9

The Returns to Third Level Education

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9.1 Introduction

The human capital framework indicates that education improves an individual's productivity and so results in increased earnings. While both Adam Smith [1776] (1979) and Alfred Marshall [1890] (1961) alluded to the relationship between the accumulation of human capital and earnings in their seminal works, the formal theoretical modelling began with the work of Mincer (1958), Schultz (1961) and Becker (1964). Subsequently, this relationship has formed the basis for much of the empirical work produced in the past 50 years within the economics of education literature, which has mainly focused on estimating the returns in the labour market to investing in education.

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Specifically, the private return to education is commonly measured by comparing the private benefits of extra education in the shape of higher life-cycle earnings against the private cost to the individual of education. Moreover, those with higher levels of education may also accrue non-monetary returns such as higher levels of happiness and better health. As noted in Chap. 2 of this book, the human capital framework suggests that like any investment, higher private returns to education will lead to higher levels of participation. Varying demand for education has important policy implications due to the association between higher education levels and economic growth. Furthermore, an examination of the private returns to third level education helps inform the debate around the financing of the sector, since high private returns may justify placing a higher cost burden upon students themselves. The public/fiscal return to education is also significant within this context. This can determine the return to government from expenditure on education and can be useful from a policy perspective. For example, it may be compared to the return from other areas of public expenditure to help gauge the best use of resources. This may also help assess the recent policy of declining public investment in higher education in Ireland.

Different techniques are available when calculating these returns, notably the internal rate of return (IRR) measure and the earnings function method. These have been used extensively to illustrate a positive private return to education, mainly using gross earnings variations as the main measurement of the benefit of extra education (Psacharopoulos and Patrinos 2004). However, some variations of the basic specification of these methods have been highlighted, particularly when estimating the private return to education. For instance, higher gross earnings from education may alter taxes/benefit liabilities (Heckman et al. 2008) and extra education may affect labour supply decisions (Booth and Coles 2007; Trostel and Walker 2006), both of which may alter the estimated return to education from a private viewpoint. Some studies, such as Harmon et al. (2001), Trostel et al. (2002) and Harmon et al. (2002), have incorporated the influence of the tax system on the private returns

to education through the use of net earnings as the outcome variable. However, this methodology does not allow the analysis of the impact of specific tax/benefit policies on the private returns and ignores the possible employment effect of additional education. This framework, like much of the literature in this area, also ignores the measurement of public returns.

Some of the few studies to explicitly estimate the net private and public returns to education include De La Fuente and Jimeno (2009) and OECD (2015). The former estimates these returns for 14 European countries, while the latter provides estimates for the majority of OECD countries. However, both these studies use average national wages to estimate the impact on gross earnings and average national tax data to simulate tax liabilities and so the estimates may be flawed. This is in contrast to using more micro-level data to provide more robust estimates of these relationships. With this in mind, Flannery and O'Donoghue (2016) attempted to bridge this methodological gap in estimating the net private and fiscal returns to education for Ireland by using micro-level data techniques. However, the data used in that study was quite dated (from the year 2000) and the analysis was confined to exploring the impact of increasing education in a marginal sense, that is, each individual was simulated to gain an extra year of education. Therefore, it cannot tell us about the specific return to completing third level education, for example. In this context, this chapter aims to utilise the methodology outlined by Flannery and O'Donoghue (2016) to both update and refine the estimates of the fiscal and private returns to tertiary education in Ireland. It also explores some non-pecuniary returns to higher education by looking at how happiness and health indicators vary with level of education.

The chapter is structured as follows: the next section provides a more detailed understanding of how the returns to education are typically measured. We then describe the alternative methodology undertaken for Ireland in this chapter. Next we present the results of our empirical estimations of the net private, public and non-pecuniary returns to tertiary education in Ireland. The final section concludes.

9.2 Approaches to Estimating the Returns to Higher Education

9.2.1 The Traditional Approach

The positive relationship between the education level an individual attains and the earnings they accrue across their life-cycle is evident in every developed economy in the world. Table 9.1 illustrates this in its simplest form by presenting the relative earnings of those working with a degree or equivalent, compared to workers with upper secondary education across a selected group of OECD countries. It shows that an individual with an undergraduate degree earns significantly more than someone with upper secondary as their highest level of education achieved. This trend is consistent for both males and females and across all countries shown. In an Irish context, we see a particularly pronounced earnings premium

Table 9.1 Relative earnings premium for workers with bachelor's degree over workers with upper secondary education for selected OECD countries

Country	Males	Females
Australia	142	160
Canada	152	167
Chile	302	293
Czech Republic	151	141
Denmark	124	114
France	146	145
Greece	199	205
Ireland	209	202
Israel	181	148
Korea	141	159
Portugal	173	172
Sweden	123	120
United Kingdom	150	170
United States	171	167
OECD average	164	160
EU21 average	161	153

Notes: Estimates based on adults with income from employment. Upper secondary education = 100

Source: Created by authors using data from OECD (2015)

attached to having a third level degree; the wage gap between these levels of education for both males and females in Ireland is significantly larger compared to the OECD or EU21 average.

While this measure provides some useful insight into the potential return to pursuing third level education, it is a simple summary calculation and does not control for observed and unobserved differences in individuals with varying levels of education. Numerous studies have utilised more comprehensive measures in estimating the returns to education. Early examples of these focused upon using the IRR method, specified as:

$$\sum_{t=c}^{n}\left(Y_s - Y_o\right)_t \left(1+r\right)^{-t} = \sum_{t=0}^{c-1} C_t \left(1+r\right)^{-t} \tag{1}$$

where the left-hand side of the equation represents the discounted benefits to extra education, while the right-hand side is the discounted costs to extra education. The discounted benefits to the individual measure the difference in net earnings from education level o and level s, while the costs are both the direct costs to the individual, in the form of tuition fees, and the indirect costs represented by the earnings foregone while in education. The private rate of return is the value r which equates the two sides. Subscript t signifies the year referred to by the variable to which it is associated. Psacharopoulos and Patrinos (2004) provide a summary of the empirical studies that have used this method.

The earnings function approach (also known as the Mincerian approach) as outlined in Becker and Chiswick (1966) and Mincer (1974) has become more common in estimating the returns to education. This is formally represented by:

$$LnY_i = \beta_o + \beta_1 S_i + \beta_2 T_i + \beta_3 T_i^2 + \beta_4 X_i + \nu_i \tag{2}$$

where Y is an earnings measure (typically gross earnings) for individual i, S is years of schooling, T is the potential labour market experience after education, X is a vector of the individual's personal characteristics and ν is unobserved characteristics. Using ordinary least squares (OLS)

techniques and the above specification, the coefficient β_1 can be interpreted as the average percentage increase in earnings per year of schooling (partial derivative of earnings with respect to years of schooling), and is generally accepted as a valid estimate of the private marginal rate of return to education. To distinguish between different levels of schooling, Equation (2) can be modified to include dummy variables corresponding to discrete education levels, such that:

$$LnY_i = \beta_o + \beta_p D_p + \beta_s D_s + \beta_u D_u + \beta_2 T_i + \beta_3 T_i^2 + \beta_4 X + \mu_i \qquad (3)$$

where D is the dummy for the subscripted level of education.

The earnings function specification has a number of advantages over the IRR method. It provides the basis for controlling for the influence of other factors besides education on earnings and also has the advantage of greater simplicity, as it does not require a large number of observations in a given age-education level to construct accurate age-earnings profiles.[1] It is thus the focus of this chapter, though with some adjustments. Card (1999), Trostel et al. (2002), Harmon et al. (2001), Harmon et al. (2002) and Dickson and Harmon (2011) all provide summaries of the many studies that have adopted this method. Generally, it is shown that there is considerable variation across countries in the rate of return to education, with an overall trend of higher marginal private returns for females over males.

In an Irish context, Callan and Harmon (1999), Barrett et al. (2002) and McGuinness et al. (2008) have used the gross earnings of workers in Ireland to estimate the private returns to education using the earnings function approach. The first found a marginal rate of return to schooling of between 7–10% using data from 1987. The second study looked at rates of return broken down by separate education levels over the period 1987–97. They specifically found an earnings gap of close to 50% in moving from upper secondary education to having completed a third level degree that remained relatively constant across the time period studied. McGuinness et al. (2008) found a similar gap examining the period 1994–97 but also found that this wage premium decreased to just above 40% by 2001.

9.2.2 An Alternative Approach

As alluded to earlier, it is important to further explore a number of potential adjustments to the typical earnings function approach of measuring returns to education. Firstly, if gross earnings are used in estimating Equations (2) or (3) for the private return to education, the interaction of increasing gross earnings and the tax/benefit system is ignored. In a progressive tax/benefit system, higher gross earnings will lead to more taxes and contributions and fewer benefits for an individual. Therefore, if we incorporate the tax/benefit system in measuring the marginal returns to education, rather than solely gross earnings, we may find that the redistributive nature of the tax/benefit system may create varying benefits to education to different individuals across the income distribution. From a fiscal viewpoint, this would suggest that as an individual's income rises with education, government revenue should also see an increase, while its expenditure should fall. It also suggests that the net private benefit from education may not be as pronounced as when changes in gross earnings are solely taken as the measure of benefit.

The specification of the returns to education in both Equations (2) and (3) assumes that changes in earnings capture the full benefit of investing in education. This ignores the possible employment effect of education. Britton et al. (2015) and Oreopoulos and Petronijevic (2013) show, for Great Britain and the US respectively, that higher levels of education reduce the probability of being unemployed. Therefore, it can be implied that an individual that makes the transition from unemployment to employment due to extra education will see a high return to that education. Conversely, the return may be close to zero if an individual does not enter or leave the labour market post-education.

Integrating such factors in measuring the return to the individual may also help facilitate measurement of the fiscal returns. The possible interaction of education and tax/benefit liabilities implies that analysing the changes in taxes and benefits from a change in education relative to the public cost of this extra education can provide an estimate of the return the government receives from investing in education.

With respect to studies that have utilised the Mincerian approach, the role of the tax system has been incorporated in some studies by using net earnings in place of gross earnings in their estimations.[2] For example, this has been undertaken in an Irish context by Denny and Harmon (2001) using data from 1987. They found that marginal returns to education were 2% lower for males and 3% lower for females using net rather than gross earnings as their dependent variable. However, this and other international estimates using net earnings ignore the role of labour force participation effects in measuring the net return to the individual from extra education. Furthermore, this framework does not facilitate the measurement of fiscal returns to education.

As mentioned in Sect. 9.1, a small number of studies have attempted to explicitly incorporate both a more detailed impact on overall gross income levels and the tax/benefit system into the measure of returns to education. In this chapter we follow the methodology outlined in Flannery and O'Donoghue (2016). Specifically, the net private return to third level education is:

$$r_{private} = \frac{\left[\left(1 - \mathrm{ss}_{\mathrm{ee}} - t\right) \times \left(\mathrm{p\_e}_{\mathrm{w}} \times \left(\mathrm{Y}_{HE} - \mathrm{Y}_{\mathrm{Upp\,Sec}}\right)\right)\right] + \left(\mathrm{bY}_{HE} - \mathrm{bY}_{\mathrm{UppSec}}\right)}{\left[\left(1 - \mathrm{ss}_{\mathrm{ee}} - t\right) \times \left(\mathrm{p\_e}_{\mathrm{s}} \times \mathrm{Y}_{\mathrm{n}}\right)\right] + E_p + \mathrm{bY}_{\mathrm{n}}} \quad (4)$$

Here, the numerator sums the net benefits to the individual from a change in education while the dominator reflects the costs to the individual from the same change. Specifically, $\mathrm{Y}_{HE} - \mathrm{Y}_{\mathrm{UppSec}}$ is the change in gross earnings in moving from upper secondary education to gaining a third level degree (or above). If we assume that gross wages increase as this change is made, this should be positive. However, this may be related to whether an individual is in work or not, which is accounted for with the probability term $\mathrm{p\_e}_{\mathrm{w}}$.

The term $\mathrm{ss}_{\mathrm{ee}}$ is the employee rate of social insurance contributions while t is the income tax rate, all of which are conditional on gross earnings and the probability of being in work. bY_{HE} represents the benefits received if the highest level of education attained is a third level degree or above, while $\mathrm{bY}_{\mathrm{UppSec}}$ signifies the benefits that one might receive with

upper secondary education. These benefits (such as unemployment benefit) are generally dependent on gross earnings. Therefore, benefits with a higher level of education may be expected to be lower in a progressive tax/benefit system, and thus the term $bY_{HE} - bY_{UppSec}$ is expected to lower the return to the individual.

On the cost side, $Y_n = Y_1' - Y_0'$ and is the net wage foregone during schooling (Y_1' is the foregone wage while in education and Y_0' is the wage while a student) and p_e_s is the probability of being employed while in education. The term ss_{ee} is the employee social insurance contribution, t is the income tax rate, both of which will be dependent on Y_n. bY_n are the benefits foregone while in education and may include benefits such as unemployment assistance. E_p is the direct private costs involved in moving from one level of education to another. The net private return is therefore the value $r_{private}$ takes when the ratio of the marginal benefits and marginal costs is calculated.

In terms of the fiscal return to education, this is specified as:

$$r_{fiscal} = \frac{\left[\left(ss_{ee} + ss_{er} + t\right) \times \left(p\_emp_w \times \left(Y_{HE} - Y_{UppSec}\right)\right)\right] - \left(bY_{HE} - bY_{UppSee}\right)}{\left[\left(ss_{ee} + ss_{er} + t\right) \times \left(p\_e_s \times Y_n\right)\right] - bY_n + E_g} \tag{5}$$

Net benefits to the state are now the numerator of our equation while costs to the state constitute our denominator. In summary, Equation (5) illustrates that higher employment probabilities and higher earnings from a change in education levels may induce higher tax and social insurance revenues while lowering benefits. This may then represent a positive return to the state. There are some common terms across Equations (4) and (5) and their description remains the same. However, some of the terms change sign compared to Equation (4) to reflect the fiscal viewpoint. For instance, the term $bY_{HE} - bY_{UppSec}$ is now subtracted within the numerator, as the expected drop in benefits received from increasing education will now create a positive fiscal return to the state. We also add the term ss_{er} to the numerator to capture *employer* social insurance contributions.

The cost element in the denominator of the fiscal return to education is similar to Equation (4). However, they are again adjusted to reflect the measurement of the return to the state rather than the individual. Higher levels of social insurance and income tax amounts foregone due to extra education now reduce the return, while the term E_g replaces the direct private cost of education and represents the public cost of varying education levels. The fiscal return is the value r_{fiscal} when the ratio of the marginal benefits and marginal costs of education to the state are calculated.

9.2.3 The Non-Pecuniary Returns to Education

In addition to any monetary return an individual may receive from extra education, there are also potential non-pecuniary returns. For example, those with higher levels of education have been shown to have higher levels of self-reported health (SRH) measures, job satisfaction and general happiness (Hartog and Oosterbeek 1998; Oreopoulos and Salvanes 2011). The work of Grossman (1972) forms the basis for exploring the relationship between health and education. This suggests that individuals with higher levels of education are more efficient producers of health; they make better choices regarding diet and exercise habits and avail of medical interventions when required. As Hartog and Oosterbeek (1998) noted, this relationship may be muddied somewhat by a variety of endogeneity and reverse causality issues, but they summarised that existing empirical evidence does suggest that the positive relationship between health and education is a direct result of the latter. Eide and Showalter (2011) provide a useful summary of the more recent literature to explore this topic, with Siles (2009) and Oreopoulos (2006) examples of studies that have found a causal link between education and health outcomes for the UK and US respectively.

Early empirical studies that explored the topic of happiness in an economic context include Easterlin (1974) and Scitovsky (1975). These focused upon the link between income and happiness at a country level, with the former giving rise to the 'Easterlin Paradox'; the concept that

rising income levels do not increase happiness. Ferrer-i-Carbone and Frijters (2004) provide a more recent summary of studies that have followed. These have generally involved a move towards using more micro-based measures of subjective well-being to explore the relationship between a variety of factors such as education, income, health and happiness. Specifically from an education viewpoint, Castriota (2006) reviewed the main literature to empirically test its impact on subjective measures of happiness. The overriding conclusion was a positive link between the two.

In an Irish context, there are numerous studies that have attempted to explain variations in measures of health and happiness. These have used different indicators of health and happiness such as levels of mental stress, rates of suicide, macro-level data, as well as subjective well-being measures. Madden (2014) provides a useful summary of these with the most relevant studies to this chapter including Madden (2011), Madden (2015) and Walsh (2011). The latter used a macro-level dataset to show well-being in Ireland has not increased as incomes have risen. The other two studies used more micro-level data (European Union Survey on Income and Living Conditions [EU-SILC]) to explore variations in happiness, health, and subjective well-being measures. However, none of these studies explicitly explored the relationship between education, and in particular third level education, and health or happiness. Other studies such as Cullinan and Gillespie (2016) have used Growing Up in Ireland survey data to investigate the impact of being overweight on SRH in Ireland, while using education levels as a control variable. However, they do not report the impact of the education estimates. In other studies, Oreopoulos (2007) used Northern Irish data to show the positive impact of additional upper secondary education on health and happiness outcomes. O'Sullivan (2012) found a positive link between higher levels of education and health outcomes in later life using a sample of men aged 50–65 years. In summary, studies that explicitly investigate the potential link between health and happiness outcomes and higher education for Ireland are rare and none have utilised the dataset to be used in this analysis.

9.3 Data and Methods

As noted in Flannery and O'Donoghue (2016), the main data requirements for calculating the net private and fiscal returns as specified in Equations (4) and (5) are a detailed micro-level dataset and an associated tax-benefit microsimulation model.[3] The data for our analysis comes from the Irish component of EU-SILC. This is a cross-sectional and longitudinal micro dataset containing income, social, demographic and labour market variables at the individual and household levels. The data has been collected on an annual basis since 2003 with the estimates in this analysis using the information from the 2014 wave. The data is collected from a representative population sample from across Ireland and is weighted to reflect independent population estimates and to correct for possible attrition. The data is collected on an annual basis with the 2014 wave having over 12,000 observations, over 9000 of which are aged over 16 years.

This data specifically includes information on an individual's highest level of education attained across six categories, namely primary education, lower secondary, upper secondary, post Leaving Certificate, third level non-degree and third level degree or above. Flannery and O'Donoghue (2016) provide a helpful step-by-step guide to estimating Equations (4) and (5) and an adapted version of these steps is outlined here:

1. The SILC dataset for the year 2014 was used as an input in a static tax/benefit microsimulation model to estimate the taxes and benefits that accrue to each individual for that year, based on their reported income and employment status;
2. Using the SILC dataset, simple OLS/logistic regression models estimated the 'market' returns to third level education by quantifying the impact of gaining a third level degree (or above) on labour market outcomes and gross earnings, compared to only having upper secondary education as one's highest level of education;
3. From these estimations, we held all other controls constant and simulated an increase in the level of education to third level degree (or

above) for those with upper secondary education only in the sample. We then predicted new labour market outcomes, earnings and other income amounts from this simulation;
4. With the new labour market outcomes and earnings levels we recalculated the new taxes and benefits for each individual using the tax/benefit microsimulation model;
5. This provided a 'before and after' picture of earnings and labour market outcomes, as well as the change in government taxes and benefits from a change in education level from upper secondary to tertiary. When both the direct and indirect costs of education were included (details below), the net private and fiscal returns to higher education as outlined in Equations (4) and (5) were calculated.

The private (E_p) and public (E_g) costs of education are also required to calculate our private and fiscal returns to third level education. To facilitate this we use expenditure per student at tertiary level education from HEA (2014). To separate the burden of this cost across private/public contributions we multiply by the public/private share as outlined in HEA (2014).[4] The annual private and public cost figures are then multiplied by 3.5[5] to obtain the costs in changing education levels from upper secondary to tertiary.

The indirect costs of education for the private returns ($p\_e_s \times Y_n$) is measured using the cross-sectional weighted averages of earnings (Y_n) of those aged 18–22 years with upper secondary as their highest level of education attained, in work and not in education. To obtain our finalised foregone earnings measure, this is then multiplied by an employment probability (p_e_s), calculated as the probability of being employed when aged 18–22 years and having upper secondary as one's highest level of education attained.

For the indirect costs relating to the public returns to education, a similar methodology is used. However, it is the foregone taxes, benefits and social contributions that are needed. To this end, the tax and social contribution rules to the level of foregone earnings calculated above are applied and used in Equation (5). The foregone benefit term bY_n is specified as the average benefit received from those in work reduced by the

average benefit received by individuals while in education and in work. This completes the terms required to calculate each of the cost elements of the fiscal and net private returns to education.

The estimation of the non-pecuniary returns to education follows a more simplified approach. The data used comes from the Irish module of the European Social Survey (ESS) for 2014. Much like the SILC data, the ESS is cross-sectional microdata. However, unlike the SILC dataset it contains detailed information on a variety of subjective well-being measures, such as indices of happiness and health. It also collects information on education, demographic and income variables at the individual level. The data has been collected on a bi-annual basis since 2002 and samples just over 2000 (2390 for 2014) representative individuals in Ireland for each wave.

The subjective indicator of happiness[6] within the ESS is segmented into 11 categories (0–10), ranging from extremely unhappy (0) to extremely happy (10). To explore the possible correlation between level of education and self-reported happiness, we estimate an ordered probit model with the 11 indicators of happiness as the dependent variable. This is regressed against highest level of education attained, with other factors such as income group, gender, age and parental education level included as control variables.

The indicator of health[7] is broken into five categories (1–5) within the ESS, ranging from very bad (1) to very good (5). However, few people indicated that their health status is within the bottom two categories—only 2.7% of the sample cumulatively. Therefore, for our analysis we follow the approach of Oreopoulos and Salvanes (2011) and make the distinction between only those that indicate very good health and those that do not indicate that they are in very good health. We then use a binary probit model to estimate the correlation between whether an individual indicates they are in very good health and level of education. Other explanatory variables include income group, gender, age, parental education level and a measure of body mass index based upon self-reported height and weight measurements within the ESS.

9.4 Empirical Results

9.4.1 Net Private and Fiscal Returns

Table 9.2 presents the results of the average net private and fiscal marginal returns to third level education for Ireland in 2014. The overall average results, as well as the breakdown across gender, are shown. We see that with an average rate of return of 37.6%, there is a significant private benefit to obtaining a third level degree in Ireland. Given that this figure accounts for the variations in taxes and benefits, as well as the employment effects of such a change in education, the net effect of completing third level education in Ireland offers a significant labour market premium. This figure is slightly below those found in previous years by Barrett et al. (2002) and McGuinness et al. (2008). Given the differences in methodologies employed and datasets used between these studies and the one presented here, it is difficult to know the exact reasons for this. However, we may conjecture that as both these previous studies used gross returns in their estimations, our results may indicate that positive employment and negative tax/benefit and private cost effects of gaining a third level degree lower the private return to higher education compared to the more standard Mincerian estimations.

While not presented here, it is important to note that the breakdown of our private return estimate shows that the particularly low opportunity cost to third level education in 2014 is one reason for this high private return. This reflects the relatively poor labour market conditions for young people in Ireland at the time. For instance, if we include the

Table 9.2 Average net private and fiscal returns to third level education for Ireland for 2014

	Private	Fiscal
Overall average (%)	37.6	69.1
Male (%)	43.5	82.3
Female (%)	32.7	53.9

Note: This sample includes all those aged over 16 years and not in full time education

Source: Authors' calculations based on EU-SILC data for 2014

foregone earnings figure (as specified in Sect. 9.3) using the 2008 SILC wave, rather than 2014, we find that the private return to education decreases to 25%. The role of low opportunity costs in the scale of these may help explain the growth in participation in third level education in Ireland across the period 2008–14. It also suggests that these returns may fall as the Irish labour market recovers.

Our results also show a significant return to the state from investing in third level education, with an estimated public return of 69.1%. This is higher than the net private return and can be explained by a number of factors. Firstly, changes to the income tax and social insurance system in Ireland in the years preceding 2014 resulted in relatively high marginal tax rates (51%) in Ireland for incomes above €32,000. Given that over the life-cycle many graduates would earn above this amount, the public return to third level education investments would be expected to be significant. Secondly, as mentioned earlier, the sample year coincided with a weak labour market for young people in Ireland. This implies that both the low taxes foregone and high benefits saved by the state in having young people in third level education helped create a high public return to this investment. If these factors are not accounted for in the calculation of public returns, the estimate falls to 44%. Finally, the high public return for 2014 is a function of the decreased public contribution to the costs of higher education, combined with a decreasing expenditure total. For example, if we include the 2007 figure for public expenditure per student in our calculations we find that the public return decreases significantly to 38%. In summary, our results illustrate that due to changes in government taxes and expenditure during the recent economic crisis in Ireland, the 2014 estimate for the fiscal return to third level education is exceptionally high. This suggests that investment in higher education during times of recession derives a particularly high return for the state.

Table 9.2 also segments the net private and fiscal return for 2014 by gender. McGuinness et al. (2008) previously found higher returns to third level education for females compared to males. However, similar to Flannery and O'Donoghue (2016), our results indicate that when other market effects and the tax/benefit system are accounted for, the private returns to education to males are higher than to females. The same is also

true for the fiscal return to third level education with returns of 82% and 54% respectively for male and females. This reflects the fact that men are more likely to be in the higher tax bands and so face higher marginal tax rates on average compared to females. It is also explained by the fact that males were more affected by Ireland's weak labour market compared to females and so low taxes foregone and high benefits saved are greater for males in our estimations.

9.4.2 Happiness and Health Status

Table 9.3 shows the relationship between self-reported happiness and level of education, having controlled from a variety of socioeconomic factors. These are presented as the predicted probabilities for each happiness category by education level and are derived from the estimated ordered probit models. Overall, the distribution of happiness indicators suggests that an individual is more likely to be in the upper end of the distribution as they accrue higher levels of education. However, the results in Table 9.3 indicate that this relationship may not be monotonic in nature, as we find that those with the lowest educational attainment are more likely to report higher levels of happiness compared to those with a lower secondary education. This would seem a somewhat counter-intuitive finding but must be viewed in the context of the reduced-form specification used here. Nonetheless, this does raise some interesting questions about the non-pecuniary returns to lower levels of education.

Given the main focus of the chapter relates to higher education, we next compare the distribution of happiness indicators for those with lower or upper secondary education with those with third level education. We find that the latter are more likely to be in the higher end of the distribution of the self-reported happiness indicator. Specifically we see that given the same level of income, gender, age and parental education level, those with third level education are about 4 percentage points (ppts) more likely to be in the highest happiness category and 3 ppts more likely to be in the second highest category, compared to those with upper secondary education. Given the rather simple model used to estimate this relationship, it is important not to draw any causal inference.

Table 9.3 Predicted probabilities of happiness categories by education level

Highest education attained	Happiness index										
	Extremely unhappy										*Extremely happy*
	0	1	2	3	4	5	6	7	8	9	10
Primary education or below	0.005	0.003	0.012	0.023	0.034	0.095	0.104	0.194	0.304	0.132	0.091
Lower secondary	0.006	0.004	0.013	0.025	0.037	0.100	0.107	0.197	0.299	0.126	0.084
Upper secondary (including post-secondary non-tertiary)	0.004	0.003	0.011	0.022	0.032	0.091	0.101	0.192	0.307	0.136	0.095
Third level degree or beyond	0.002	0.002	0.007	0.015	0.024	0.071	0.086	0.177	0.319	0.162	0.133

Note: These are the predicted probabilities of each happiness category by education level from an ordered probit model estimated with a range of socioeconomic controls

Source: Authors' calculations based on European Social Survey data for 2014

Table 9.4 Predicted probability of indicating very good health by education level

Highest education attained	Probability of indicating very good health
Primary education or below	0.165
Lower secondary	0.332
Upper secondary (including post-secondary non-tertiary)	0.413
Third level degree or beyond	0.443

Note: These are the predicted probabilities of responding as being in very good health in a subjective health measure by education level from a binary logit model estimated with a range of socioeconomic controls
Source: Authors' calculations based on European Social Survey data for 2014

However, the results do hint at some potentially important non-pecuniary returns to obtaining a third level qualification in Ireland.

Table 9.4 shows the predicted probabilities of reporting being in very good health by education level, derived from the binary probit model, and we find evidence of a strong positive association. This relationship is particularly pronounced when comparing those with primary education to individuals with a third level qualification; the predicted probability of reporting being in very good health more than doubles. There is also an appreciable increase of 3 ppts in the probability of reporting being in very good health for those with a third level qualification compared to those finishing education at upper secondary level.

Overall, these results show evidence consistent with some non-pecuniary returns to tertiary education in Ireland. Self-reported measures of happiness and health for those with a third level qualification are higher than for those with lower levels of education. Although the former relationship does not appear to be monotonic in nature, the results generally fit with the international trend of higher happiness and health for higher levels of education.

9.5 Conclusion

The main focus of empirical estimation of the private return to education has been based upon the relationship between gross earnings and education. The incorporation of the tax/benefit system, labour market

transitions and other possible interactions that may impact the returns to education have largely been ignored. The return to the state from this relationship between education, gross income and the tax/benefit system has also rarely featured in the literature. Furthermore, an explicit analysis of the non-pecuniary returns to third level education is lacking in an Irish context. In this chapter we build upon a previously used microsimulation methodology to estimate the net private and fiscal return to third level education for 2014. We also explore the relationship between higher education and subjective well-being measures related to happiness and health.

Our results show a large private return to obtaining a third level degree in Ireland, even after adjusting for unusually low opportunity costs within the labour market. In the policy context of higher education financing (as discussed in Chap. 10), these results show that despite increases in the student contribution to the cost of financing third level education in Ireland, there are still large returns for graduates. This finding may provide some justification for placing more of the financial burden upon the individual in the future. This is supported by the estimated non-monetary returns; we find tentative evidence that individuals with a third level qualification report higher measures of happiness and health compared to those at lower levels of education, controlling for income and other factors.

Our results also show evidence of a significant return on state investment in third level education. This leads to the understandable policy recommendation of increased educational investment, particularly in times of a depressed labour market. The transition of people from being unemployed and drawing down state benefits to being in third level education is found to be a significant driver of the high estimated public return. In terms of the debate surrounding higher education financing, the high fiscal return and possible happiness/health effects of increased education may lead to the suggestion that the state should invest more in third level education. However, given that both the public and private returns are quite large, the argument could be framed that both the individual and the state should both increase their contributions. The more macro-level contribution of higher education investment discussed in Chap. 8 of this book also lends support to this argument.

The results must be viewed in the context of some limitations however. Firstly, the estimated market effects of having a third level degree

on earnings uses a simple OLS framework rather than an instrumental variable (IV) approach. This was due to data constraints in finding a suitable instrument and may imply some endogeneity bias in the estimation of this relationship. However, Card (2001) and Harmon et al. (2002) acknowledge that some caution must be shown in relying on IV estimates, mainly due to choice of instrument. In an Irish context, Callan and Harmon (1999) suggest that OLS estimates for Ireland are not significantly biased downwards when compared to IV estimates. Also, given the large net private return estimated in our analysis, we are confident that any potential bias in the relationship between education and earnings would not skew the general trend observed.

It is also important to highlight that the estimates presented are averages. There may be heterogeneity within these figures driven by factors such as field of education and type of third level education received that we are unable to capture. Also, we do not explore the wider social returns to higher education. These include increased political stability, reduced crime levels, lower population growth, knowledge spill-overs and reduced income inequality (McMahon 2004, 2009). These are notoriously difficult to estimate and beyond the scope of this chapter. However, they present an opportunity for future research in the area and are important to acknowledge in the context of higher education financing. Finally, the results presented in this chapter only take one sample year in looking at the various estimated returns. Future work in the area may expand this analysis beyond 2014 to obtain the emerging trend in these estimates. It may also be helpful to expand the analysis outside of Ireland to provide an international context. Nonetheless, despite these possible limitations, the analysis presented here provides important evidence in relation to the public, private and non-pecuniary returns to third level education in Ireland.

Notes

1. See Psacharopoulos and Patrinos (2004) for a detailed discussion.
2. See Harmon et al. (2001, 2002) and Trostel et al. (2002) for a description of some of the international studies that have used net earnings in their estimations.

3. Static microsimulation models have been developed to primarily investigate the impact of tax and social benefit systems on individuals and households—see Merz (1991) and Gupta and Kapur (2000) for useful descriptions.
4. See Tables 10.1 and 10.2 of Chap. 10 in this book for more details.
5. A figure of 3.5 was chosen as different degree programmes have a length of three or four years in Ireland.
6. The question asked in the survey is: "Taking all things together, how happy would you say you are?"
7. The question asked in the survey is: "How is your physical and mental health in general?"

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