ESRI

Working Paper No. 436

May 2012

The Costs of Working in Ireland

Niamh Crilly[a], Anne Pentecost[b] and Richard S.J. Tol[c,d,e*]

Abstract: When in employment, after-tax income must be spent on childcare, required clothing and transport for example. These additional costs must be taken into account when analysing the motivation to work as not to do so could underestimate the incentives to take-up paid employment. Using data from the Irish Household Budget Survey, this paper takes a two-stage logit model and Hausman selection model to control for selection effects to estimate the additional costs an employed CES faces compared to an unemployed CES. The main finding is that the additional costs of working are highly significant at nearly €7000 per year without children; increasing to nearly €9000 per year with one child under the age of five. These substantial additional costs seriously hamper work incentives as it is shown that there is a 25-fold increase (without young children) in the number of individuals who have a higher income when unemployed than when in employment with the inclusion of these additional costs of working.

Key words: costs of working, work incentives

Corresponding Author: Richard Tol, Economics Department, Mantell Building, University of Sussex, Falmer, Brighton, BN1 9RF, r.tol@sussex.ac.uk

[a] European Central Bank, Frankfurt, Germany
[b] Economic and Social Research Institute, Dublin, Ireland
[c] Department of Economics, University of Sussex, United Kingdom
[d] Institute for Environmental Studies, Vrije Universiteit, Amsterdam, The Netherlands
[e] Department for Spatial Economics, Vrije Universiteit, Amsterdam, The Netherlands

The Costs of Working in Ireland

1. Introduction

Unemployment benefits are often compared to wages at the low end of the pay scale as the difference is one of the key incentives to work (Adam and Browne, 2010). That comparison is incomplete because spending patterns differ between the employed and the unemployed. This includes non-discrectionary spending. Work-related costs include transport, childcare, representative clothing and meals consumed away from home. Many analyses of work incentives fail to take these costs into account; however they can represent a significant proportion of the wages earned by an employee. Without taking such costs into consideration research into measures of financial work incentives may not provide an accurate picture of reality. In the existing literature it is childcare costs and female labour force participation incentives relating to childcare which are mostly looked at in great descriptive detail, for example Immervoll and Barber (2006) and Andrén (2002). This paper expands on the existing literature by taking a more analytical and comprehensive approach and by including costs other than childcare.

There are several different ways to approach the question of the incentives to work. When examining an individual's choice of whether to work or not to work, research often quotes the replacement rate or the participation rate (for example Immervoll and Barber, 2006 and Adam *et al.,* 2006). The replacement rate is the ratio of out-of-work income to in-work income; as such the higher the replacement rate, the lower the financial incentive to work. The marginal effective tax rate measures the incentive to work *more* or progress in the work place. A discussion of these measures using micro simulation techniques is carried out for Ireland in *Budget Perspectives 2012* (Callan *et al.*, 2011). While these measures of financial incentives provide a useful description of the effects of tax and welfare policy on the incentive to work, they do not account for those costs incurred by choosing to work, in the form of transport, childcare, appropriate clothing, food and so on.

Research carried out at the Institute for Fiscal Studies, detailed in *Financial Work Incentives in Britain (*Adam *et al., 2006),* points out that these work-related costs will have a "negative and important effect" (page 21) on work incentives. They estimate childcare costs for those not working, based on data for those in work, and show a weakening in financial incentives, however do not include these results in their main analysis. The authors also do not correct for selection effects. In the following we aim to correct for this selection bias and to include the additional costs of work.

Of course, one could go further and point out that even when all wages and costs are taken into account, the preferences of an individual or household must also be considered. There are non-financial incentives to work as well; some individuals may choose to work on principle, or to set an example for their children, even if the financial incentive to do so is quite weak. In such cases, expenditure on something like childcare may not be a work-related cost. In the following we correct for several factors (including sex, education and age, amongst others) in an attempt to isolate work-related expenditure on items such childcare and transport. The paper is set out as follows; Section 2 describes the data and methodology, Section 3 shows the results, Section 4 outlines the implications of the results and Section 5 concludes.

2. Data and Methodology

The data used is the 2004/2005 Household Budget Survey (CSO, 2007), which is a survey of a representative random sample of all private households in Ireland. In the 2004/2005 survey 6,884 household participated in the survey which is a return of 47%. The analysis in this paper examines only those in full-time employment and those who are unemployed on either a short-term and long-term basis as well as those undertaking home duties. The self-employed, students, retired and those in temporary employment schemes are omitted for the purposes of this analysis. This yields 4,028 households for inclusion in the analysis.

The HBS provides detailed information on the costs borne by a particular household on items such as transport and childcare. However this information is not available per individual but only per household. In the following analysis we use the 'Chief Economic Supporter' (CES) in each household as a reference person for the working status of the entire household. However work-related expenditure is not available for those households classed as unemployed. These costs must be inferred using the existing survey data. In the following we aim to estimate the various costs associated with working and their differences for employed and unemployed households. Given the set-up of the HBS only accounts for a sample of the total population it is necessary to have a population weighted grossing factor to in order to be able to apply the survey results to the whole population[1].

Table 1 summarises weekly expenditure on items of interest in this study related to work; that is childcare, transport, heat and light, clothing and food consumed away from home. Most average weekly expenditure is on transport and the smallest average expenditure is on childcare.

Tables 2 and 3 show the average weekly expenditure for a chief economic supporter in work (Table 2) and out of work (Table 3). Table 2 and 3 suggest that on average a CES who is in employment will typically have a higher weekly expenditure than those who are unemployed. The biggest difference is seen in transport costs with a difference of nearly €80 per week between at employed and unemployed CES. The smallest difference is seen in heat and light expenditure at nearly €6 per week, however this may be expected given that heating and lighting are necessities.

The independent variables are as follows. A binary 0-1 dummy is created where 1 denotes that the CES is in work and 0 denotes the CES to be unemployed. Most representatives in the dataset are employed with only 654 being unemployed. A binary dummy is also created for sex where 0 denote a male CES and 1 denotes a female CES; there is double the number of male CESs compared to female CESs in the dataset. Seven dummy variables are also created for education levels of the CES where education levels are classed as no formal education, primary level education, inter/junior/group certificate or O-level, leaving certificate or A-levels, sub degree, primary degree and a higher degree. Age dummies are also created for age ranges below 24, 25-34, 35-44, 45-54, 55-64, 65-74 and 75 upward. Retired CES's are also taken into account for ages 65 plus. A dummy is also created if the CES is part of a couple where 1 denotes marriage with spouse present and 0 otherwise. Variables also include the logarithms of disposable income of a household, total number

[1] The population weighted grossing factor only applies to the data in Table 1 and not the regression results.

of rooms in a household, total number of people in a household and the number of children under the age of five in a household.

In this paper two different estimation methods are used, a two-stage logit regression using an OLS as the second stage, after using the logit regression as a selection model and a Heckman selection model where appropriate. The logit regression is set-up such that it yields the probabilities of observing expenditure on each item of the additional costs of working for alternative characteristics of the CES. The main motivation for using the Heckman selection model is because there could be problems of sample selection bias. When estimating costs related to work not everyone in the population is estimated but only those in work, which leads to biased results as the choice of whether to work or not is not random. The Heckman selection model controls for the person's endogenous selection into the labour market. The first stage of the estimation is to establish whether to opt to pay for childcare, for example, and the factors which influence this decision and the second step thus estimates the factors which influence the intensity of childcare used. The correlation between the error terms of the two regressions is given by rho (ρ) which is significant when the two decisions are related; that is if rho is not equal to zero the Heckman selection is viable. The Heckman model is estimated by maximum likelihood and the coefficients estimated are marginal effects.

3. Results

3.1 Childcare

One of the most important costs faced by working parents is the need to organise, and often pay for, someone to look after their children during working hours. Childcare may be formal and centre-based or arranged through friends, family or neighbours.

Expensive childcare provides a disincentive for female labour force participation (Andrén, 2002). Immervoll and Barber (2006) comment that in some countries where the tax burdens are high, low income earners would have a higher disposable income if parents stayed at home with their children and received benefits. For this reason childcare costs can contribute to the unemployment trap (Holm *et al.*, 1999) as incentives to work are reduced if the income gained by paid employment is taken by childcare costs leaving an insignificant net financial gain.

Affordable and good-quality childcare services have a positive effect on labour market participation, particularly for females, consequently having an impact on gender equality and economic growth. Therefore it is in the interest of the state to provide affordable and good-quality services. Furthermore higher labour market participation throughout the working life of an individual decreases the likelihood of poverty in women and children (Jaumotte, 2005) given a consistent wage allows for savings to be made, especially for retirement or on the occasion of separation from a partner.

Affordable childcare services are also important for the development of the child; a crèche or Montessori school can provide a safe, stimulating and social environment for children which can have long-term benefits for socioeconomic integration (EC, 2009). The HBS records expenditure on childcare through a crèche or Montessori school, as well as care provided by a family member or friend. While childcare costs certainly do provide a disincentive to work for many people, it is

important to note that this is not the case for some households. A stay-at-home mother may enrol her children in a crèche - there is a plethora of existing research that cites the benefits of early social interaction for child development - or pay a family member to look after them at certain times.

Despite the well-known benefits of affordable and good-quality childcare, Ireland remains one of the most expensive countries in Europe to avail of these services. Irish childcare costs are high by European standards. Immervoll and Barber (2006) show net childcare costs for several European countries, by various family structure types. Ireland has the highest net cost under all scenarios (Figure A1 in Appendix). As an example the fees charged per month by childcare centres, per two-year old, for various European countries are displayed below for the year 2001 or latest year available. Ireland is seen to have very expensive childcare with 30% of a monthly wage being spent on childcare services. This figure is for the private sector, however; the figure for the public sector is lower with childcare costing 25% of a monthly wage but which is still above the average in Europe.

In the following, 'childcare' refers to payment for childcare in a crèche or elsewhere. In examining the influence of CES working status on childcare expenditure, variables controlled for include the logarithm of household disposable income, the logarithm of number of children under five, urban/rural location and the sex, age and education level of the CES.

The probability of observing childcare expenditure in a given household is fairly low in both cases as the need to spend on childcare only applies to those households with very young children. Only 919 households in the sample of 4028 have children under the age of five. In the overall sample used for analysis, only 11% of households have positive childcare expenditure. The probability of positive childcare expenditure increases when the Chief Economic Supporter is in work, to 0.40, from 0.13 when the CES is not in work. From the computed marginal effects if a CES goes from unemployment into employment an increase of 18% in childcare expenditure is observed. The regression passes the link test suggesting there are no omitted variables.

When the CES is female the probability of observing childcare expenditure is higher than for a male CES; 0.38 compared to 0.33 respectively. This seems reasonable as it is often the women who spend more time looking after children than the men (Hallberg & Klevmarken, 2003), thus childcare options must be found when the CES is female. The more children under five a household has the less likely childcare expenditure is observed. With one child under the age of 5 the probability of observing childcare is 0.37, which decreases with the addition of an extra child and with four children under the age of 5 the probability decreases to 0.28. This result is intuitive given childcare costs increase with the number of children – sibling discounts are often small – and thus the likelihood of opting for childcare decreases the more children a CES has to pay for. It is not possible to separate the effects of the different age groups of children under five as the dataset does not give this information. It can be postulated, however, that a child aged three to five may induce a higher likelihood of child care expenditure for parents than a new born baby[2] as a new born baby, for example, needs more care from its mother, however by the time a child reaches the age of three parents are more likely to enroll their child in day-care to enable them to socialise and prepare them for school. From

[2] Maternity leave covers the first six months of a newborn's life. Many crèches refuse younger babies. Paternity leave is a few days at best.

computing the marginal effects of the logit model other significant explanatory variables include log of disposable income (an increase induces 17% increase in the likelihood of child care expenditure) and the number of children less than five years old (an additional child induces a 10% decrease in likelihood of childcare expenditure). The age and education level of the CES are not significant.

The OLS regression (using the logarithm of childcare expenditure as the dependent variable) shows that if the CES is in work then child care expenditure increases by 63% and the coefficient is highly significant. The results do not control for a couple as the dummy variable for a couple is found to be insignificant and thus the results are not shown. The Ramsey test for higher order omitted variables does reject the null of no omitted higher order variables at the 5% level suggesting the relationship is non-linear as inclusion of higher order variables is needed. The R^2 is also fairly low (24%) suggesting the model does not fit the data well.

The Heckman selection model shows that the CES coefficient is insignificant in the regression equation, suggesting that having chosen childcare, work status does not affect how much is spent on childcare. This could be because crèches charge fixed costs and thus costs do not change whether a parent is in or out of work. The coefficient for a CES being in work in the selection equation is significant, however, suggesting the choice of putting children in childcare does depend on whether the CES is in employment. The rho coefficient shows a strong negative correlation which is significant and thus the Heckman model should be used as the null hypothesis of rho being equal to zero is rejected and thus stage 1 (selection equation) effects stage 2 of the regression. Lambda is significantly different from zero and thus sample selection bias is present which is corrected for by the Heckman model. The likelihood of paying for childcare depends upon the logarithm of disposable income, whether the CES is in work, the logarithm of the number of children less than five years old and if the CES is a woman. Given childcare is chosen the significant variable of choosing the intensity of is log of disposable income; an increase of 10% in the log of disposable income would raise the intensity of childcare expenditure by 3.1%.

3.2 Transport

In examining transport costs, only *current* transport expenditure is examined; capital expenses (such as the purchase of new vehicles, as well as receipts for the sale of second hand cars) are not accounted for.[3] In contrast to childcare, transport costs are incurred by the majority of households. However there are still a significant number with zero transport expenditure which merits the use of selection procedures. These include cases where the individuals in a household can walk to work or those who live in (or over) their place of work.[4] Commuting costs incorporate two aspects: the actual monetary value of a fare (bus/ rail or petrol of vehicle/ wear and tear) and also the value of time (Becker, 1965). This study does not investigate the value of time aspect of commuting costs as it is very difficult to quantify especially at the individual level.

[3] Some households included the sale of second hand vehicles in vehicle expenditure, leading to negative overall transport expenditure.

[4] This still does not include self-employed people working from home.

It is noted in the literature (White, 1977) that the time (either married or single) women commute is less than men's commuting time. This could be for several reasons: firstly women also tend to have the housekeeping roles; that is they cook and clean as well as have paid employment and thus it is necessary for them to have a smaller commuting time in order to be able to complete all their tasks. Secondly women tend to be the second wage earners in a household and thus are more flexible about their employment and choose to be closer to home and as costs of commuting are related to wages, women commute for less time than men as poorer people typically live closer to their employment than higher wage earners. Given this difference the estimation in this paper will control for sex of the CES. Also controlled for are the effects of the logarithm of household disposable income, the logarithm of the number of persons in the household, urban/rural location, if the vehicle of the household is owned and the age and education levels of the CES. The probabilities generated by the logit model are given in the table below.

The probability of positive transport expenditure is high regardless of the work status of the CES; being unemployed induces a probability of observing transport expenditure of 0.89 which increases to 1.00 when the CES is employed. This suggests all CESs who are in work have commuting costs. The model passes the link test suggesting no important omitted variables. Other significant driving forces of transport expenditure are logarithm of the number of people residing in a household and the number of vehicles owned per household. With an increase in the number of vehicles owned transport expenditure increases by 18%. The OLS results are shown below which suggest the work status of the CES is a significant determinant of transport expenditure.

The R^2 is reasonable at 43% but the null of the Ramsey reset test is rejected suggesting higher order variables are needed for inclusion in the model. Other significant variables include the log of disposable income, if vehicles are owned and the log of the number of residents in a household, all of which have a positive relationship with transport expenditure. Location is also significant and suggests that transport costs fall if a CES is an urban dweller which is intuitive as rural households include much of the commuter belt who have high commuting costs. Age is also a significant variable showing transport costs decrease with each age group. Again this is intuitive as retired people tend to travel less as they no longer have the need to commute. Education level of CES is also significant however the sex of the CES is insignificant.

Table 9 shows the rho coefficient is again strongly negative showing a correlation between the error terms of the two regressions. The use of the Heckman model is advised as the null that rho is equal to zero can be rejected and thus the Heckman estimation corrects for any selection bias an OLS regression would suffer from. Also lambda is significantly different from zero suggesting sample selection bias is present. The likelihood of having transport costs depends upon whether the CES is in work and also if the vehicle of the household is owned. Given that transport costs are incurred a CES in work is likely to pay 42% more on transport costs than those unemployed. Increasing the number of residents in the household increases transport costs by 34%. Living in an urban area reduces transport costs by 26% compared to those in rural areas.

The sex of the CES was found to be insignificant in all specifications and in the logit model the probability of observing transport expenditure was slightly lower for women than for men at 0.996 and 0.999 respectively but they are extremely close suggesting no real difference here between men

and women's expenditure on transport when being the CES which is the opposite finding of White (1977).

3.3 Heat and Light

All households need heat and light but perhaps more is spent on heating and lighting when the CES is in work as a higher disposable income may induce higher spending. On the other hand, people who are out of work may spend more time at home and thus use heat and lighting more. In the dataset there are some cases of zero heating and lighting. This could be due to households generating their own power, or using solar panels or something which involved a once off capital payment not seen here. Some households may have their energy needs subsidised by relatives or, more likely, the local authority. Another reason could be that heating and lighting is only needed when people are present in a house; it is not necessary all the time and hence zero values are observed when the household are at work, for example. Finally, there may be measurement error. The HBS is administered for a two week period. Although the data is supposed to be corrected for seasonality and infrequency of purchase, such corrections are imperfect. These cases, as they cannot be distinguished in the HBS dataset are dropped for the estimations. This means that a logit regression cannot be run as there is not a binary dependent variable (all heat and lighting expenditure is above zero). A Heckman model can also not be run as the selection part of the regression must be binary[5].

In the OLS regression the independent variables include the logarithm of the number of rooms, the logarithm of the number of people residing in a household, location and sex of the CES as well as the logarithm of disposable income.

The OLS regression does not reject the null of the Ramsey test that there are no higher order omitted variables as the test statistic is less than the critical value at 5%. The R^2 is fairly low (23%), however suggesting the model does not fit the data too well. The dummy variable denoting the CES to be employed is insignificant, however which suggests that heat and light expenditure does not depend on being in employment. The logarithm of the number of rooms and people residing in a household, as well as location (urban households spend less than rural households) seem to be the main driving forces of heat and light expenditure; an increase in the number of people residing in a household leads to an increase in heat and light expenditure of 32%, an increase in the number of rooms leads to an increase of 42% in heating and light expenditure and an urban household spends 11% less than a rural household. Age is also a driving force of heat and lighting expenditure; young people aged 25-34 spend the least but expenditure rises for the next to age groups (45-54 and 55-64) where joining these age groups leads to an increased expenditure of 6% and 12% respectively. The retired aged group see a decrease in expenditure of heat and light so from turning 65 expenditure falls by 23%. The logarithm of disposable income and sex of the CES are not significant.

[5] The zero values were left in the dataset in order to test a logit and Heckman regression however, for both models the coefficient for employment status of the CES was insignificant. The logit regression failed the link test suggesting misspecification of the model and the Heckman selection regression is not viable as rho is not statistically significantly different from zero and thus the two equations are not related.

3.4 Take-away Food

People in work often buy food away from home, be it in a lunch hour to save bringing a packed lunch every day or in the evening on the way home from work when there is no time to cook or a person is simply too tired to cook. Darian and Klein (1989) find by survey analysis that the number of hours a wife works is positively related to the number of meals purchased away from home especially during week days. More recently Lo and Tashiro (2011) find by regression analysis that the higher the income and the longer hours worked the more likely food is consumed away from home. They conclude that older people, larger and poorer households are more likely to prepare and eat food at home. Buying food away from home is an additional cost of working. Of course people not in work also buy take-away food and thus the use of the Heckman selection model is justified. The results below only show the outcomes of the regression for expenditure on food not cooked at home. The regression controls for the logarithm of the number of people in the household, the logarithm of disposable income, location, the sex and the work status of the CES as well as their age and education level.

The probability that take-away food is consumed is high for both cases (where the CES is or is not in work), however, it is substantially higher if the CES is in work; the probability of seeing positive expenditure on take-away food for an employed CES is 0.97! For an unemployed CES the probability is still high but only at 0.65. The coefficient of the work status of the CES is highly significant in the logit regression and the marginal effects suggest that a CES who enters employment observes an increase in expenditure of take-away food of 7.4%. The regression failed the link test, however suggesting there are important explanatory variables missing. A female CES is less likely to observe take-away food expenditure than a male CES with probabilities of 0.92 and 0.96 respectively however, both probabilities are very high. Urban dwellers are also more likely to have a positive take-away food expenditure than households residing in rural areas with probabilities of 0.95 and 0.94 respectively, but again, both probabilities are very high.

If the chief economic supporter is in work then food expenditure consumed away from home increases by 42% from the OLS regression results. The Ramsey test for higher order omitted variables does reject the null of no omitted higher order variables suggesting the specification is incorrect and higher order variables are needed for inclusion in the model. The R^2 again is fairly low suggesting the model does not fit the data well. A 10% increase in the logarithm of disposable income induces an increased expenditure on take away food by 7.6%. The age and education level of the CES seem to be insignificant drivers of take-away food expenditures as does the sex of the CES.

A Heckman selection model was also estimated, however, the rho parameter was found to be not statistically significantly different from zero and thus the two error terms of the selection and regression equations are not correlated and consequently a selection model is not viable as there is no selection bias and thus results are not reported here.

3.5 Clothing

Some companies like their employees to keep up a certain standard of appearance which necessitates the buying of professional clothing from impressive jewelry and watches, the correct shoes, bags and even to the correct hair style. All these items cost money which the employee has to

bare. The analysis carried out in this paper only covers those clothes bought (including dry cleaning and shoe repairs) in relation to work. If the CES is unemployed work style clothes may be bought for interviews, for example. The logit regression also controls for location, logarithm of disposable income, logarithm of the number of people residing in a household, sex of the CES, the relationship status of the CES as well as age and education level of the CES.

The probability of observing clothing expenditure is 0.67 for with the chief economic supporter being in work, which is just under double that where the CES is not in work. The logit regression passes the link test and thus additional variables will only be significant by chance. Computing the marginal effects it is possible to conclude that from being unemployed and entering employment clothing expenditure increases by 22%. Clothing expenditure also depends upon urban household location, logarithm of disposable income and also sex of the CES. The probability of observing positive expenditure on work clothing for an urban dweller is 0.63 which is greater than that for a rural dweller which is 0.58. Education is not significant; however age seems to be significant. The youngest age group (under 24) experiences the highest expenditure on work clothing and expenditure decreases the older the age group which is intuitive as younger people need to buy work clothes for the first time as they enter the job market, however a mature person may have already purchased work clothes in the past and thus only need to replace worn clothes when required.

The OLS regression results shown above suggest that the work status of the CES is not a significant driving factor of clothing expenditure. In fact the only significant variable is the logarithm of disposable income which shows an increase of 10% induces a 5% increase in clothing expenditure. The R^2 is very low at 7.6% suggesting the model does not fit the variation of the data well. The null hypothesis of the Ramsey test can be rejected suggesting that higher order variables have been omitted from the regression. This suggests that the decision to buy work related clothes is based on the work status of the CES but work status does not reflect the volume of clothes bought. The logit specification was also run splitting chief economic supporters by sex and the results are shown in the Appendix.

A Heckman selection regression was also undertaken, however the rho parameter is not statistically significantly different from zero and thus the selection equation and the regression equation are not related to each other and thus the Heckman model is therefore not viable as no selection bias is present.

4. Implications

The total costs of being in work compared to those of being out of work are now computed. This is done by running a simulation. The probability of observing additional working costs is multiplied by the appropriately averaged costs for that expenditure and summed to get total costs in and out of work; the difference is then taken get obtain the additional costs of being employed. For those estimations where the logit was insignificant (heat and lighting), the additional costs of being in work are zero and thus not necessary to be included here.

The average extra weekly expenditure is calculated in Table 15 below, where the probabilities of observing expenditure on food, transport and clothing when the CES is in work or out of work are

taken from the significant logit regression results of Section 3.1-3.5. Average expenditure is taken from Tables 2 and 3 where the total additional weekly costs are calculated by multiplying the respective probabilities by the average expenditure for each item. The total cost of transport for an unemployed CES is 26.92*0.889=23.93Euros per week, for example. Probabilities for childcare, however, are not included in order to give a representation of the costs for each particular scenario (a CES with no children under five years old, with one child under five and two children under five). It should be noted that CESs without children under five may have children in school and thus may still see a positive childcare expenditure from after school care.

By adding the total costs together it is possible to see that additional costs of working for an employed CES are 5.02 times those of an unemployed CES without children; for a CES in work a further €177.82 after tax should be deducted from their salary every week to account for clothing costs, take-away food costs and transport costs. This is compared to a deduction of €35.39 for an unemployed CES for the same costs. This difference amounts to €142.43 per week of additional costs of working. These extra costs amount to €6836.64 per year which is substantial. For households with one child under the ages of five the CES observes a €227.83 reduction in disposable income per week to account for in-work costs of living which is €185.86 per week more than for an unemployed CES with a child under five. The difference between having a single child under the age of five and no children needing childcare under the age of five for a working CES is €50.01 and for an unemployed CES the difference is much smaller at €6.58 per week.

We use the anonymised Survey on Income and Living Conditions (SILC) for Ireland to further illustrate the difference between in-work and out-of-work income. We estimate a Tobit model to estimate income when an individual is employed or not. A Tobit model is required as the data are censored given wages are only observed for those in work. The regression equation is constructed as follows[6] based on 2005 data to be consistent with the HBS.

$$lincome = a + b_1 sex + b_2 nationality + b_3 married + b_4 ed1 + b_5 ed2 + b_6 ed3 + b_7 ed4 + b_8 ed5 + b_9 manager + b_{10} prof + b_{11} tech + b_{12} sec + b_{13} craft + b_{14} sales + b_{15} mach + b_{16} protect + u \quad (1)$$

The dependent variable is the logarithm of weekly disposable income for an individual (annual disposable income divided by the 52 weeks in the year). The independent variables are a binary sex variable (1 denotes male), a binary married dummy (1 denotes married), binary nationality dummy (1 denotes Irish), binary education dummies for less than a junior certificate (ed1), junior certificate (ed2), leaving certificate (ed3), post school but less than tertiary degree (ed4) and tertiary degree (ed5). Also included are binary employment sector dummies for managers and administrators, professional, technical, secretaries and clerical, craft, sales, machine operative and lastly personal and protective services. Age and experience cannot be included as the anonymised SILC dataset does not capture these variables (there are only three age categories: child, working age and retirement age) and *u* is a random error term.

[6] Equation based on that used in Barrett *et al*., (2000) and Barrett *et al*., (1999).

The regression is run twice[7], firstly on the condition of employment then secondly on the condition of unemployment. This generates two series of income when in work and not, for otherwise identical individuals. This forms our baseline figure of the difference between in-work and out-of-work pay for each individual. From this baseline, the additional costs of working (the far right hand column in Table 15) were subtracted. Figure 2 shows only two scenarios against the baseline as the graph for zero children under 5 years old is very close to the no childcare scenario and the two children under 5 very close to the 1 child under 5 and thus not shown for clarity.[8]

Figure 2 shows that the additional costs of working could have a large effect on the incentives to work: far more people have a negative income difference (wage when unemployed is greater than when employed) when these extra costs are taken into account and of course, with childcare the difference is even larger. Figure 2 shows that under the baseline scenario 81 (1%) individuals have a higher income when unemployed. This compares to 1554 (25%) individuals when the additional costs are included without childcare and 2686 (44%) individuals with childcare for one or two children under five years old; the latter of which is just under half of the sample. This number falls to 1635 (26%) with no children under 5 years old.

5. Conclusion

This paper estimates the true cost of working, considering not just take home income but also incorporating all the additional costs, such as childcare, travel costs for commuting and appropriate clothing. Previous literature on the costs of working largely ignores these extra costs in estimations of the return to work. This paper thus extends the literature.

The evidence presented in this paper suggests that the costs of working are high. Expenditure is higher for those in work than out of work. For an employed person without children the additional costs of working sum to some €140 per week, or almost €7000 a year. This increases to €9000 when there are young children in the household!

The employed may have a higher disposable income but they spend more on clothing, transport, childcare and eating out. There is no significant impact of employment on heating and lighting expenditure. Employed people incur 5 times the costs of an unemployed person.

This is important for policy as it substantially affects the incentives to work. A comparison of take home pay shows that it does not pay to work for 1% of the population. However, a comparison of take home pay plus extra expenditures shows that 15% of the people without children, and 44% of people with children, are better off not working.

[7] Results of which can be found in Table A3 in the Appendix.

[8] This graph is of course only illustrative as the expenditure pattern is based on the HBS and the income pattern is based on the SILC. Although both surveys are representative of the Irish population, different people were interviewed.

References

Adam, S, Brewer, A and Shephard, A (2006). 'Financial Work Incentives in Britain: Comparisons over Time and Between Family Types', *The Institute for Fiscal Studies,* Working Paper 20.

Adam, S and Browne, J (2010). 'Redistribution, Work Incentives and Thirty Years of UK Tax and Benefit Reform', *The Institute for Fiscal Studies,* Working Paper 24.

Andrén, T (2003). 'Structural Model of Childcare, Welfare, and the Labor Supply of Single Mothers', *Labour Economics*, Vol. 10, No, 2, pp. 133-147.

Apps, P and Rees, R (2000). 'Household Production, Full Consumption and the Costs of Children', *IZA (Institute for the Study of Labor) Discussion Paper No. 157.*

Barrett, A, Callan, T and Nolan, B (1999). 'Rising Wage Inequality, Returns to Education and Labour Market Institutions: Evidence from Ireland', *British Journal of Industrial Relations,* Vol. 37, No. 1, pp. 77-100.

Barrett, A, FitzGerald, J and Nolan, B (2000). 'Earnings Inequality, Returns to Education and Immigration into Ireland', *Institute for the Study of Labour (IZA),* Discussion Paper no. 167.

Becker, G (1965). 'A Theory of the Allocation of Time', *The Economic Journal*, Vol. 75, No. 299, pp. 493-517.

Callan, T, Crilly, N, Keane, C, Walsh, J and Shúilleabháin, Á (2011). 'Tax, Welfare and Work Incentives*', Budget Perspectives 2012,* Economic and Social Research Institute; Dublin.

CSO (2007). 'Household Budget Survey 2004/2005', *Central Statistics Office*, Cork.

Darian, J and Klein, S (1989). 'Food Expenditure Patterns of Working-Wife Families: Meals Prepared Away From Home Versus Convenience Foods', *Journal of Consumer Policy*, Vol. 12, No, 2, pp139-164.

European Commission (2009). 'The Provision of Childcare Services: A Comparative Review of 30 European Countries,' Report prepared for the use of the European Commission's Directorate-General for Employment, Social Affairs and Equal Opportunities.

Hallberg, D and Klevmarken, A (2003). 'Time for Children: A Study of Parent's Time Allocation', *Journal of Population Economics*, Vol. 16, pp. 205-226.

Holm, P., Kyyra, T and Rantala, J (1999). 'Household Economic Incentives, the Unemployment Trap and the Probability of Finding a Job', *International Tax and Public Finance*, Vol. 6, No. 3, pp. 361–378.

Immervol, H and Barber, D (2006). 'Can Parent's Afford to Work? Childcare Costs, Tax-Benefit Policies and Work Incentives,' *Institute for the Study of Labor (IZA),* Discussion Paper No. 1932.

Jaumotte, F (2005). 'Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries', *presented at Labour Force Participation and Economic Growth Workshop*, OECD.

Lo, C and Tashiro, S (2011). 'Balancing Nutrition, Luxury and Time Constraints in Food preparation Choice', *China Agricultural Economic Review*, Vol. 3, No. 2, pp. 245-265.

White, M (1977). 'A Model of Residential Location Choice and Commuting by Men and Woman Workers', *Journal of Regional Science*, Vol. 17, No. 1, pp. 41-52.

Table 1: Weekly expenditure on various items, Household Budget Survey 2004/2005

	Childcare	Transport	Heat & Light	Clothing	Take-away food
Average	11.77	93.15	32.71	31.99	42.81
Std Dev	45.82	95.58	19.75	52.93	46.8
Min	0	0	0	0	0
Max	950	1293.66	416.77	577.48	450.75
No. of zero expenditure cases	3596	320	36	1563	389

Based on 4028 observations

Table 2: Weekly expenditure on various items, Household Budget Survey 2004/2005
CES employed

	Childcare	Transport	Heat & Light	Clothing	Take-away food
Average	13.88	106.30	33.66	36.11	49.10
Std Dev	49.72	97.61	18.09	55.93	47.82
Min	0	0	0	0	0
Max	950	1293.66	200.52	577.48	450.75
No. of zero expenditure cases	2947	50	23	1147	142

Based on 3361 observations

Table 3: Weekly expenditure on various items, Household Budget Survey 2004/2005
CES unemployed

	Childcare	Transport	Heat & Light	Clothing	Take-away food
Average	1.10	26.92	27.95	11.25	11.22
Std Dev	9.24	43.57	26.08	25.30	22.65
Min	0	0	0	0	0
Max	180	425.95	209.50	416.77	333.66
No. of zero expenditure cases	649	268	13	416	247

Based on 667 observations

Table 4: Logit results for childcare

Logit Equation	Pr(Childcare expenditure observed)
If CES in work	0.395
If CES not in work	0.127

Table 5: OLS regression results for childcare

Regression Equation	Coefficient	Standard Error	t statistic
If CES in work	0.631	0.221	2.73
Ramsey reset test	F(3, 318) = 3.40 Probability = (0.0182)		
R^2	0.2437		

Table 6: Heckman selection model results for childcare

Selection Equation	**Coefficient**	**Standard Error**	**Z statistic**
CES in work	0.508	0.191	2.65
Regression Equation			
CES in work	0.228	0.237	0.96
Lambda	-0.956	0.097	
Rho	-0.904	Chi2(1)= 27.55 Probability = 0.000	

Table 7: Logit results for transport

Logit equation	Pr(Transport expenditure observed)
If CES in work	1.000
If CES not in work	0.889

Table 8: OLS Regression results for transport

Regression Equation	Coefficient	Standard Error	t statistic
If CES in work	0.280	0.062	4.54
Ramsey reset test	F(3, 3690) = 6.15 Probability = 0.0004		
R^2	0.4279		

Table 9: Heckman selection model results for transport

Selection Equation	Coefficient	Standard Error	Z statistic
CES in work	0.631	0.199	3.18
Regression Equation			
CES in work	0.420	0.058	7.24
Lambda	-0.523	0.033	
Rho	-0.671	Chi2(1)= 174.84 Probability = 0.000	

Table 10: OLS regression results for Heat and light

Regression Equation	Coefficient	Standard Error	t statistic
CES in work	0.006	0.038	0.16
Ramsey reset test	F(3, 3972) = 4.56 Probability = (0.0034)		
R^2	0.226		

Table 11: Logit results for take-away food

Logit equation	Pr(Takeaway food expenditure observed)
If CES in work	0.966
If CES not in work	0.651

Table 12: OLS regression results for take-away food

Regression Equation	Coefficient	Standard Error	t statistic
CES in work	0.420	0.102	4.12
Ramsey reset test	F(3, 3620) = 8.20 Probability = (0.000)		
R^2	0.2478		

Table 13: Logit results for clothing

Logit equation	Pr(Clothing expenditure observed)
If CES in work	0.667
If CES not in work	0.369

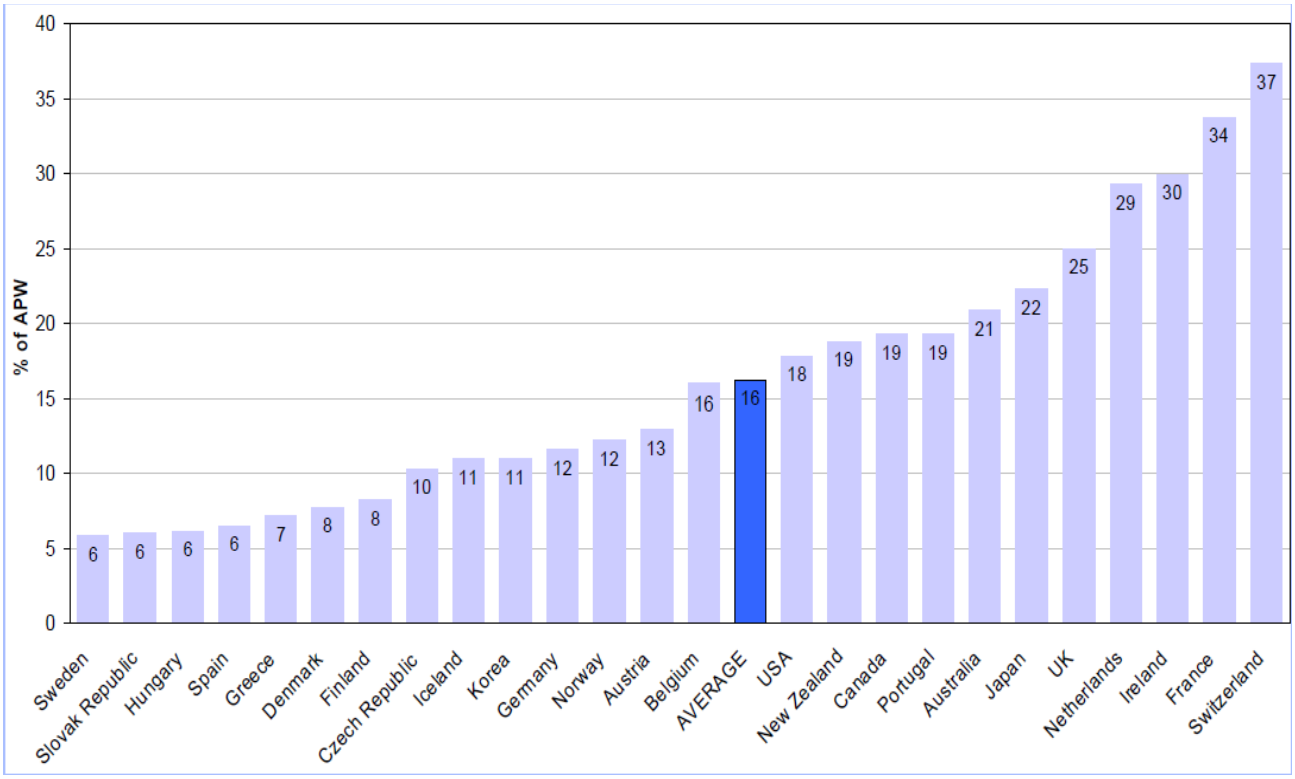
Table 14: OLS regression results for clothing

Regression Equation	Coefficient	Standard Error	t statistic
CES in work	0.102	0.120	0.93
Ramsey reset test	F(3, 2446) = 2.69 Probability = 0.0446		
R^2	0.0760		

Table 15: Extra average weekly expenditure for a CES

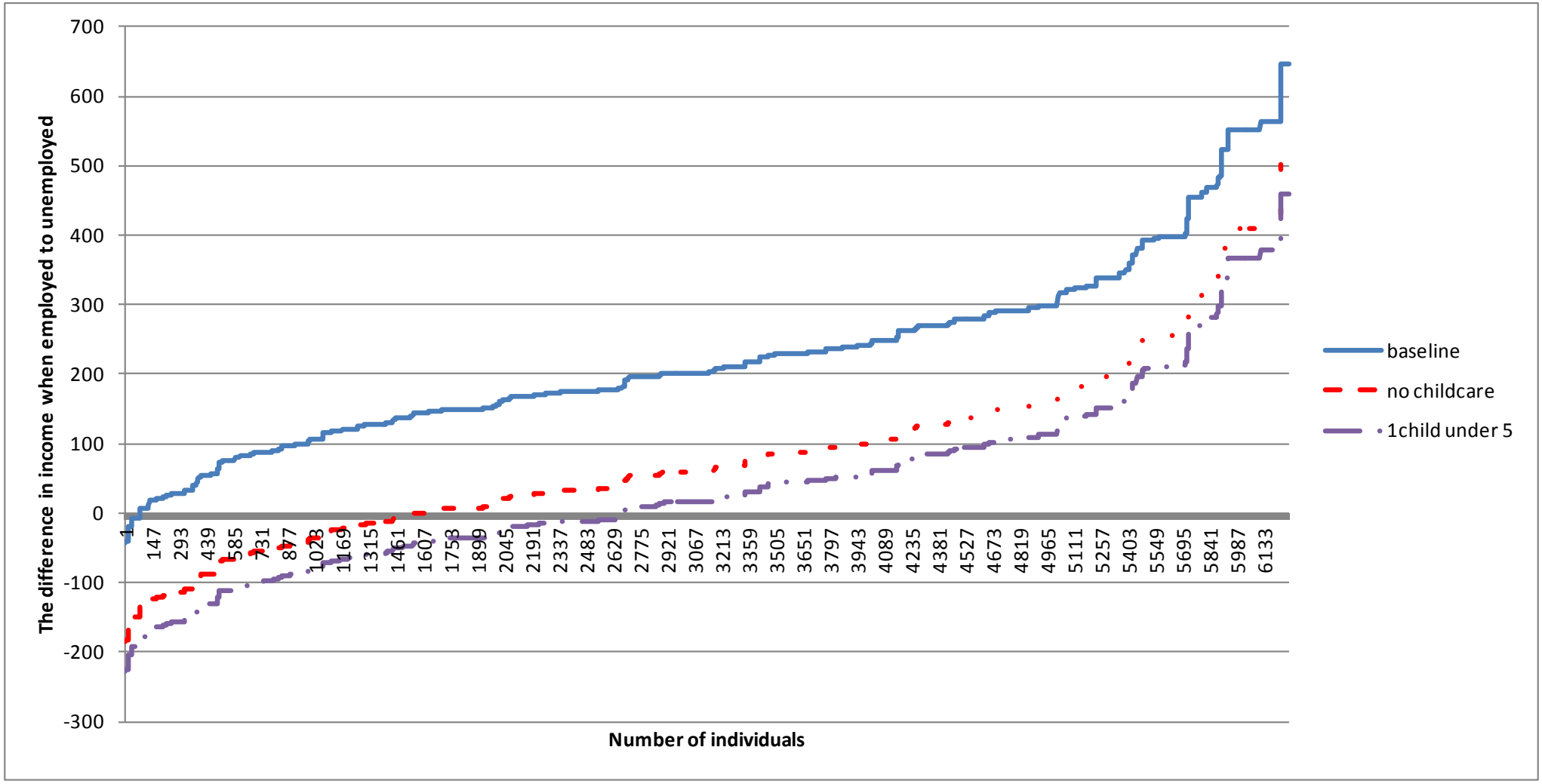
Childcare for 0 children under 5 (3109 observations)						
		Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
		3.02	0.00	3.02	0.00	
Childcare for 1 child under 5 (627 observations)						
		Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
		50.01	6.58	50.01	6.58	
Childcare for 2 children under 5 (262 observations)						
		Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
		49.66	3.98	49.66	3.98	
Transport expenditure observed						
Probability if in work	Probability if out of work	Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
1.000	0.889	106.30	26.92	106.30	23.93	
Take-away food expenditure observed						
Probability if in work	Probability if out of work	Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
0.966	0.651	49.10	11.22	47.43	7.30	
Clothing expenditure observed						
Probability if in work	Probability if out of work	Average expenditure if in work	Average expenditure if out of work	Total cost if in work	Total cost if out of work	
0.667	0.369	36.11	11.25	24.09	4.15	
Total extra weekly expenditure excluding childcare (€/week)				177.82	35.39	142.43
Total extra weekly expenditure including childcare for 0 children <5yr (€/week)				180.84	35.39	145.45
Total extra weekly expenditure including childcare for 1 child <5yr(€/week)				227.83	41.96	185.87
Total extra weekly expenditure including childcare for 2 children <5yr(€/week)				227.48	39.37	188.11

Figure 1: Fee per two-year old relative to average production wage (APW)



Source: Immervoll and Barber (2006)

Figure 2: The difference in weekly income when employed against being unemployed for each individual (€)



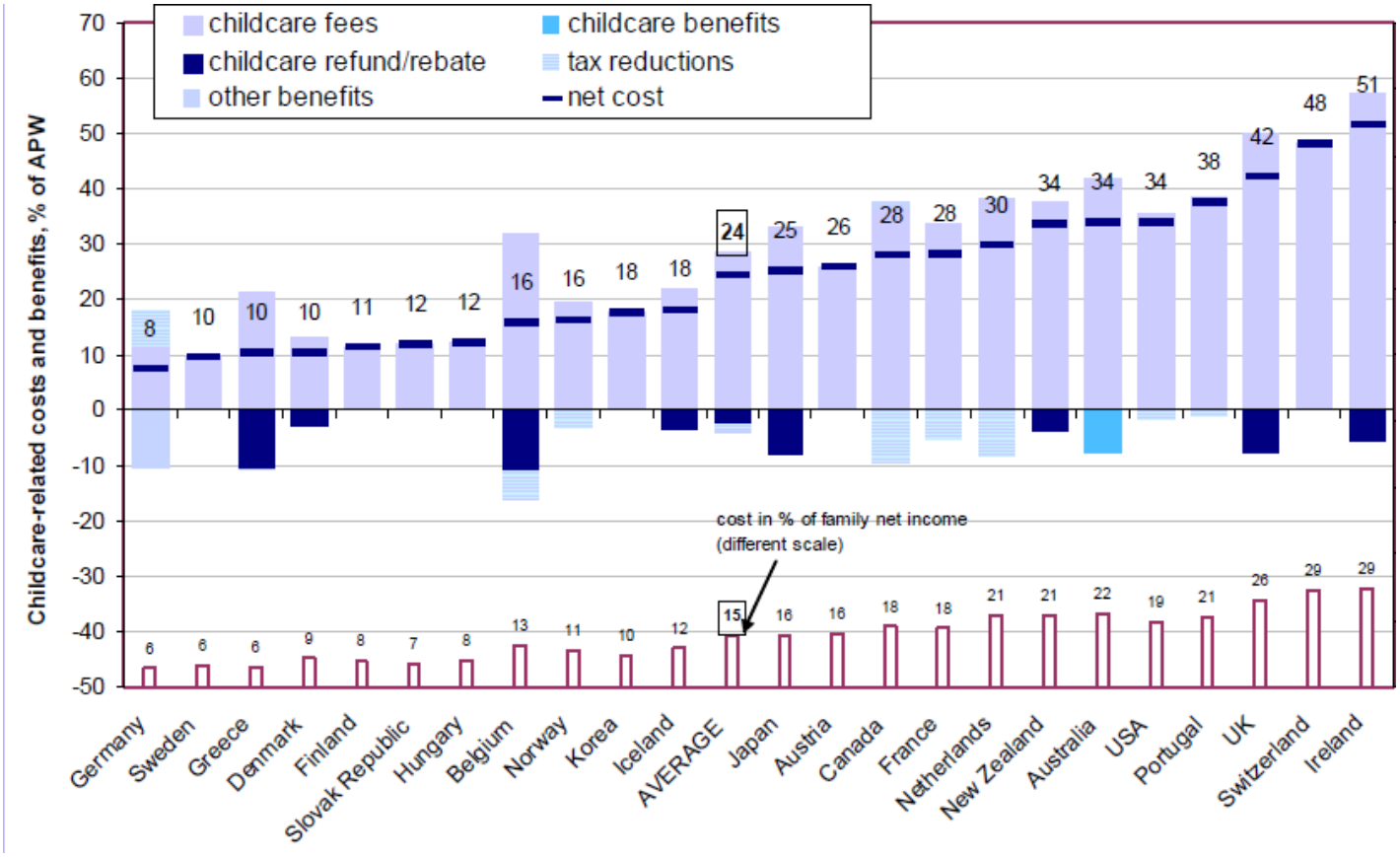
Appendix

Figure A1 depicts the net costs of childcare for selected European and OECD countries. Ireland has the highest even in net figures at 51% of a monthly wage paying childcare costs which is 27 percentage points above the average. When taking the whole family net income the cost of childcare in Ireland is still the most expensive at 29% but this is joint most expensive with Switzerland. The cheapest in Europe is Germany.

The regressions for clothing from Section 3.5 are run by sex however it is only the female regression which is significant; the logit for male CESs fails the link test suggesting misspecification and the work status of the CES is not significant in either the OLS selection regression or the logit regression thus only the female results will be shown here. This result suggests that the working costs for women who are CESs are potentially higher than those for male CESs.

The logit regression probabilities show that for a woman in work the probability of observing clothing expenditure is 0.54 which is reasonably high. This is higher than for an unemployed female CES who sees a likelihood of observing clothing expenditure of 0.29. The education level and age of the female CES are not significant drivers of clothing expenditure. Computing the marginal effects suggests that an urban female dweller (from being a rural dweller) raises clothing expenditure by 7.1%. Also an increase of 10% in the logarithm of disposable income induces a 0.84% increase in clothing expenditure and going into employment from being unemployed leads to an increase in clothing expenditure of 17%. The results for the OLS selection equation are shown below which suggest that the work status of a female is an important factor in the determination of clothing expenditure; a working female CES will increase clothing expenditure by 24%. The Ramsey reset test cannot reject the null hypothesis of no omitted higher order variables suggesting the specification is correct however, the R^2 is very low at 8.4% suggesting the model does not fit the data well.

Figure A1: Net childcare costs



Source: Immervol and Barber (2006).

Table A1: logit results for women CES clothing

Logit equation	Pr(Clothing expenditure observed)
If CES in work	0.541
If CES not in work	0.294

Table A2: OLS regression results for women CES clothing

Regression Equation	Coefficient	Standard Error	t statistic
CES in work	0.247	0.121	2.04
Ramsey reset test	F(3, 1996) = 1.77 Probability = 0.1505		
R^2	0.0841		

Table A3: Tobit regression results

VARIABLES	employed	unemployed
Married	0.23***	0.30***
	(0.017)	(0.104)
sex	0.35***	-0.00
	(0.019)	(0.116)
nationality	0.25***	0.08
	(0.038)	(0.190)
ed1	-0.34***	-0.09
	(0.030)	(0.151)
ed2	-0.21***	-0.10
	(0.028)	(0.153)
ed3	-0.16***	-0.16
	(0.025)	(0.168)
ed5	0.24***	0.03
	(0.029)	(0.228)
manager	0.19***	0.30
	(0.032)	(0.216)
professional	0.27***	0.57**
	(0.041)	(0.269)
technical	0.24***	0.12
	(0.039)	(0.275)
secretary	0.05	0.18
	(0.036)	(0.194)
craft	0.05	0.42***
	(0.037)	(0.140)
protection	-0.10***	0.29
	(0.036)	(0.198)
sales	-0.20***	0.44**
	(0.040)	(0.198)
Machine op	0.14***	0.47**
	(0.038)	(0.191)
Constant	5.44***	4.82***
	(0.048)	(0.233)
Observations	5,769	405

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Ed4 (post leaving certificate and less than tertiary degree) is dropped from the regression as there are no individuals within the sample with a qualification in this band.

Year	Number	Title /Author(s) ESRI Authors/Co-authors */talicised*
2012		
	435	Choice, Price and Service Characteristics in the Irish Broadband Market *Seán Lyons* and *Michael Savage*
	434	International Migration in Ireland, 2011 *Philip J. O'Connell, Corona Joyce* and *Mairéad Finn*
	433	The Potential for Segmentation of the Retail Market for Electricity in Ireland *Marie Hyland, Eimear Leahy* and Richard S.J. Tol
	432	Timing and Determinants of Local Residential Broadband Adoption: Evidence from Ireland *Seán Lyons*
	431	Obesity and Employment in Ireland: Moving Beyond BMI Irene Mosca
	430	Offshoring, Inward Investment and Export Performance in Ireland Frank Barry and *Adele Bergin*
	429	The Long Term Health Effects of Education *Vincent O Sullivan*
	428	Should Coal Replace Coal? Options for the Irish Electricity Market *Seán Diffney, Laura Malaguzzi Valeria and Darragh Walsh*
	427	Competition Policy in Ireland: A Good Recession? *Paul K. Gorecki*
	426	Socioeconomic Distribution of Emissions and Resource Use in Ireland *Seán Lyons, Anne Pentecost* and Richard S.J. Tol
	425	Behavioural Economics and Policymaking: Learning from the Early Adopters *Pete Lunn*
	424	The ESRI Energy Model *Valeria Di Cosmo, Marie Hyland*
	423	The Impact of Climate on Tourist Destination Choice Richard S.J. Tol and *Sharon Walsh*

For earlier *Working Papers* see

http://www.esri.ie/publications/search_for_a_working_pape/search_results/index.xml