

# **PART I**

## **CROSS-COUNTRY ANALYSES**

## 2. RETURNS TO EDUCATION IN EUROPE <sup>1</sup>

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This chapter gives a general overview of the basic rates-of-return results of the PURE project. Specifically, it deals with one of the fundamental points of the project's research agenda; that is, analysis and comparison of wage and human capital structures and private returns to education between countries and within countries over time in order to uncover distinct trends as well as similarities and dissimilarities across countries.

Return to education is defined as the extra income earned as a result of completing one more year of education. The benchmark model for the development of empirical estimation of the returns to education is the key relationship derived by Mincer (1974). The typical human capital theory (Becker 1964) assumes that education,  $s$ , is chosen to maximise the expected present value of the stream of future incomes, up to retirement at date  $t$ , net of the costs of education. So, at the optimum level of schooling, the present value of the  $s^{\text{th}}$  year of schooling just equals the costs of the  $s^{\text{th}}$  year of education. For the simple estimation, the schooling measure is treated as exogenous, although education is the endogenous choice variable in the underlying human capital model. This, however, complicates the analysis and various econometric approaches have to be taken in those cases. This will be discussed later in this summary chapter.

### 2.1 Data and specification

Within the PURE project it was possible to evaluate this relationship between wages and education across Europe. The necessary tool in this process is access either to cross-national individual data, or to national individual data that can be analysed by

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<sup>1</sup> This chapter is based on the introductory chapter in the forthcoming PURE book *Education and Earnings in Europe: A Cross Country Analysis of the Returns to Education*, edited by Colm Harmon, Ian Walker and Niels Westergaard–Nielsen (March 2001, Edward Elgar Publishing Ltd.).

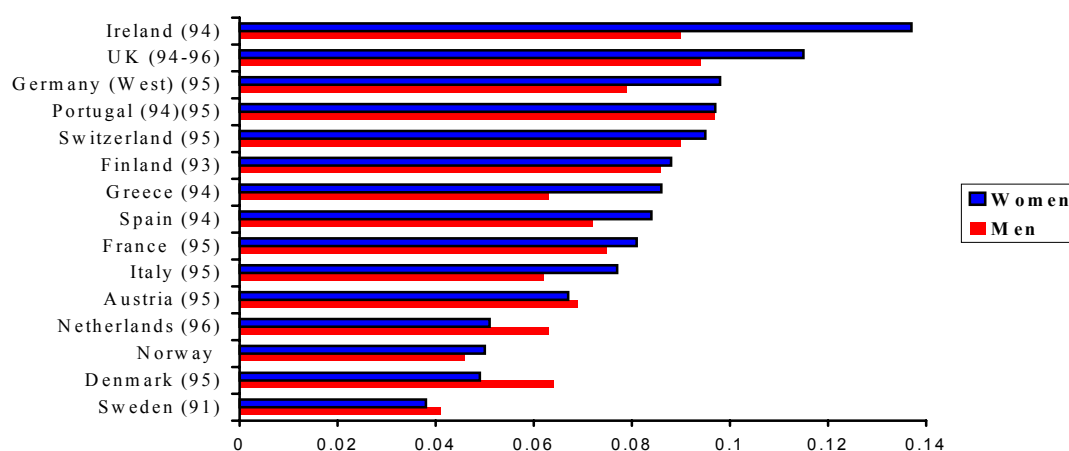
researchers from all countries involved. Since Europe can still only in rare cases provide sufficient cross-national data, we had to rely on the latter method.

A further condition is that the data has to be more or less comparable across countries; i.e. wage, experience and years of schooling should be calculated in a similar fashion. Since each country uses their own national surveys or register data, this condition is hard to maintain. However, for the purpose of this review we formulated a common specification across our research partners and collected estimates of the return to schooling from each. All PURE partners have estimated the return to education using log of the hourly gross wage where available (with the exception of Austria, Greece, Italy, Netherlands and Spain who use net wages).

## 2.2 Estimates of the return to education

The returns to education seem to fall into three different classes. The lowest return to one extra year of education is found in the Scandinavian countries (Norway, Sweden and Denmark), while the highest returns are found in Ireland and the UK. West Germany, Portugal and Switzerland are leading the third group of in-between countries. Furthermore, we find that for some countries like the UK, Ireland, Germany, Greece and Italy there is a substantial variation in returns between gender, i.e. returns to women are significantly higher than returns to men.

Figure 2.1. Returns to education



### 2.3 Are there trends?

Most partners had access to longitudinal data (or at least a combination of cross-sections) for human capital variables (schooling and experience) and earnings, which gives us the opportunity to identify trends in returns to human capital for men and women in the European countries. There does not seem to be a clear pattern in the trends, however. In total there appears to be 15 cases of no trend, 7 cases of increasing returns, and 7 cases of decreasing returns. Countries characterised by decreasing returns for both males and females are Austria, Switzerland and Sweden. Countries characterised by increasing returns are Denmark, Portugal, Finland and Italy. The remaining PURE countries are either characterised by no trend or by different male–female trends.

Figure 2.2 shows the three countries with the downward trend. Sweden differs from the other countries because the downward trend is based on very early years, which cannot be matched for other countries. The reduction for the comparable years in Sweden is seen to be very modest. The possible common reasons for the downward trend are an increasing number of educated people and more participating women.

Furthermore, these findings raise the question whether there are any tendencies to convergence in the returns to education across the different European nations, as you would expect with increasing mobility. The answer is rather mixed. Some countries move from low to higher returns (Denmark, Italy, UK (men) and Spain (men)), while one country (Austria) moves from high to lower, others move from high to higher (Portugal and Finland (men)), and finally Sweden moves from low to lower. The conclusion is that there are few general trends and rather confusing signs with no general tendency, at least so far.

One of the crucial elements in a cross-country study of returns to education is the impact of different measurements of work experience, since various countries have access to different measures. Because of the common data set-up we have been able to investigate this impact for a large number of countries. The main conclusion is that it does not matter whether actual or potential work experience is used, whereas using age as a proxy for accumulated work experience in the human capital function gives a substantial downward bias in the return to education.

Figure 2.2. Countries with a downward trend in the return to education

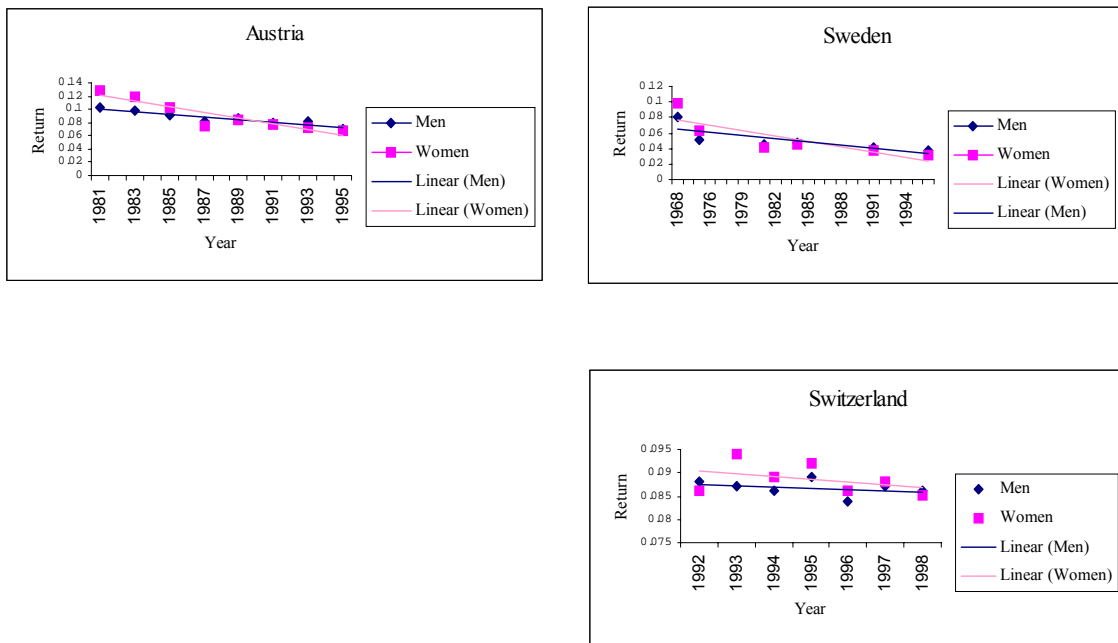
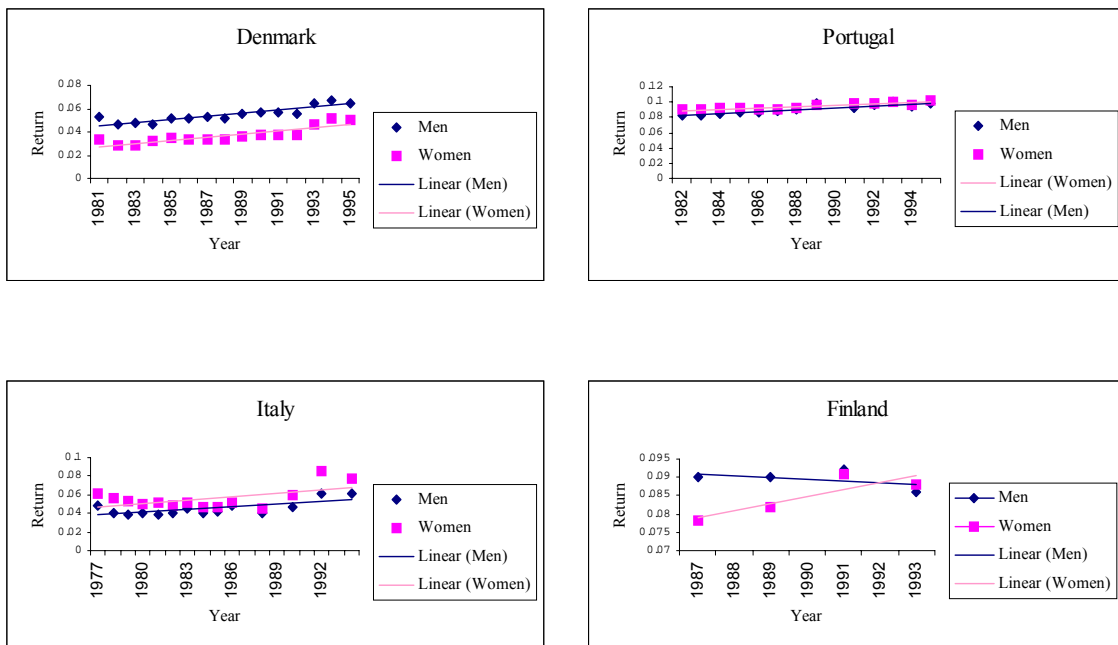


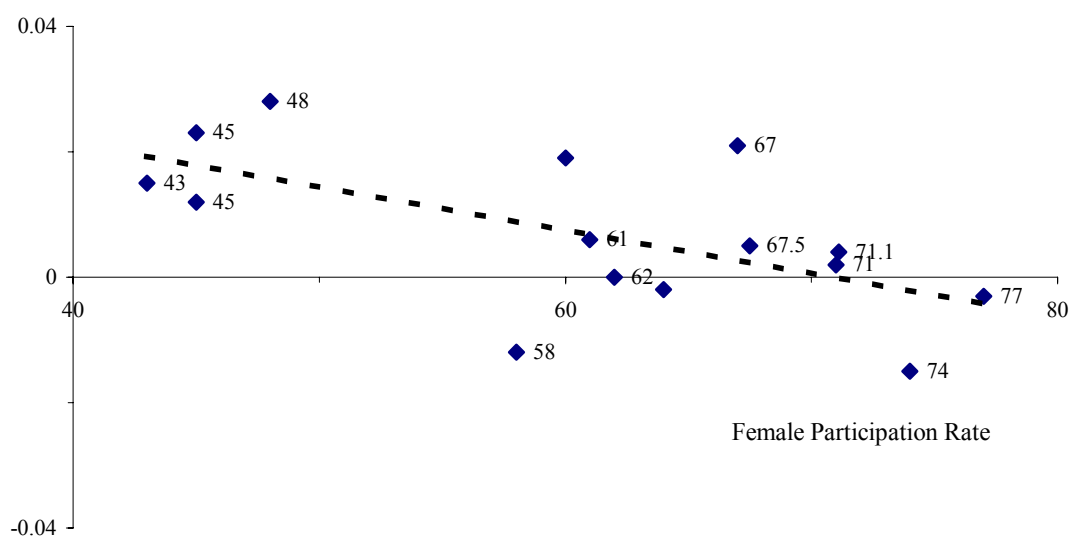
Figure 2.3. Countries with an upward trend in the return to education



## 2.4 Participation and returns to education

Another source for bias in the returns to education is that the samples used for estimations are not representative. This is especially important when comparing returns to education for women between countries where the participation rate is quite different. As a consequence, countries with a high participation rate for women appear to have a low rate of return and vice versa. This finding suggests that increasing female labour force participation reduces the return to education. The reason is undoubtedly that the group of women participating in countries with a low participation rate, is dominated by women with high ability. This domination is clearly reduced with higher participation.

*Figure 2.4. The relationship between participation and returns to education for females*



## 2.5 Quantile regressions<sup>2</sup>

It is possible that the returns to schooling are different for individuals in the upper part of the wage distribution compared with individuals in the lower portion of the distribution. Quantile regression allows us to estimate the return to a particular level of education within different quantiles of the (hourly) wage distribution. The OLS results show that over the observed period average returns to schooling have in general

<sup>2</sup> For a more detailed presentation of PURE quantile regression results, see summary chapter 6 of this volume.

increased. There is, however, a clear implication from comparisons between the 90<sup>th</sup> and the 10<sup>th</sup> percentile of the wage distribution that the returns to schooling are, indeed, higher for those at the top of the wage distribution compared with those at the bottom (although for some countries the profiles of returns to education are flat across a range of the wage distribution). There is also some suggestion that returns to education have risen at the top of the wage distribution.

One factor influencing the distribution of wages is the distribution of inherent ability with low-ability individuals predominating in the bottom half of the distribution. Thus, education may have a bigger impact on the more able than the less able, and this complementarity between ability and education is either getting stronger or slightly weaker over time.

## **2.6 Meta analysis**

To summarise the various issues discussed above we use the methods common in meta analysis to provide some structure to our survey of returns to schooling and a framework for determining whether our inferences are sensitive to the chosen specification. A meta analysis combines and integrates the results of several studies that share a common aspect so as to be “combinable” in a statistical manner. The methodology is typical in the clinical trials in the medical literature.

Well over 1,000 estimates were generated across the PURE project on three main types of estimated return to schooling – existing published work (labelled PURE1), existing unpublished work (PURE2), and new estimates produced within the PURE project (PURE3). A number of findings emerge from this comparison. Despite the points raised earlier in this chapter there is a remarkable similarity in the estimated return to schooling for a number of possible cuts of the data with an average return of around 6.5% capturing to a large extent the returns for different countries and different model specifications. There are some notable exceptions, though. The Scandinavian countries generally have lower returns to schooling together with Italy, Greece and the Netherlands. At the other extreme, the returns for the UK and Ireland are indeed higher than average. (See Figure 2.5.)

Figure 2.5. *Meta analysis of the return to education*

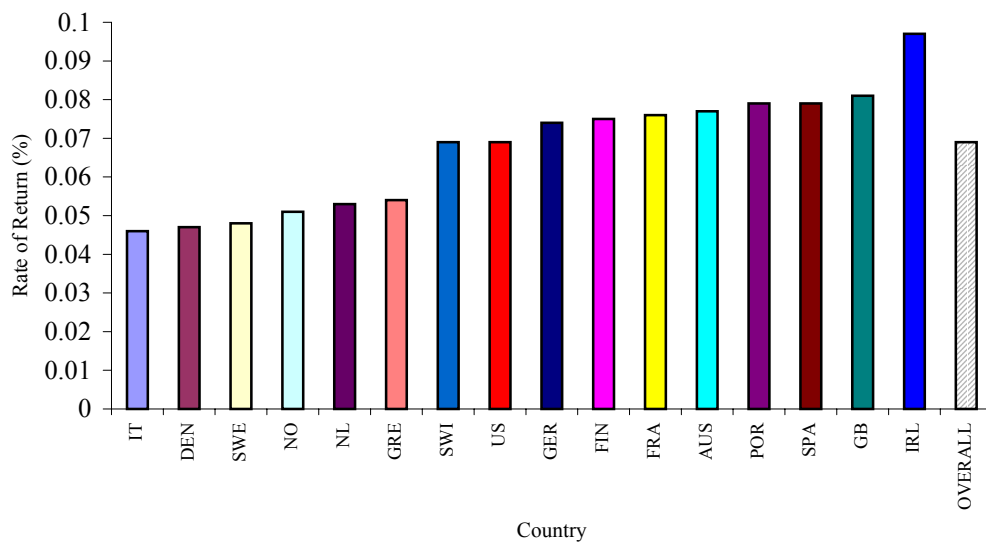
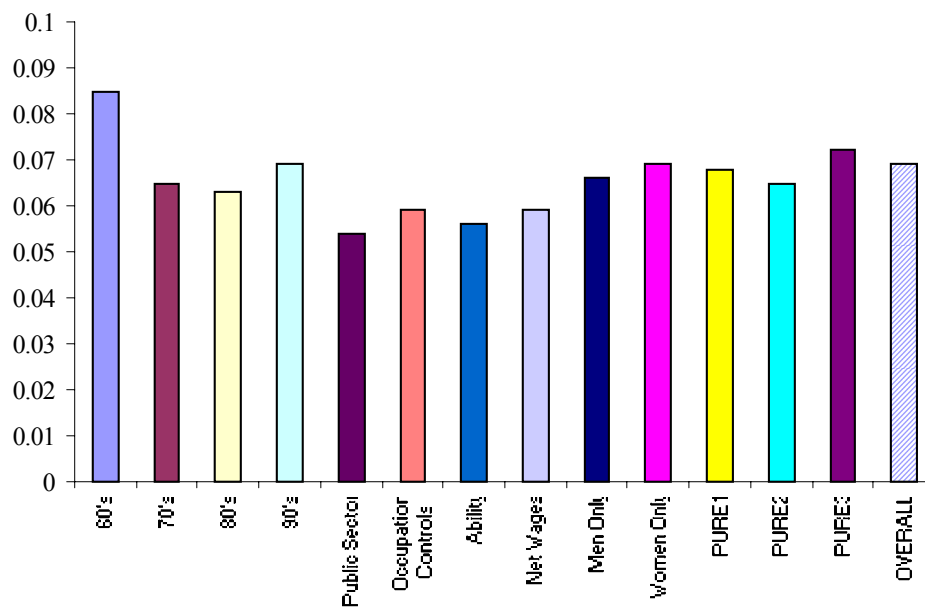


Figure 2.6. *Meta analysis of the return to education, different specifications*



In addition, we find that estimates in data from the 1960s give a clearly higher return to education than similar estimates from the 1970s. After a further drop in the 1980s, the return rises in the 1990s. Estimated returns from studies of public-sector workers, and from studies where net (of tax) wages only are available average about 5% (though we would expect the net returns to be lower than those from gross earnings by an amount approximately equal to the average tax rate).

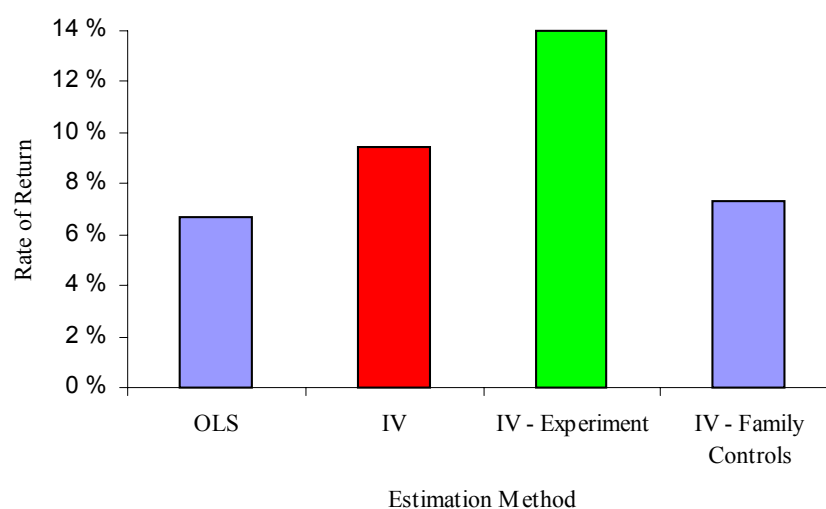


## 2.7 Endogeneity of schooling

Finally we investigated for some countries the question of endogeneity in the schooling decision. Using the instrumental variables technique (IV) is one way of dealing with endogeneity. In brief, the idea of this technique is that one uses exogenous factors that are not correlated with income to predict the level of education. Returns to education obtained in this way are commonly somewhat larger compared to those where schooling is considered to be exogenous. However, the size of the extra return depends markedly on the choice of instruments.

The results from the PURE project seem to be in line with what has been obtained in other similar studies. Figure 2.7 summarises the return to education using different IV-estimators. Overall, it can be seen that the return to education based on IV exceeds the conventional OLS-based estimates. This will happen if the instrument affects subgroups with a relatively high marginal return to education. And this is to a large extent what the IV-estimates based on experiments actually does, because most of the experiments affect groups with lower levels of education and refer to situations where the variation in ability between the control group and the treatment group is small. Likewise, family controls produce only slightly higher returns because the educational levels of siblings do not differ so much.

Figure 2.7. Instrumental variables (IV) estimates using different types of instruments



## 2.8 Conclusion

The evidence on private returns to the individual is compelling and despite some of the subtleties involved in estimation there is still an unambiguous positive effect on the earnings of an individual from participating in education.

We have found that returns to education differ somewhat across Europe, with the Scandinavian countries and the Netherlands lowest, and Ireland and the UK highest. We have also found that the marginal return to females is often highest in countries where the female participation rate is lowest. Though the returns differ, we find no signs of convergence between the European countries in the sense that the high-return countries experience a decreasing trend in returns. Nor do the low-return countries seem to experience a clearly increasing trend in returns.

These findings of the PURE project raise the following policy-relevant issues. First, although we have not yet seen any convergence in returns to education across Europe, the existing differences could lead to higher mobility between countries in the future. Especially, the highly educated are expected to exploit cross-country differences in returns to education in the future because electronic communication makes it possible to work and live in different places. At the same time, the low returns in some countries might have severe incentive effects with respect to the choice of education. As a consequence of the low return, a growing number of youths in these countries may decide not to take further education.

Second, the high wage premium to female education in countries with low female participation may disappear when more women start working. Finally, our attempts to produce instrumental variables estimates indicate a high potential return to educating social groups who tend to acquire little education. Further research might identify those groups. A necessary condition for an increased research effort is better access to Trans-European data on individuals.

### References:

- Becker, G. (1964), *Human Capital – A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.
- Mincer, J. (1974), *Schooling, Experience and Earnings*. New York: Columbia University Press.