it was omitted. However interpretation of this parameter is not simple. Working mothers will generate higher family income, unobserved in this data, which might be correlated with better educational outcomes.

Turning to socio-economic background, there may be a presumption that children from better backgrounds are better behaved. However it is not clear what the *a priori* grounds for this are. Children whose parents are well educated may be better informed about education and place a greater value on it. Whether they exercise greater influence on their children is quite a different matter. There could be also a genetic link but this seems tenuous. Just as there are several channels through which parents socio-economic status may have an effect, there are several ways in which one might empirically address the issue.

While economists would tend to favour a monetary measure such as household income, sociologists would prefer some indicator of social class or occupational status. Within sociology there is a choice between categorical class schema along the lines developed by Goldthorpe and Erikson (e.g. Erikson, Goldthorpe and Portacarero, 1983), prestige scales (e.g. Goldthorpe and Hope(1972)) or indices of occupational status (also called a Socio-economic index, SEI) . These approaches are not independent and there are close empirical and theoretical links between the latter two approaches. This paper

uses an index of occupational status developed by Ganzeboom *et al* (1992) for several reasons. Firstly it is provided in the data for each of the parents. Secondly as a continuous measure it is both more convenient to use and exploits the variation in the data better. There are also a priori reasons; Featherman and Hauser (1976) conclude that "prestige scores are `error prone' estimates of the socio-economic attributes of occupations".

An SEI can be thought of as measuring "the attributes of occupation that convert a person's main resource (education) into a person's main reward (income)" (Ganzeboom *et al*, 1992, p9). Specifically it is a weighted average of mean income and mean education for each occupation using a simple optimal scaling algorithm. It is optimal in the sense that maximizes the indirect effect of education on income (via occupation) and minimizes the direct effect. It is normal to allow for age as a confounding factor. In this paper, the highest SEI (of the mother or father) is used.

In addition we include dummy variables representing the father's highest level of education completed using UNESCO's (1997) ISCED classification. Specifically a dummy variable for "medium education" corresponds to ISCED levels 2, 3B and 3C and a dummy variable for "high education" corresponds to ISCED levels 3A, 5 and above [8]. Mothers education level is not included simply because it is highly correlated with that of fathers and initial investigations suggested strongly that it would be impossible to distinguish between the two.

Turning to the individual coefficients in Table 4, in only two out of twelve cases is there a statistically significant effect of parents socio-background (Lateness in Ireland and Truancy in Mexico) and in both cases, those from better off backgrounds are *more* likely to display "bad behaviour". So whatever benefits more socially advantaged parents are able to pass on to their children, better school attendance is apparently not one of them.

To get an idea of the size of the effects, consider the case of Mexico. The index ranges from 16 to 90 with a median of 40 and the inter-quartile range is 24 (=53-29). So comparing two children whose parents lie at the first and third quartiles of the socio-economic index, the latter are about 5% (24 x .002) more likely to exhibit truancy in a

[8] The omitted category is therefore ISCED 1 (completed Primary education) or less. ISCED level 2 is the junior cycle of secondary education. 3A is secondary education designed to access third level academic education. 3B and 3C are secondary programs designed to access more practical, vocational streams. Levels 5 and 6 correspond to tertiary education.

two-week period. This should be compared with the average incidence there of 50% (from Table 1).

The evidence form considering the effects of father's education presents a somewhat different picture. In Germany, Russia and the USA there is evidence that higher father's education contributes to better school attendance. In the USA, having a father with college level education has a particularly strong effect with truancy being over 12% lower. Tests for the joint significance of the three variables in the system of equations are given in Table 3: only in Ireland, Russia and the USA are they statistically significant.

Overall the impact of parental background on the outcomes of interest is somewhat underwhelming. The results are dependent on how we have modelled socio-economic background; however given the data available the results are generally robust. For example allowing a quadratic specification for the SEI index does not change the results, nor does replacing it with a series of indicator variables for its quintiles.

(iii) School effects

The possibility that characteristics of the school or the child's attitudes towards school may affect their behaviour with regard to attendance hardly needs justification. The main difficulty is knowing exactly what to look for: PISA is an extraordinarily rich dataset. There are many possible measures of school quality as well as details of how the respondent's experience. After some experimentation , six variables were included in the model.

Two are commonly used in much of the literature on school effects, class size and an indicator of whether the school is private or public (this is missing for Russia). The other four are based in the student's responses to a series of questions eliciting their attitudes to various aspects. One picks up on the students opinions of whether the teachers are good, a second measures whether the students think that there is a good disciplinary climate in the school and a third measures the students they feel they belong in the

school. A fourth question measures the level of social interaction between the children and their parents[9].

In the extensive economics literature on class size effects there is much debate on the existence or otherwise of class size effects on educational outcomes such as student academic performance. In a meta-analysis of the literature, Hanushek (1997) finds that the evidence in support of such effects is neither strong nor consistent. However Krueger (2003) has argued that this can be explained by methodological weaknesses in the meta-analysis and finds strong evidence of positive school quality effects. In general the results here indicate that bigger class sizes is associated with *less* truancy, contrary to what one might expect 'though Mexico and the USA are exceptions and the sizes of the effects are fairly modest. Care needs to be taken in interpreting this: it does necessarily mean that increasing class size has the effect of reducing truancy. Schools obviously exercise some control of where students are allocated. If they assign students with worse attendance records to smaller classes so as to monitor them more closely this would generate the results we observe. This variable may also be reflecting other unmeasured aspects of school quality which are correlated with class size.

There is some evidence of the benefits of private schooling with lower truancy in Korean and, especially, the US and better punctuality in Mexico. Overall the effects are small and money, at least for these purposes, does not appear to matter.

One feature that has a fairly consistent effect in improving attendance is the respondents attitude to teachers. Where students think well of their teachers they are less likely to miss school or turn up late with a one standard deviation change in this variable typically reducing the probability by around 4%. A second consistent finding is that the school's disciplinary climate (or more precisely, the students' perception of it) matters: where students perceive disciplinary as bad in the school they are more likely to have poor attendance.

Students' sense of belonging (to the school) is for the most part not statistically significant 'though it is associated with better behaviour in a small number of cases. Somewhat perversely, in Ireland, it actually increases the probability of being late. One can only conjecture that their sense of belonging is "too high" such that they consider

[9] The last three of the questions come "packaged" in the data & are named *Disclima*, *Belong* and *Soccom* respectively. The first question I created based on the responses to Question 30, using factor analysis. All four variables are standardised to have a mean of zero and a standard deviation of one. Note that high values of *Disclima* correspond to *poor* disciplinary climate contrary to OECD(2002).

school as an extension of the home environment and are correspondingly relaxed about being on time.

7 Conclusions

This paper uses data on six countries from the Program for International Student Assessment database to analyse the effect of birth order and other family characteristics. The analysis of birth order effects is motivated by the well known hypothesis of Frank Sulloway developed in his 1996 monograph *Born to Rebel* in which he argued that first borns were more likely to be conservative and orthodox while the later borns were more likely to be rebellious. Using school attendance, whether being late, missing school or skipping classes, as one manifestation of rebelliousness, the evidence here provides very little support for the thesis. This paper joins a lengthening series of papers that are at odds with the hypothesis. Most these have considered one country only, usually the USA, but the underlying psychological mechanisms behind the hypothesis are not culture specific and indeed Sulloway's evidence is based on a wide range of data from many countries and eras. It follows that using data from a diverse set of six countries provides a good test of the theory. Since the respondents are 15 years old, the absence of birth effects at this age suggests that they are even less likely to be found later.

Aside from birth order, the paper finds little evidence that socio-economic background of the parents' matter. This is perhaps more surprising since in general one would expect that more socio-economically advantaged parents would inculcate better behaviour. However a number of important determinants of school attendance emerge: a good disciplinary climate helps, as does a positive experience of teachers by the children. Private schools in some cases lend themselves to better behaviour.

Aside from serving as an indicator of youthful rebelliousness does school attendance matter? Clearly it matters to educators and parents who consistently demonstrate their concern over it. It is also notable that recent economics literature on the returns to schooling there has been much emphasis on the influence of student behaviour on academic and hence economic outcomes[10].

[10] See for example Carneiro and Heckman (2004).

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Table 1:

Dependent variables:	Germany:	Ireland:	Korea:	Mexico:	Russia:	USA:
Truant:	0.31	0.47	0.20	0.50	0.50	0.44
	(0.01)	(0.012)	(0.009)	(0.012)	(0.01)	(0.008)
Late:	0.28	0.34	0.03	0.48	0.36	0.34
	(0.012)	(0.014)	(0.004)	(0.011)	(0.012)	(0.008)
Miss class – days:						
None	0.88	0.88	0.96	0.68	0.64	0.76
	(0.007)	(0.008)	(0.004)	(0.012)	(0.009)	(0.007)
1 or 2	0.09	0.09	0.03	0.27	0.27	0.18
	(0.006)	(0.006)	(0.004)	(0.012)	(0.007)	(0.005)
3 or 4	0.01	0.02	0.01	0.03	0.05	0.03
	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)	(0.002)
5 or more	0.01	0.01	0.00	0.02	0.05	0.03
	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)	(0.002)
Miss school – days:						
None	0.74	0.58	0.81	0.68	0.65	0.65
	(0.01)	(0.011)	(0.009)	(0.012)	(0.009)	(0.007)
1 or 2	0.21	0.34	0.13	0.28	0.26	0.28
	(0.008)	(0.01)	(0.007)	(0.011)	(0.008)	(0.006)
3 or 4	0.03	0.06	0.03	0.03	0.04	0.04
	(0.004)	(0.005)	(0.003)	(0.004)	(0.003)	(0.002)
5 or more	0.02	0.03	0.03	0.01	0.04	0.03
	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)
Arrive late – days:						
None	0.72	0.65	0.97	0.51	0.64	0.65
	(0.012)	(0.014)	(0.004)	(0.011)	(0.012)	(0.008)
1 or 2	0.21	0.26	0.02	0.41	0.27	0.26
	(0.009)	(0.01)	(0.003)	(0.01)	(0.009)	(0.005)
3 or 4	0.04	0.06	0.01	0.06	0.05	0.05
	(0.004)	(0.006)	(0.001)	(0.005)	(0.004)	(0.003)
5 or more	0.03	0.03	0.01	0.01	0.04	0.04
	(0.006)	(0.003)	(0.001)	(0.002)	(0.004)	(0.003)
N:	4126	3422	3171	3741	5318	2760

Table 2: Descriptive statistics of covariates : means & standard deviations

	Germany	Ireland	Korea	Mexico	Russia	USA
Girl[1]:	0.509	0.501	0.421	0.497	0.515	0.541
	(0.015)	(0.032)	(0.039)	(0.013)	(0.011)	(0.012)
Socio-economic index:	49.451	48.365	42.934	42.818	49.828	52.725
	(0.55)	(0.541)	(0.662)	(0.814)	(0.523)	(0.666)
Father's education: medium [1]:	0.459	0.244	0.335	0.244	0.113	0.098
	(0.013)	(0.008)	(0.013)	(0.012)	(0.006)	(0.008)
Father's education: high [1]:	0.388	0.473	0.524	0.280	0.745	0.784
	(0.015)	(0.013)	(0.017)	(0.02)	(0.008)	(0.015)
Single parent family[1]:	0.150	0.113	0.076	0.152	0.190	0.193
	(0.007)	(0.006)	(0.006)	(0.007)	(0.006)	(0.01)
Number of siblings:	1.548	2.620	1.303	2.969	1.751	2.384
	(0.034)	(0.035)	(0.032)	(0.069)	(0.039)	(0.048)
Oldest[1]:	0.271	0.229	0.277	0.249	0.212	0.228
	(0.008)	(0.008)	(0.011)	(0.009)	(0.007)	(0.012)
Youngest[1]:	0.386	0.363	0.509	0.282	0.436	0.359
	(0.008)	(0.009)	(0.012)	(0.009)	(0.009)	(0.01)
Number older siblings:	1.835	2.552	1.826	2.617	2.005	2.321
	(0.021)	(0.029)	(0.025)	(0.044)	(0.022)	(0.033)
Good teachers at school[2]:	0.019	-0.006	0.049	0.014	0.000	0.064
	(0.023)	(0.023)	(0.026)	(0.024)	(0.023)	(0.031)
Parental social interest[2]:	0.003	-0.023	0.070	0.002	0.017	0.032
	(0.019)	(0.02)	(0.032)	(0.026)	(0.017)	(0.025)
School disciplinary climate[2]:	0.094	0.010	-0.039	-0.009	-0.010	-0.022
	(0.029)	(0.028)	(0.034)	(0.033)	(0.025)	(0.034)
Sense of belonging [2]:	0.029	0.003	0.057	0.020	0.022	0.036
	(0.029)	(0.02)	(0.026)	(0.024)	(0.019)	(0.025)
Town[1]:	0.620	0.452	0.163	0.444	0.315	0.507
	(0.036)	(0.044)	(0.034)	(0.041)	(0.034)	(0.047)
City[1]:	0.204	0.252	0.821	0.398	0.377	0.228
	(0.029)	(0.038)	(0.035)	(0.04)	(0.035)	(0.038)
Average class size:	23.908	22.505	37.214	34.838	23.561	23.353
	(0.229)	(0.257)	(0.548)	(0.789)	(0.328)	(0.344)
Private school[1]:	0.042	0.610	0.529	0.164		0.061
	(0.014)	(0.043)	(0.046)	(0.031)		(0.025)
N:	4126	3422	3171	3741	5318	2760

1- Dummy variable
2- Normalised subjective measure

Standard deviation in parenthesis
Statistics are weighted.

Table 3:

Tests for joint significance:	Germany	Ireland	Korea	Mexico	Russia	USA
Single equation tests:						
Birth order effects:						
$\chi^2(3)$ – truancy equation	0.320	0.340	9.080	3.990	8.970	0.650
	(0.9554)	(0.9514)	(0.0283)	(0.262)	(0.0297)	(0.8849)
$\chi^2(3)$ – lateness equation	3.030	0.500	1.240	6.640	6.550	5.690
	(0.3876)	(0.9183)	(0.7423)	(0.0844)	(0.0879)	(0.1278)
System tests:						
Birth order effects:						
$\chi^2(6)$	3.320	0.830	10.160	11.610	15.580	6.870
	(0.768)	(0.9914)	(0.1181)	(0.0713)	(0.0162)	(0.3326)
Family background effects:						
$\chi^2(6)$	9.270	16.670	3.340	15.430	6.210	46.900
	(0.1588)	(0.0106)	(0.7652)	(0.0172)	(0.4002)	(0)

$p>\chi^2$ in parenthesis

Notes :

1. "Birth order effects" tests for the joint significance of the three birth order variables (oldest, youngest, number of older siblings) in either the single equations separately or the two jointly (in the lower panel).
2. "Family background effects" tests the joint significance of the socio-economic index and the two father's education level variables in the two equations.

Table 4: Marginal effects from bivariate probit

	Germany		Ireland		Rep. of Korea	
	Truant:	Late:	Truant:	Late:	Truant:	Late:
Girl[1]:	0.064	-0.038	0.020	-0.044	-0.006	0.005
	(3.85)	(-2.51)	(0.91)	(-1.92)	(-0.35)	(0.75)
Socio-economic index:	0.000	0.001	-0.001	0.002	0.001	0.000
	(0.58)	(0.84)	(-1.62)	(2.8)	(1.14)	(-0.18)
Father 's education:medium[1]:	-0.029	-0.068	0.004	0.011	-0.003	0.011
	(-1.05)	(-2.6)	(0.19)	(0.43)	(-0.12)	(1.07)
Father 's education:high[1]:	-0.030	-0.052	-0.018	-0.001	0.005	0.008
	(-1.17)	(-2.01)	(-0.84)	(-0.06)	(0.24)	(0.84)
Single parent family[1]:	0.105	0.043	0.090	0.049	0.034	0.014
	(3.91)	(1.71)	(2.81)	(1.72)	(1.16)	(1.13)
Number of siblings:	0.010	0.022	0.011	0.021	0.004	0.001
	(0.87)	(1.92)	(0.99)	(1.85)	(0.19)	(0.21)
Oldest[1]:	-0.006	-0.028	0.007	-0.016	-0.055	-0.005
	(-0.26)	(-1.09)	(0.22)	(-0.55)	(-2.39)	(-0.77)
Youngest[1]:	-0.011	0.003	-0.015	0.006	-0.043	-0.002
	(-0.46)	(0.13)	(-0.55)	(0.23)	(-1.77)	(-0.23)
Number older siblings:	0.004	0.002	0.007	-0.003	-0.007	0.002
	(0.19)	(0.12)	(0.41)	(-0.19)	(-0.25)	(0.26)
Good teachers at school[2]:	-0.040	-0.055	-0.072	-0.057	-0.030	-0.002
	(-5.03)	(-6)	(-6.82)	(-5.58)	(-3.52)	(-0.66)
Parental social interest[2]:	0.003	0.017	-0.007	-0.032	-0.012	-0.004
	(0.33)	(1.91)	(-0.6)	(-3.42)	(-1.61)	(-1.81)
School disciplinary climate[2]:	0.047	0.048	0.027	0.050	0.024	0.003
	(5.11)	(4.84)	(2.84)	(6.1)	(2.79)	(1.1)
Sense of belonging[2]:	-0.002	0.005	-0.013	0.018	-0.033	-0.012
	(-0.31)	(0.64)	(-1.35)	(2.13)	(-3.14)	(-3.52)
Town[1]:	-0.034	-0.001	0.054	0.008	0.059	0.039
	(-1.05)	(-0.02)	(1.91)	(0.25)	(0.68)	(1.25)
City[1]:	0.032	0.058	0.099	0.097	0.077	0.016
	(0.93)	(1.43)	(3.17)	(2.56)	(1.21)	(1.49)
Average class size:	-0.007	-0.011	-0.005	-0.006	-0.003	-0.001
	(-2.55)	(-4.82)	(-2.52)	(-3.31)	(-4.29)	(-3.85)
Private school[1]:	-0.053	0.072	-0.046	0.029	-0.054	-0.014
	(-0.98)	(1.53)	(-1.81)	(1.02)	(-3.38)	(-2.3)
N:	4126	4126	3422	3422	3171	3171
rho:	0.28		0.17		0.44	
standard error:	0.029		0.024		0.052	

t-statistics in parenthesis
1- Dummy variable
2- Normalised subjective measure
Rho is the estimated correlation between the two equations

Table 4: Marginal effects from bivariate probit:

	Mexico:		Russia:		USA:	
	Truant:	Late:	Truant:	Late:	Truant:	Late:
Girl [1]:	-0.026	-0.020	-0.057	-0.083	0.084	0.028
	(-1.26)	(-1.05)	(-3.32)	(-5.39)	(3.95)	(1.32)
Socio-economic index:	0.002	0.001	0.000	0.000	-0.001	-0.001
	(2.34)	(0.95)	(-1)	(-0.94)	(-1.14)	(-1.51)
Father's education:medium [1]	0.027	0.021	-0.066	-0.006	0.043	-0.010
	(1.31)	(0.9)	(-1.98)	(-0.2)	(1)	(-0.21)
Father's education: high[1]:	0.040	0.030	-0.040	0.015	-0.126	-0.067
	(1.24)	(1.15)	(-1.58)	(0.62)	(-3.14)	(-1.91)
Single parent family[1]:	0.056	-0.007	-0.005	0.021	0.034	0.016
	(2.52)	(-0.25)	(-0.18)	(0.89)	(1.29)	(0.69)
Number of siblings:	-0.001	0.013	-0.013	-0.002	0.011	0.013
	(-0.16)	(1.25)	(-1.51)	(-0.27)	(0.81)	(1.19)
Oldest[1]:	-0.026	-0.042	0.017	-0.042	-0.003	-0.039
	(-0.87)	(-1.61)	(0.69)	(-1.72)	(-0.1)	(-1.28)
Youngest[1]:	0.001	0.048	-0.040	-0.005	0.026	0.033
	(0.04)	(1.84)	(-1.85)	(-0.27)	(0.79)	(1.11)
Number older siblings:	0.008	-0.019	0.050	0.010	-0.009	-0.005
	(0.53)	(-1.3)	(2.98)	(0.63)	(-0.43)	(-0.28)
Good teachers at school[2]:	-0.045	-0.010	-0.042	-0.033	-0.042	-0.034
	(-3.93)	(-1.04)	(-4.45)	(-3.99)	(-3.52)	(-3.38)
Parental social interest[2]:	-0.008	-0.031	-0.015	-0.034	-0.013	-0.027
	(-0.83)	(-3.19)	(-1.5)	(-3.42)	(-1.07)	(-2.63)
School disciplinary climate [2]:	0.068	0.017	0.071	0.063	0.029	0.005
	(6.76)	(1.54)	(9.03)	(7.82)	(2.91)	(0.54)
Sense of belonging[2]:	-0.031	-0.025	-0.009	0.014	0.005	0.000
	(-3.56)	(-2.8)	(-0.87)	(1.51)	(0.44)	(0.00)
Town[1]:	0.061	0.034	-0.021	-0.027	-0.008	-0.090
	(1.76)	(1.01)	(-0.79)	(-0.93)	(-0.24)	(-2.75)
City[1]:	0.061	0.065	0.022	-0.062	0.098	0.038
	(1.61)	(1.8)	(0.75)	(-2)	(2.68)	(1.01)
Average class size:	-0.001	0.002	-0.002	-0.004	-0.003	0.000
	(-1.34)	(1.86)	(-1.15)	(-2.55)	(-1.4)	(0.18)
Private school [1]:	-0.026	-0.068			-0.153	0.008
	(-0.63)	(-1.97)			(-3.39)	(0.12)
N:	3741	3741	5318	5318	2760	2760
rho:	0.21		0.19		0.33	
standard error:	0.028		0.026		0.033	

t-statistics in parenthesis
1- Dummy variable
2- Normalised subjective measure
Rho is the estimated correlation between the two equations