PART II

SELECTED COUNTRY-SPECIFIC STUDIES

11. THE SCREENING VERSUS HUMAN CAPITAL HYPOTHESES: EVIDENCE FROM FRANCE AND SPAIN[1]

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The relationship between education and productivity has long intrigued economists. According to the human capital theory, the role of education is to augment individuals' productivity. In contrast, the so-called screening hypothesis argues that education merely signals to potential employers about individuals' innate ability.

Since education enhances individuals' lifetime earnings regardless of whether it signals their inherent productivity or augments it, it is certainly a good investment for the individual. What is less clear is whether it is a good investment for the society as a whole as well. Indeed, if the only role of education is to serve as a signalling device, then the absence of social benefits from education would imply that public funding policies of education are no longer justified. If education plays both a signalling and a productivity-augmenting role, then public resources should be devoted mainly to those qualifications that improve individuals' productivity most. In contrast, if the effect of education on individuals' earnings exclusively measures an effect on productivity, then social benefits might be substantial enough to justify that education is accordingly publicly funded.

A proper test to discriminate between the screening hypothesis and the human capital theory would require data on individuals' productivity to be available. Obviously, such data do not exist so an alternative test must rely on earnings functions, where wages are assumed to proxy productivity. The problem, however, is that both the screening hypothesis and the human capital theory predict a positive effect of education on wages

[1] This chapter summarises work in progress.

and, hence, are observationally equivalent. To overcome this problem, most empirical tests consist in using a particular sub-sample of the population as an unscreened control group to compare the rates of return to education for this group with those of screened sub-samples. Advocates of the so-called *P*-test compare returns across relatively competitive and non-competitive sectors. The idea here is that wages are closer to the marginal product of labour in competitive sectors than in non-competitive ones where wages are bureaucratically set and, hence, where screening is more likely. An alternative approach consists in assuming that self-employed constitute the unscreened group since they have no need to signal innate ability. Therefore, the returns to education for the self-employed are nothing but true returns to human capital. If the screening hypothesis holds, then the signalling value is the difference between the returns to education of the employed and the self-employed.

Unfortunately there are many potential problems with this approach. First, it is not clear to what extent the two comparison groups are differently screened. At least, such a difference, if any, is not independent of institutional considerations. This is perhaps why evidence of screening has been found in some countries and not in other. Second, when comparing employees and self-employed individuals, one is comparing two types of income that are different in nature. In particular, not only are the earnings of the self-employed more variable, but clearly, business owners have more earnings opportunities not directly dependent on their educational qualifications. Third, the literature on self-employment shows that the self-employed are, in general, for tax considerations reluctant to declare their actual earnings. Last, but not least, an implicit assumption underlying this approach is that education is acquired solely with a view to future employment opportunities. Yet, not only is education not necessarily acquired for investment considerations, but employment expectations are not necessarily fulfilled, either. In addition, if screening models are right in assuming that individuals determine their employment plans on the basis of offered wage schedules set by potential employers, then one would expect individuals observed in unscreened groups to invest less in education. This is because they are supposed to decide to work in unscreened sectors prior to certification.

For these reasons, one of the tests performed in this study is that of comparing the returns to schooling for public- and private-sector employees. We model wages and sectoral choice simultaneously in order to overcome the problem of self-selection. Of course, the advantage of our cross-country comparative analysis is to shed light on the extent to which institutional considerations might condition the outcome. Our results

indicate that, both in France and Spain, the returns to education are higher in the private sector, hence suggesting rejection of the screening hypothesis.

An alternative testing approach adopted in the study relies on the following idea. If the only role of education is to serve as a signalling device, then the essence of the signal should be distilled into the individual's position in the educational distribution, according to the cohort (s)he belongs to. For instance, an individual with a given qualification might be negatively signalled today, although (s)he could have been positively signalled had (s)he entered the labour market a few years ago. In the screening framework, the individual's rank in the cohort-specific educational distribution should have a greater impact on earnings than mere years of schooling. Although such a test has not yet been made for France, the Spanish results show that the ranking effect is almost zero.

One might argue that such testing strategies do not do justice to the screening hypothesis. Once an individual is hired, the employer might learn more about his/her actual capabilities and adjust his/her wage accordingly. This is the so-called weak version of the screening hypothesis. It would imply that the signalling value of education decreases over time and, hence, might be underestimated in cross-section analyses. Nevertheless, it is worth recalling that Michael Spence, one of the leading advocates of the screening hypothesis, shows that as employers hire employees with different qualifications, they also learn about the relationship between education and productivity, so that their own expectations about individuals' ability become self-fulfilling. This is the so-called strong version of the screening hypothesis. It implies that in a signalling equilibrium, a decreasing pattern of the signalling value of education is not justified.

In our attempt to do justice to both the weak and the strong version of the screening hypothesis, we have re-produced the experience–earnings profiles of university graduates. It turned out that, in Spain, only in the beginning of working life wages are higher in the public sector. However, wages in the private sector grow faster and become higher at the end of the working career. Such a result is compatible with the weak version of the screening hypothesis, but it might also simply reflect specific wage-setting mechanisms. Indeed, in the French case, private- and public-sector experience–earnings profiles do not intersect.

An alternative test that we perform in our study relies on the comparison of returns to schooling of individuals with different job tenure durations. In contrast to what the weak version of the screening hypothesis predicts, the returns to education seem to be increasing with job tenure. In Spain, only after 20 years of seniority do returns start to decrease. In France, they start to decrease after 5 years of job tenure, but newly hired individuals get the lowest returns to schooling.

As a complementary test, we also distinguish between individuals according to their highest qualification. The idea here is that if, indeed, employers perceive higher education as a signal of higher ability, then the weak version of the screening hypothesis would predict that the seniority–earnings profiles of differently qualified individuals should converge. Neither the French nor the Spanish evidence confirms such converging patterns.

Another test that we perform consists in comparing the mid-to-early career earnings ratio for different industries as the number of years of schooling increases. Not only should we expect these ratios to decrease with the industry-specific degree of competitiveness but also with the number of years of schooling, if the weak version of the screening hypothesis holds. Once again, neither in France nor in Spain do the data uncover such decreasing patterns.

Although none of the results discussed above can be considered as strong evidence for the screening hypothesis, French as well as Spanish data do support one of its predictions; that is, faster completion of a degree should be perceived as a signal of higher ability and, hence, should yield higher returns. Indeed, estimation of the returns to qualifications according to the number of years it has taken individuals to attain them clearly shows that the longer it takes an individual to attain the qualification, the lower return (s)he gets. This also suggests that, at a given time, among individuals having spent the same number of years in school, those who fail to complete a degree get lower returns. This means that significant sheepskin effects are at work, that is, bonus returns to finishing a degree, thus reflecting the idea that drop-outs signal a lower ability to jump hurdles and to finish tasks.

12. DOES EDUCATION REDUCE GENDER SEGREGATION?[1]

Aniela Wirz and Josef Zweimüller

The difference in educational attainments between men and women accounted for around 25–30% of the gender wage gap[2] in Switzerland in 1996, calculated using the Swiss Wage Structure Survey[3] and applying a Oaxaca–Blinder (1973) wage differential decomposition. Differences in other human capital components, like working experience and tenure, explain an additional part (attributes' component of the decomposition) of the gender wage gap. But the major share remains unexplained. This unexplained component contains unobserved gender differences as well as pay differences due to discrimination.

The standard decomposition method based on wage regressions has shortcomings. First, we do not know how the unexplained component of the average gender wage differential interacts with education. If unobserved gender differences and/or sexual discrimination decrease with increasing education, then the decrease of 25–30% of the wage gap due to a catch up in women's education would underestimate the total impact of education on wage inequality. Second, it does not take into account possible differences in the distribution of men and women across establishments. We do not know if an unexplained wage differential arises because of unequal pay within a firm for given observed human capital or because men and women end up working with employers paying different wage premia. As wages are shown to differ across employers (Gibbons and Katz 1992) for given human capital endowments, sexual segregation across employers affects the gender wage gap (Barth and Mastekaasa 1996).

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[1] This work was supported by the Swiss Federal Office for Education and Science.

[2] Which amounts to about 30% of the average male wage.

[3] The survey of the Swiss Federal Statistical Office consists of data from 8,266 firms and 564,907 employees (Schweizerische Lohnstrukturerhebung 1996, BFS).

In order to answer these questions we adapted the Oaxaca–Blinder wage differential decomposition method to account for segregation across employers using a fixed-effect wage estimation framework. Our results (see Table 12.1) show that this segregation accounts for a substantial part (13%) of the gender wage gap. But the component unexplained by human capital endowment differences within establishments still makes up the largest share of the gender wage gap. The attributes' component, which mainly reflects the impact of different educational attainments and working experience between men and women, amounts to 22–35% of the wage gap.

Table 12.1. Oaxaca–Blinder decomposition for the standard case and for fixed-effect estimation results

Estimation method:	**Components:**						**Gender wage differential***
	Unexplained		**Attributes**		**Segregation**		
	U		**A**		**S**		**WD**
Men's wage structure is the reference:							
Standard	0.171	+	0.150			=	0.322
Fixed-effect	0.164	+	0.115	+	0.042	=	0.322
Women's wage structure is the reference:							
Standard	0.210	+	0.112			=	0.322
Fixed-effect	0.208	+	0.072	+	0.042	=	0.322

Note: * Difference in mean log hourly wage rates, men – women's sample average.

In a second step we estimate the wage regressions separately for each gender and education level in order to get a wage differential decomposition and segregation measure by educational level. Our results (see Table 12.2) show that individuals with a high education are segregated into establishments paying high wages. Most interestingly, the difference between the average establishment pay premium between sample men and women, which measures the segregation component, decreases clearly with increasing education.

The unexplained component of the wage gap, measuring the influence of unobserved gender differences and sexual wage discrimination within establishments, which is the

only discrimination targeted by constitutional laws, is still the major part of the gender wage differential (see Table 12.3 and Table 12.4).

Table 12.2. Average fixed-effects by educational level and gender

Educational level	**Men**	**Women**	**Difference: Segregation – Component (S)**
University[1]	0.099	0.100	–0.001
Upper secondary[2]	0.037	0.063	–0.027
Vocational educ.[3]	0.012	–0.010	0.022
Mandatory school[4]	–0.026	–0.065	0.039
Foreign, MEI[5]	0.022	–0.035	0.057

Notes: [1] University level includes also tertiary education of the vocational education system. [2] Includes upper secondary graduates of vocational and non-vocational education and teachers. [3] Professional education certificate officially recognised. [4] Mandatory schooling level includes also training on the job, not recognised as federal degree. [5] Foreign: non-Swiss educational degree. MEI: missing education information.

Table 12.3. Oaxaca –Blinder decomposition for standard estimation

	Men's wage structure as reference:					**Women's wage structure as reference:**				
Educational level	**U**		**A**		**WD**	**U**		**A**		**WD**
University[1]	0.135	+	0.100	=	0.235	0.165	+	0.070	=	0.235
Upper secondary[2]	0.161	+	0.090	=	0.251	0.203	+	0.048	=	0.251
Vocational educ.[3]	0.172	+	0.071	=	0.243	0.217	+	0.026	=	0.243
Mandatory school[4]	0.180	+	0.036	=	0.217	0.221	+	-0.005	=	0.217
Foreign, MEI[5]	0.239	+	0.110	=	0.350	0.306	+	0.044	=	0.350

Notes: [1] University level includes also tertiary education of the vocational education system. [2] Includes upper secondary graduates of vocational and non-vocational education and teachers. [3] Professional education certificate officially recognised. [4] Mandatory schooling level includes also training on the job, not recognised as federal degree. [5] Foreign: non-Swiss educational degree. MEI: missing education information.

Table 12.4. Oaxaca–Blinder decomposition for fixed-effect estimation

Education level	Men's wage structure as reference:							Women's wage structure as reference:						
	U		**A**		**S**		**WD**	**U**		**A**		**S**		**WD**
University[1]	0.139	+	0.096	+	-0.001	=	0.235	0.180	+	0.055	+	-0.001	=	0.235
Upper secondary[2]	0.184	+	0.093	+	-0.027	=	0.251	0.235	+	0.042	+	-0.027	=	0.251
Vocational educ.[3]	0.174	+	0.048	+	0.022	=	0.243	0.208	+	0.013	+	0.022	=	0.243
Mandatory s.[4]	0.155	+	0.023	+	0.039	=	0.217	0.198	+	-0.020	+	0.039	=	0.217
Foreign, MEI[5]	0.209	+	0.084	+	0.057	=	0.350	0.271	+	0.023	+	0.057	=	0.350

Notes: [1] University level includes also tertiary education of the vocational education system. [2] Includes upper secondary graduates of vocational and non-vocational education and teachers. [3] Professional education certificate officially recognised. [4] Mandatory schooling level includes also training on the job, not recognised as federal degree. [5] Foreign: non-Swiss educational degree. MEI: missing education information.

Sexual segregation across employers seems to be closely related to quantitative differences in education and other personal human capital endowments. Qualitative differences[4], in contrast, seem to be of no importance, as the employer segregation component between men and women is highest at the lowest educational levels and mandatory education is of quite comparable quality and content within Switzerland. Gender segregation in the educational choices within a given educational level[5] does not seem to have an impact on segregation between employers paying high and low wages, either. This then leaves some scope for other factors like gender differences in job-search behaviour, personal preferences (working time, regional mobility) and/or discrimination in the hiring process to explain gender segregation across employers for individuals with low and average education levels in Switzerland. These factors are beyond the influence of educational policy but contingent on the general institutional and cultural framework determining the labour market behaviour of women.

[4] Qualitative differences in education may concern the quality in teaching but also the education subject chosen by students within a level.

[5] For instance, in upper secondary and tertiary education boys in Switzerland tend to choose more often than girls a specialisation in mathematical and technical fields to the opposite of language-related teaching subjects.

In summary, these results show that increasing education of women reduces segregation. Increasing women's education allows them to get employed at establishments paying higher wages. The higher their education is, the smaller the gender difference in segregation across employers. Education thus has a more differentiated impact on the reduction of wage inequality between men and women than the standard wage differential decomposition has led us to believe so far. The remaining unexplained gender wage differential within establishments is not correlated with education. Even if this measure reflects unobserved human capital endowment differences as well as sexual discrimination, the large size of this component (50–65%) points to some scope for equal pay legislation to reduce wage inequality within establishments in Switzerland.

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13. CHILD OUTCOMES AND CHILD POVERTY: PROVISIONAL RESULTS ON EARLY SCHOOL LEAVING

Colm Harmon and Ian Walker

The available evidence of child poverty is based on a definition that a child is in poverty if (s)he is living in a household below half median (equivalised) net income. The available evidence suggests that child poverty rates vary considerably across countries: France 11% (1998); Denmark 4% in 1979 and 6% in 1999; and UK 14% of children in 1979, 19% in 1999.

Major factors behind the high UK child poverty rates are: High and growing proportion of lone mothers; high and growing number of teenage pregnancies; low levels of child support compliance; and unemployment benefit is independent of number of children. There is a strong correlation between being brought up in a low-income household and a variety of (bad) child outcomes. For the UK see, for example, Machin et al. (1999) who show that low parental incomes are associated with outcomes such as crime, substance abuse, poor long-term health, and low levels of educational achievement. For the USA, see e.g. Currie (1998).

This correlation between low incomes and bad outcomes motivates child poverty policy and the UK government committed to "eliminating child poverty within a generation and halving it within 10 years" and is addressing the issue with higher *Child Benefit, Working Families' Tax Credit, SureStart* (a variety of direct interventions, such as high quality childcare and the (re)introduction (in 2001) of child tax allowances).

While there is enormous evidence that bad child outcomes are associated with growing-up in a poor household, there is almost no evidence that giving poor parents more money makes for better children. Recent research by Duflo (2000) looks at a recent South African "natural experiment" and finds that supporting grandmothers makes for better granddaughters. Research on US panel data by Shea (1995) looks at PSID and

instruments parental incomes and finds that "exogenous" variation in incomes has only small effects on outcomes. The implication is that poor parents may simply be more likely to be poor at parenting; or they may not be skilled at spending money well on behalf of their children (or may spend it on themselves). This, then, motivates direct interventions like SureStart.

Our research concentrates on one (bad) outcome: early school leaving. The UK has a particularly high incidence of early school leaving and this may be an important factor behind the intergenerational transmission of inequality. The policy relevance of the issue is that the UK government is currently piloting the introduction of payments to children to stay at school beyond the minimum age for leaving – "educational maintenance allowances".

There is considerable evidence, from the PURE project and elsewhere, that the financial returns of education are high (see e.g. Harmon and Walker (1995) who found the returns for men to be 14%, and Chapter 2 of this volume). There is anecdotal evidence that low education levels are related to other outcomes such as crime, health, and marital stability. However, there have been no attempts to extract the "causal" effect of education on such outcomes.

Earlier research by Micklewright (1996) and Chevalier and Lanot (1999) using NCDS data found large parental class/education effects but rather small income effects. US evidence on NLSY data reported by Cameron and Heckman (1998) suggests weak current income effects but strong wealth effects.

We use Family Resources Survey data pooled over 1994, 1995, 1996 and 1997. The over 18's were dropped because of censoring by leaving home – only post 18 children in HE/FE are recorded as external children. Thus our attention is confined to staying on at 16 (the minimum). The data contains 4,416 households containing 16–18 year old children

The raw data for boys suggests strong social class effects (non-manual sons about 30% points higher than manual sons); strong regional effects (North and Midlands about 10% lower than South); strong effects of father's education at low levels (leaving at 18 rather than 15 adds about 30% to staying-on-rate); strong effect of current income (staying-on rises at about 3% per decile); strong area (peer group) effects; and weak wealth effects.

The raw data for girls suggests weak social class effects (non-manual daughters about 15% points higher than manual daughters); strong regional effects (North and Midlands about 10% lower than South); some effect of father's education at low levels (leaving at 18 rather than 15 adds about 20% to staying-on-rate); some effect of current income (staying-on rises at about 2% per decile); weak area (peer group) effects; and weak wealth effects.

However, parental income and education (and other variables) are correlated so we cannot make inferences about the effect of either without controlling for both, and hence we need to model both (all) effects simultaneously. Unobservable effects are also likely to be correlated with income, so we cannot make inferences about the effects of income without controlling for unobservable factors that affect school leaving.

A second issue is that we are interested not just in parental income but also in schooling-contingent income. EMAs are not yet available but child benefit and child support are school-contingent income which we use here to capture the potential effect of EMAs.

We adopt a multivariate modelling strategy and estimate the *probability* of early school leaving in the FRS micro data. Our explanatory variables are: parental incomes, parental education, siblings, gender, race, region, year; wealth (proxied by council tax band times owner occupier interaction), area effects (proxied by council tax band), child support and child benefit, and other characteristics (employment status, working mother). We deal with the endogeneity of income by replacing incomes by predicted incomes which depend on education, work experience, etc. and on *instrumental variables* (the "raising of the school leaving age" and union membership). The idea is that the predicted income picks up the effect of exogenous changes in income, that is, potential policy effects.

We use a number of alternative specifications: no controls (includes only parental incomes (predicted), siblings, gender, race, region, year, and child support and child benefit); basic controls (adds parental education, other characteristics (employment status, working mother)); and, finally, a model with a full set of controls (adding wealth (proxied by council tax band times owner occupier interaction), area affects (proxied by council tax band), paternal income effects, and schooling contingent income effects).

The major policy conclusions were that:

- Parental education is very important.

  ⇒ Each additional year increases probability by 5%.

  ⇒ Major neglected externality of education.

  ⇒ Motivates case for intervention.

- But EMA-type effects are small and lack precision.

  ⇒ Best estimate is that £25 per week would raise the probability of "low achiever" from about 50 to 55% – but very imprecise estimates.

- Parental income effects are small and also not statistically robust.

  ⇒ Not strong support for loans.

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