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Returns to Education and Risky Financial Investment

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Abstract

The aim of this paper is to explore the relationship between wages, human capital and investment in financial assets with risky returns at the individual level. To explore this relationship from an international perspective, we analyse individual level data from the *British Household Panel Survey*, the *German Socio-Economic Panel* and the U.S. *Panel Study of Income Dynamics*. Our findings suggest that investment in financial assets with risky returns is positively associated with returns to human capital investment.

Keywords: Education; Financial Investment; Human capital; Wages.

JEL Classification: J24; J30.

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I. Introduction and Background

Investment activities of individuals and households have attracted a significant amount of attention in the economics literature from both an empirical and a theoretical perspective. Two types of investment activity – namely human capital investment and financial investment – have been the subject of much scrutiny. In general, economists have analysed human capital or financial investment in isolation of one another. Since, these two investment decisions have common influences such as individuals' risk preferences, it is surprising that the relationship between human capital investment and financial investment has attracted limited interest in the economics literature. Given that individuals make investments in both human capital and financial assets, it is interesting to explore the potential inter-relationship between these two types of investment activity.

One exception in the literature is Shaw (1996) who jointly models investment in risky human capital and financial wealth allowing for interpersonal differences in risk preference. The theoretical framework predicts an inverse relationship between an individual's degree of risk aversion and investment in risky human capital, which, in turn, impacts on wage growth. Using U.S. data, Shaw finds that wage growth is positively correlated with willingness to invest in risky financial assets such as stocks and shares. Brown and Taylor (2005) extend Shaw's empirical analysis and explore the relationship between wage growth, human capital and investment in financial assets at the individual level using data from five waves of the *British Household Panel Survey*. The findings support a positive association between financial assets and wage growth with this relationship becoming more pronounced over time. Investment in financial assets may be related to an individual's risk preference. One might predict, *ceteris paribus*, an inverse association between risk aversion and investment in financial assets

such as stocks and shares. Evidence supporting such a relationship is reported by Barsky *et al.* (1997) who find that measured risk tolerance is positively related to holding stocks.

To date, there has been a distinct lack of empirical research in this area. Hence, in this paper, we add to the existing literature by exploring the relationship between returns to human capital investment (i.e. educational attainment) and investments in financial assets with risky returns at the individual level. In order to explore this relationship from an international perspective, we exploit individual level panel data from the British Household Panel Survey (*BHPS*), the German Socio-Economic Panel (*GSOEP*) and the U.S. Panel Study of Income Dynamics (*PSID*).

III. Data and Methodology

For Great Britain, we exploit information contained in the 2000 wave of the *BHPS*, which is the most recent wave containing information about individuals' financial investments. The *BHPS* is a random sample survey, carried out by the *Institute for Social and Economic Research*, of each adult member from a nationally representative sample of more than 5,000 private households (yielding approximately 10,000 individual interviews). In 2000, individuals are asked what type of financial investments they hold. For individuals who hold investments in stocks/shares, personal equity plans and unit trusts only, we classify this as risky financial investment in that the return is uncertain, so we define a dummy variable $r_i = 1$ for such individuals.

For Germany, we use the *GSOEP*, a representative longitudinal study of private households who have been surveyed annually since 1984, funded by the German National Science Foundation. We concentrate on the 2002 wave since it is the most recent year that respondents are asked detailed questions about holdings of financial

assets. To be specific, for those individuals who respond that they hold stocks, bonds and company assets only, $r_i = 1$.

For the U.S., we use the *PSID*, which began in 1968, and is a longitudinal study of a representative sample of U.S. individuals and the family units in which they reside. We concentrate on the 2001 wave – the most recent year that households are asked detailed questions about their holdings of financial assets. Risky investments (i.e. $r_i = 1$) are defined as portfolios consisting solely of shares of stock in publicly held corporations, mutual funds and investment trusts.[1]

Our samples, which consist of individuals in employment aged between 16 and 65, drawn from the *BHPS*, the *GSOEP* and the *PSID* comprise 3,486, 5,548 and 1,123 heads of households respectively. We exclude the self-employed, agricultural workers and individuals with more than one job. For each country we explore how investments held in financial assets affect estimated returns to human capital by comparing the returns to education in a standard mincerian wage equation with the returns to education allowing for interactions between human capital investment and risky financial investments. To be specific, for each country we initially estimate the following semi log mincerian wage equation:

$$\ln w_i = \alpha + \beta_1 S_i + \gamma' \boldsymbol{X}_i + \varepsilon_i \qquad (1)$$

where $\ln w_i$ denotes log real hourly wages of individual *i*, S_i denotes years of education of individual *i*, $\boldsymbol{X}_i$ denotes a vector of controls and ε_i denotes the random error term. We then investigate whether investment in risky financial assets influences the return to education. To investigate how the return to schooling is influenced if an individual holds risky financial assets, we augment the wage equation as follows:

[1] Although each country specific survey asks for the overall amount held in financial investments this is an aggregate figure and, unfortunately, can not be decomposed into the amount invested in each asset.

$$\ln w_i = \alpha + \beta_1 S_i + \beta_2 (S_i \times r_i) + \gamma' \boldsymbol{X}_i + \varepsilon_i \quad (2)$$

The estimated coefficient on the interaction term, $(S_i \times r_i)$, indicates how risky financial investment affects the returns to education. Hence, the overall influence of years of schooling on wages is denoted by $\beta_1 + \beta_2$. Full summary statistics for the dependent variable, years of schooling and r_i are shown for each country in Table 1.

Finally, to explore the robustness of our findings, we instrument r_i since arguably this variable is endogenous. To model the probability that $r_i = 1$, we adopt a probit specification where r_i is the binary dependent, conditioning on age, labour and non labour income, savings and occupation dummies following Guiso *et al*. (2003) who model the share of assets held in risky stocks. Equation (2) is then re-estimated using the predicted probability interacted with years of schooling i.e. $(S_i \times \hat{r}_i)$.

IV. Results

Throughout the results, shown in Tables 2-4, controls other than those shown in the tables are gender (depending upon sample), ethnicity and industry of employment dummies. Results are based upon White robust standard errors and *p* values show the significance of a joint test of the hypothesis $\beta_1 = \beta_2 = 0$. Table 2 presents the results from estimating equations (1) and (2) for the U.S., Great Britain and Germany. All results are based on robust standard errors. In general, the findings accord with the existing literature in that labour market experience impacts concavely on earnings and it is apparent that, across all three countries, years of education increase earnings. Moreover, the interaction term between years of education and having risky financial investments is positive and highly significant in the U.S. and Great Britain suggesting that holding risky financial investments augments the returns to education. Indeed,

focusing on the U.S., in comparison to the baseline return to schooling of 8.08%, holding risky investments increases the return to schooling to 9.35%, i.e. $\left(\hat{\beta}_1 + \hat{\beta}_2\right) \times 100\%$.

Interestingly, in Germany there is no evidence of an extra return to having risky investments. Hence, our findings suggest that the relationship between holding risky financial investments and the return to education differs across countries. Such a finding is perhaps not surprising given the differences in the education systems, and in particular funding, across these three countries.

Table 3 presents the results from estimating separate wage equations for males and females separately, shown in Panels A and B respectively. Controls are as in Table 2 with the exclusion of gender. For the U.S. and Great Britain the results for both genders mirror those found for the overall sample in that the interaction term is statistically significant. Across countries, it is interesting to note that the return to schooling as well as the return when incorporating the interaction term between risky financial assets and education differs in magnitude between the genders. For the U.S. and Great Britain, the overall impact of the return to education, $\hat{\beta}_1 + \hat{\beta}_2$, for those individuals who hold risky financial investments is larger for females than males. This is consistent with empirical findings which highlight a gender differential in the return to schooling, Trostel *et al*., (2002).

Finally, in Table 4 we present the returns to schooling having instrumented the type of financial investment. In general the above results are substantiated suggesting robustness in our findings with the effect of the interactive term being extenuated across all individuals. Again, there is evidence of a gender differential.

V. Conclusion

For the U.K. and the U.S., our findings suggest that risky financial investment augments the returns to education. Interestingly, there are differences in the magnitude of the

effect by gender and also across countries. The degree of investment in risky financial assets, which has been the focus herein, may reveal information about individuals' risk preferences (Barsky *et al*., 1997). One possible inference may be that less risk averse individuals have higher returns to schooling.

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Table 1: Summary Statistics of Key Variables

	U.S.		**GREAT BRITAIN**		**GERMANY**	
	MEAN	*SD*	MEAN	*SD*	MEAN	*SD*
Log Hourly Wage	1.7262	0.5657	2.2233	0.4985	2.3106	*0.4500*
Years of Schooling	13.2841	2.4441	13.1406	3.2234	12.9094	*2.8575*
Risky Assets (r_i)	0.0801	0.2716	0.1231	0.3286	0.0607	*0.2389*
Observations	*1,123*		*3,486*		*5,548*	

Table 2: Returns to Schooling across Countries: All Individuals

	U.S.				**GREAT BRITAIN**				**GERMANY**			
Intercept	-1.0299	*(5.65)*	-0.8387	*(4.61)*	0.6775	*(2.12)*	0.7054	*(2.21)*	0.2467	*(2.75)*	0.2454	*(2.74)*
Years of Schooling	0.0808	*(13.38)*	0.0723	*(11.87)*	0.0406	*(17.23)*	0.0395	*(16.72)*	0.0623	*(32.44)*	0.0621	*(32.17)*
Years of Schooling$\times r_i$			0.0212	*(6.22)*			0.0074	*(4.59)*			0.0010	*(0.67)*
Experience	0.0542	*(6.20)*	0.0504	*(5.85)*	0.0497	*(9.47)*	0.0491	*(9.37)*	0.0364	*(8.76)*	0.0365	*(8.77)*
Experience Squared	-0.0006	*(5.11)*	-0.0005	*(4.82)*	-0.0006	*(9.36)*	-0.0006	*(9.24)*	-0.0003	*(6.87)*	-0.0003	*(6.89)*
R Squared	0.3540		0.3753		0.2759		0.2800		0.3274		0.3273	
Return $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$			*9.35% p=[0.000]*				*4.69% p=[0.000]*				*6.21% p=[0.000]*	
Observations	*1,123*				*3,486*				*5,548*			

Table 3: Returns to Schooling across Countries: By Gender

PANEL A: MALES	**U.S.**		**GREAT BRITAIN**		**GERMANY**	
Years of Schooling	0.0774 *(11.14)*	0.0692 *(9.91)*	0.0382 *(13.90)*	0.0372 *(13.51)*	0.0646 *(30.01)*	0.0646 *(29.82)*
Years of Schooling$\times r_i$		0.0211 *(5.49)*		0.0058 *(3.26)*		0.0001 *(0.02)*
R Squared	0.3548	0.3789	0.2185	0.2214	0.3035	0.3033
Return $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$		*9.03% p=[0.000]*		*4.30% p=[0.000]*		*6.46% p=[0.000]*
Observations	*765*		*2,581*		*4,417*	

PANEL B: FEMALES	**U.S.**		**GREAT BRITAIN**		**GERMANY**	
Years of Schooling	0.0886 *(7.30)*	0.0793 *(6.42)*	0.0453 *(9.96)*	0.0438 *(9.68)*	0.0536 *(12.56)*	0.0527 *(12.32)*
Years of Schooling$\times r_i$		0.0227 *(3.13)*		0.0138 *(3.70)*		0.0068 *(2.25)*
R Squared	0.3237	0.3405	0.2351	0.2459	0.2342	0.2370
Return $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$		*10.20% p=[0.000]*		*5.76% p=[0.000]*		*5.95% p=[0.000]*
Observations	*358*		*905*		*1,131*	

Table 4: Returns to Schooling across Countries: Instrumentation of Risky Financial Investment

	U.S.	**GREAT BRITAIN**	**GERMANY**
ALL INDIVIDUALS: $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$	10.32%	6.49%	6.68%
MALES: $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$	9.80%	6.09%	6.48%
FEMALES: $\left(\hat{\beta}_1 + \hat{\beta}_2\right)\times 100\%$	10.88%	9.40%	5.64%