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Comment on Erik Mellander and Per Skedinger: Corporate job ladders in Europe: Wage premia for university versus high-school level positions

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1. Introduction

This paper presents an empirical investigation of the returns to education in seven European countries. It does so using internationally comparable micro data compiled from (a non-random sample of) *internationally active* firms.

In the policy discussion, cross-country comparisons of the return to education gained in popularity with the development of the theory of endogenous growth, e.g., Lucas (1988). Among other things, the literature on endogenous growth emphasises the beneficial role of human capital in the growth process. Given the potential importance of human capital for growth, it is natural that a lot of interest has been directed to the incentives to invest in education.

The return to schooling is far from a given constant (neither over time nor across countries). By now, it should be well known that the return to university education declined in almost all OECD countries during the 1970s and rose (at least moderately) in most countries during the 1980s; see, e.g., Burtless (1995).[1] The failure to recognise this fact has caused some unfortunate confusion in the Swedish discussion.[2] A common practice has been to compare an estimate of the return to schooling in Sweden from the early 1980s with an average rate of return in the OECD from the late 1960s or early 1970s.[3] On the basis of this comparison, a government policy document, for ex-

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[1] Katz and Murphy (1992) vividly illustrated the extent of the variation over time in the college wage premium for the US.

[2] The argument that follows is based on Edin, Fredriksson and Holmlund (1994).

[3] This average rate of return is based on Psacharopoulos (1985, 1994). The bulk of the observations in the *global update* of the 1994 paper come from the 1960s or 1970s. So as a point of reference, the global update seems more or less outdated.

ample, asserts that the return to education is too low in Sweden; see Proposition 1992/93:1. This may well be true, but comparing estimates of the return to education 10-15 years apart is clearly not the proper basis for making this argument.

The paper by Mellander and Skedinger does not suffer from this problem, since it compares estimated earnings premia holding time constant. In this sense, the paper fills an important void. Moreover, it is a virtue that the data have been collected in an identical fashion in all countries.

The few previous international comparisons available (e.g., Blau and Kahn, 1995), suggest that the return to university education in Sweden is slightly below average. So to a Swedish reader, some of the results in the paper may come as a surprise; in particular, we learn that Sweden holds a top rank among engineers. To me, the extent to which the rather special nature of the data drives this result is not clear.

Although the data set has some virtues, there are also drawbacks. First, it is not clear to what population the results generalise. Second, the data lack some of the standard control variables. Third, there is no explicit measure of what the authors set out to measure the returns to, i.e., education. In the sequel, I explore the implications of these drawbacks.

My principal tool in fulfilling this objective is an earnings regression of the following Mincer variety:

$$\ln(\textit{earnings}) = f(\textit{education, gender, immigrant status, marital status, region of residence, industry, age, age squared}) \quad (1)$$

I estimate versions of this equation using a (3%) *random* sample of employees drawn from the Swedish Population Census in 1990; Edin and Fredriksson (1997) describe the data in greater detail. Given the differences in the set up and the data, the *level* of the educational premium estimated here and those reported in Mellander and Skedinger will not be conformable. So I focus on how a particular problem affects the *relative* size of the educational premium estimated from (1).

2. What are the data representative of?

In the description of the data, we learn that the data were compiled from privately owned and *internationally active* firms. But the firms are not sampled. Instead, they decide themselves whether or not to participate.

Looking at some of the characteristics of the data, I cannot help but suspect that *internationally active* (in an objective sense) has a different meaning across countries. For example, while the population size of Belgium is less than one-fifth of Italy, there are twice as many Belgian as Italian firms in the sample. There are also striking differences across countries in terms of average firm size. For example, the average German firm is four times greater than the corresponding Italian firm. Both facts suggest that industrial composition differs across countries. The authors apparently have information on the industry affiliation of the firm; a summary account of the differences between countries (if any) would have been helpful.

Industrial composition matters for estimates of the rate of return to education. At the most basic level, the rate of return usually differs between individuals employed in the private and the public sector; e.g., Zetterberg (1994). Table 1 explores the variation in the university earnings premium across different aggregate of industries.

Table 1. The university premium across industry aggregates. Per cent.

	Earnings premium
All industries	28.4
Private sector	28.6
Mining and manufacturing	34.8

Notes: The premium refers to the relative earnings difference between individuals with university education (of at least 3 years) and individuals with high-school education (of more than 2 years). The regression is restricted to individuals less than age 65 who worked full time. The regression controls for gender, immigrant, and marital status, age, age squared, industry of employment (2-digit), and region of residence (county level). The number in row one is based on 90,623 observations; row two, 56,758 observations; and row three, 22,591 observations.

Table 1 shows that the university earnings premium does not differ much between the private sector and the rest of the economy. But if *internationally active* is interpreted narrowly to mean mining and manufacturing, the difference is substantial; the premium is around

23% higher (in relative terms) for an employee in mining and manufacturing than for an average employee in the Swedish economy.

Here, I think the authors could have done better. It should be straightforward to weigh the data to control for any differences in industrial composition.[4] But even if this problem is handled, one wonders what the data are representative of and whether the results extend to a random sample of, say, the private sector in each country.

3. Standard controls are missing

The lack of standard control variables is another dimension where the data are somewhat inadequate. Equation (1), to my mind, has a conventional set of standardising variables. The data set used by Mellander and Skedinger only contains industry and age. In addition, however, they have information on firm size and responsibility.[5] In Table 2, I investigate how the educational return is affected by excluding the information that the authors do not have. I confine the regressions to the private sector and run them separately for engineers and administrators.

Table 2. The university premium and the importance of controls, private sector. Per cent.

	Engineers	Administrators
All controls	24.7	24.9
Excluding marital status ...	25.0	25.0
...and region of residence	26.7	27.0
...and immigrant status	26.8	26.7
...and gender	25.0	32.5

Notes: The earnings regression for engineers has 9,169 observations, while the regression for administrators includes 17,011 individuals.

[4] To be concrete, suppose that telecommunication employs 20% of the German sample, 40% of the Swedish sample, and the average rate of employment (in telecommunication) across the seven countries is 30%. Then it is straightforward to generate a weight such that German individuals employed in telecommunication get a weight 3/2 and Swedes employed in that industry 3/4. After applying the same principle to all countries and industries, an earnings regression can be estimated by weighted least squares to control for differences in industrial composition across countries.

[5] Using data from mining and manufacturing, I have examined whether plant size matters. It turns out that accounting for plant size reduces the university earnings premium slightly (5% in relative terms). I thank Fredrik Andersson for supplying these data.

The results in row 1 are based on all control variables in equation (1). The logic of rows 2-5 is that each subsequent row reduces the set of right-hand-side variables, step-by-step. The end result in row 5 is an equation that is similar to the one that Mellander and Skedinger used.

It is noteworthy that the estimate of the university earnings differential is more or less identical for engineers and administrators. Thus, I find little support for the conclusion that "aggregation over fields of work ... seems to be a questionable practice when comparing the returns in different countries". As the set of conditioning variables is reduced, nothing much happens for engineers. But for administrators, the university earnings premium has increased by around 30% in comparison to the first row. What drives much of this increase is excluding the information on gender. Here, the authors argue that the lack of information on gender is a minor problem, because indicators for occupation and responsibility are available. A comparison between Table 2 (in this comment) and Table 8 (in Mellander and Skedinger) suggests otherwise.[6] According to the row 1 of Table 2, there are no differences between engineers and administrators. But Table 8 suggests that the wage premium in administration is around 40% larger than in engineering; this is in the same ballpark as the relative difference implied by row 5 in Table 2.[7]

Female participation rates differ radically across the OECD countries; at the extremes we have Sweden, where 79.1% participated, and Italy, where only 46.5% of the female population participated in 1992; see OECD (1994). Table 2 (in this comment) suggests that these differences may be of particular relevance for the cross-country comparison when it comes to business administration.

[6] To me, the results in Table 8 are the most credible ones because they control for the entry and exit of firms.

[7] In an attempt to be as fair as possible to the authors, I conducted a similar exercise as in Table 2—holding the socio-economic classification (SEC) constant. Because the SEC controls for occupation, responsibility and the normal educational requirement, the level of the estimated university premium conveys little information about the "true" premium. But relative comparisons may still have some value. In brief, the results were as follows: When using all controls, the university premium for administrators relative to engineers was -3%. The specification equivalent to row 5 in Table 2 yielded an estimate of the premium that was 13% higher for administrators relative to engineers. In the course of excluding control variables, the premium in business administration increased by 14%; the exclusion of region and gender drove all of this increase.

4. We don't observe what we're interested in

My last comment concerns the fact that the data contain no information on education; instead, positions are classified according to their normal educational requirement. The socio-economic classification in the *Population Census* contains analogous information.

Years of schooling vary substantially within a position that normally requires a certain education. Table 3 gives an example that pertains to administrators in the private sector. It presents the educational distribution among individuals occupying a position that requires at least six years of post-compulsory schooling (which I interpret as a university ≥ 3 years or higher). In this particular example, the majority of individuals have formal schooling below the normal requirement.

Table 3. Educational distribution of a position normally requiring university education.

Actual education	Per cent
< 9 years	5.6
9-10 years	6.8
High school ≤ 2 years	11.5
High school > 2 years	21.0
University < 3 years	21.2
University ≥ 3 years	33.0
Graduate level	0.9

Note: The table reports the distribution of education among administrators in the private sector who occupy a position normally requiring at least six years of post-compulsory schooling.

Now, what happens to the university earnings premium if we base our estimates on *inferred* education—the normal educational requirement—rather than actual education? Table 4 addresses this question for administrators.

Table 4. The university premium by educational information, private sector. Per cent.

	Administrators
Inferred education	23.7
Actual education	20.6

Note: Inferred education gives the relative earnings difference between positions requiring at least six, and positions requiring more than two (but not six) years of post-compulsory schooling respectively. To ensure comparability *actual education* gives the corresponding estimate when aggregating educational levels six and seven of Table 3 and relating that to an aggregation of educational levels four and five.

It turns out that inferring education introduces an upward bias in the order of 15%. But it is difficult to have a clear prior on the more important question of how this influences the cross-country comparison.

5. Concluding remarks

So, what is my end judgement of the results in this paper? Are they in line with previous studies? Concerning the relative ranking of the return to education, I have argued elsewhere (Edin, Fredriksson and Holmlund, 1994) that the return to education in Sweden is slightly below the OECD average; my reading of the results is that they are broadly consistent with this prior.

Regarding the level of the education premium, the estimates for engineers appear to be reasonable; assuming four years of university education, they imply a premium of 7-10% per additional year of schooling. But the return for business administrators struck me as too high. In some countries, the premium in business administration is more than twice the size of the premium in engineering. In Sweden (the least-extreme case), the return is about 50% higher in business administration. The previous Swedish evidence does not suggest such large differences across these two fields of work; see Wadensjö (1991).

My comments have mostly concerned the special features of the data. The additional fact that they are confined to individuals working in competitive labour markets potentially hides some of the interesting variation across countries. Nationally representative surveys may have their drawbacks, but they pick up the variation in the return to schooling that is due to institutional differences across countries;

moreover, there is (of course) no ambiguity concerning the population they refer to.

It is clear that there is a great market for conducting international comparisons in this field. I would find a comparison based on nationally representative micro data particularly interesting. The *Luxembourg Income Study*, which is a collection of internationally comparable micro data, seems to be particularly useful for this purpose.

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