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Abstract

How can poverty reduction be improved and at what cost? Available evidence suggests that social investment strategies and employment policies are important but not sufficient. In order to reduce the number of people below the relative at-risk-of-poverty threshold of the EU, countries must develop not only effective employment policies but also ensure adequate social protection. This implies increasing social transfers for working and non-working households, while protecting work incentives. In this paper we show that this is not a cheap option. We calculate the hypothetical cost of closing the poverty gap while maintaining the existing average labour market participation incentives at the bottom of the income distribution. We do it in three of the most developed welfare states of the EU, representing different welfare regimes, namely Belgium, Denmark and the United Kingdom. Results show that this would require around two times the budget needed to just lift all disposable household incomes to the poverty threshold. The cost would obviously be lower in countries with smaller poverty gaps and with weaker participation incentives. Furthermore, the results suggest that for anti-poverty strategies to be effective other factors should be considered more carefully, including the drivers of rising inequalities in market incomes, and especially the downward pressures on low wages, as well as the most appropriate magnitude of financial work incentives.

JEL: H23, H24, H53, I32, I38

Keywords: poverty gap, work incentives, redistribution, tax-benefit system, minimum income, in-work benefit

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1 Introduction

The lack of substantial progress in the fight against poverty stands in stark contrast to the ambitious policy goals formulated by the European Union (EU). Whereas the situation has worsened considerably after the onset of the 2007-08 economic crisis, it is mainly the lack of progress in the pre-crisis years that indicates the existence of important structural constraints. In the decade leading up to the economic downturn, despite years of growing employment and increasing average incomes, Europe failed to make substantial progress in combating relative income poverty, particularly among the working-age population. Certainly, Europeans became richer and material deprivation declined during this time period; however, relative income poverty, i.e. the proportion of individuals living on an income lower than 60 per cent of the median income in their country, remained at the level of approximately 16 per cent of the European population (Cantillon & Vandenbroucke, 2014). Of course, below the surface of an apparent stasis there were divergent national trends to be observed. Consistent increases of the at-risk-of-poverty rate were noticeable in the Nordic countries. There were clear and significant decreases in Ireland, the UK and in many of the new Member States, while other countries displayed no significant change (Corluy & Vandenbroucke, 2014). On average, however, poverty within the EU remained steady.

In many of the most developed welfare states of the EU, we can assume that an increasing inadequacy of minimum incomes contributed at least partially to disappointing poverty trends (Cantillon, Collado, & Van Mechelen, 2015). More in general, in the EU even in the most generous welfare states, current minimum income protection for jobless households fall short of the at-risk-of-poverty thresholds, in particular for families with children (Van Mechelen & Marchal, 2013). Moreover, although with large variations, in a large majority of the EU member states the wage floor too is inadequate for families with children (Marx, Marchal, & Nolan, 2013). Also, we should not forget that many retired persons are below the at-risk-of-poverty threshold, even though their risk of poverty has been falling in many countries over recent decades (Eurostat, 2015).

Recent decades saw the reorientation of social policy from more passive income compensation towards activation, social investment (Hemerijck, 2012) and “pre-distribution” (Hacker, 2011), i.e. preventing poverty through increasing employability and human capital. The European Commission has also embraced social investment “to ‘prepare’ people to confront life’s risks, rather than simply ‘repairing’ consequences” (European Commission, 2013). However, the available outcome indicators clearly suggest that, even before the crisis, this paradigm shift has not (yet?) achieved the desired poverty reduction (Cantillon & Vandenbroucke, 2014). Even if social investment strategies were to demonstrate some level of success in reducing poverty, these observations point to the lasting importance of adequate social protection to support those in and out of work.

For these and other (normative) reasons, some politicians and NGOs have proposed to increase minimum income support to the level of the at-risk-of-poverty threshold (see most notably the proposal for an EU directive by the European Anti-poverty Network in Van Lancker, 2010). In line with this, previous research has calculated the cost of mechanically closing the gap between the incomes of poor families and poverty thresholds (e.g. Cantillon, Van Mechelen, Pintelon, & Van den Heede, 2014; Vandenbroucke, Cantillon, Van Mechelen, Goedemé, & Van Lancker, 2013). These studies usually find that the amounts required to close the poverty gap in the developed welfare states of Northern

and Western Europe are sizeable, though they seem generally not beyond the capacity of these welfare states to generate. For example, they were between 1.9 to 2.7 per cent of total incomes in 2009 in the countries we study. However, given that in many European countries the lowest wages are below the at-risk-of-poverty threshold, such a measure in itself would result in considerable ‘unemployment traps’. In this way, any realistic proposal to eliminate poverty should take care that income in work exceeds income out of work.

Hence, in this paper we calculate the cost of closing the poverty gap while maintaining average financial participation incentives at the bottom of the income distribution in Belgium, Denmark and the United Kingdom (UK). These countries are three of the most developed welfare states of the EU and represent different welfare regimes. Results show that the amounts are around two times the budget needed to just lift all disposable household incomes to the poverty threshold. This highlights that the eradication of poverty in Europe would require substantial additional income redistribution. These findings point to the need to reconnect the discourses about poverty reduction on the one hand with those on rising market income inequality, downward pressures on low wages and the issue of adequate work incentives on the other.

The paper is structured as follows. Section 2 details the policy context. In section 3 we discuss the data and methods used. Section 4 presents the results and section 5 concludes.

2 Policy context: a social trilemma

We argue that the structural forces underlying the inadequacy of social protection can be understood as a ‘social trilemma’. We mean that as a consequence of mounting pressures on low productive segments of the labour market resulting from skill-biased technological change and increased global competition, it might have become difficult to achieve adequate income protection for those out of work while preserving sufficient financial work incentives, without increasing social spending for both those in and out of work^{1,2}.

In the past decades, EU15 countries seem to have struggled with the social trilemma so conceived. On the one hand, there were attempts to increase employment by reducing and tightening social protection for jobless households (Atkinson, 2010; Bartels & Pestel, 2015). For example, in less than half of EU15 countries the minimum social floor was raised in relation to poverty thresholds (Van Mechelen & Marchal, 2012). On the other hand, ‘gross-to-net’ efforts for households on low wages were increased in most countries (Immervoll, 2007; Marchal & Marx, 2015; Marx et al., 2013). Aligned with this, there is evidence that decreases in the number of jobless households were generally compensated by increases in poverty among the households which remained jobless. However, this

¹ Our trilemma refers to improving the social floor by increasing social transfers while not affecting employment through financial work incentives. Therefore, it does not consider other possible ways out of the trilemma such as measures affecting gross wages (e.g. higher minimum wages or working hours reallocations), non-monetary measures or others.

² This argument has some parallels with the notion of Iversen and Wren (1998) of a ‘social service trilemma’. These authors argued that advanced democracies facing the objectives of *wage* equality, employment and low public outlays for wages, could only pursue two of them as a consequence of their transition into service-dominated economies. In this way, the resemblance between the trilemmas is the idea of tough political trade-offs among policy objectives related to equality, employment and spending, whereas the difference rests on the specific policy objectives analysed and consequently on the mechanisms explaining the trade-offs.

was also accompanied by increased poverty among working households (Corluy & Vandenbroucke, 2014). This would mean that gross-to-net efforts for working households seemed to not have been enough (Cantillon et al., 2015). Furthermore, while the magnitude of these trends strongly differed across countries and time, not a single EU15 country achieved simultaneously an expansion in employment, a reduction in poverty, and a decrease of spending on cash transfers (Cantillon & Vandenbroucke, 2014). This paper provides further evidence to illustrate the complexity of simultaneously achieving all three elements of the social trilemma. Our hypothesis is that significant spending is necessary to reduce relative income poverty without substantially reducing work incentives.

3 Methods and data

3.1 Estimating the cost of reducing poverty

Previous research has already calculated the cost of closing the poverty gap. In this paper, we improve on these studies by estimating the cost of closing the poverty gap while maintaining average participation incentives at the bottom of the income distribution. To do so, we calculate the cost of an income-tested hypothetical transfer with a basic entitlement at the level of the poverty line from which net *earned* income is withdrawn at a lower rate than 100 per cent – while deducting net *non-earned* income at 100 per cent. The resulting hypothetical transfer is defined in equation 1. Given that earned income is withdrawn at a rate below 100 per cent, a part of the hypothetical transfer tops up incomes beyond the poverty threshold. We will refer to the total amount spent in excess of the poverty threshold as ‘leakage’.

$$Transfer = Max(0, poverty\ line - y_{net\ non-earned} - y_{net\ earned} * withdrawal\ rate) \quad (1)$$

Ideally, we would set the withdrawal rate the lowest possible to ensure financial incentives are sufficiently high. However, this would entail a high budgetary cost. For this reason, we take the existing situation in each country as our benchmark, and aim at maintaining the current level of participation incentives for low-income households. Given the very simple design of the hypothetical transfer, it is not possible to keep participation incentives at the same level for each individual or household separately, so we focus on the average level of participation incentives for the three bottom (equivalised household income) deciles, to which the hypothetical transfer would be primarily targeted. It is important to note that we do not take into account any behavioural reactions when estimating the cost of eliminating poverty.

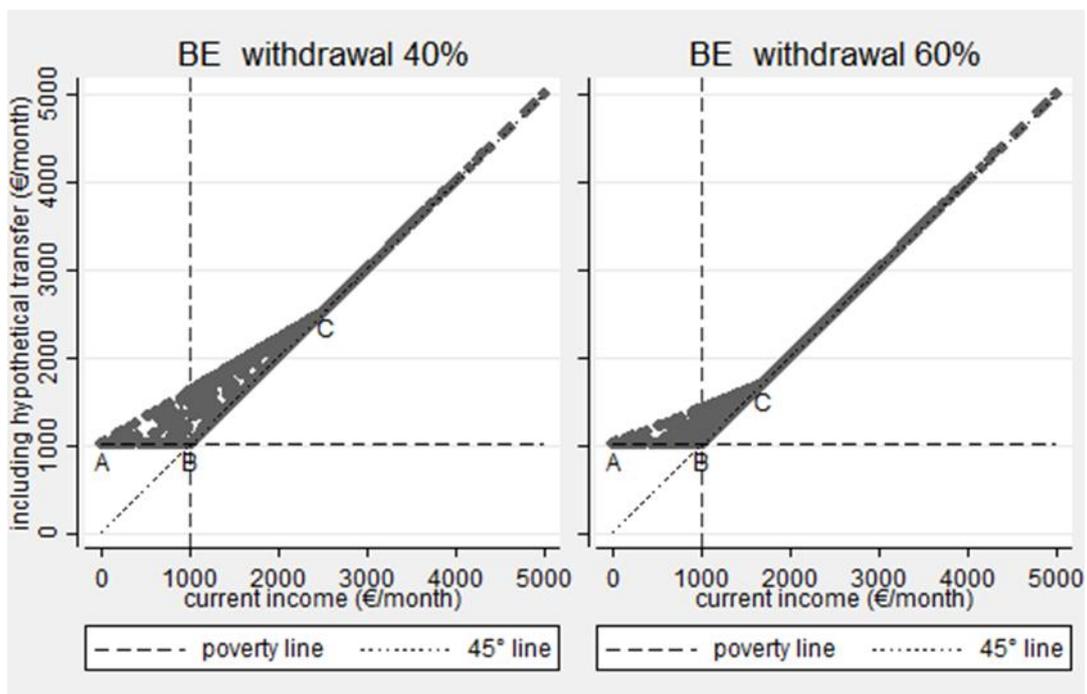
Earned and non-earned incomes are considered *net*, meaning that taxes and social contributions (including tax credits) arising from each source are subtracted from the respective *gross* components. The at-risk-of-poverty threshold is equal to 60 per cent of median equivalised household income using the modified OECD scale³. An important limitation of this study is that we do not specify how the new hypothetical transfer is funded, except that we assume implicitly that it does not directly affect the incomes of households in the bottom half of the income distribution. Costs will be presented as a

³ Given that the poverty line is defined as a percentage of the median disposable household income, the hypothetical transfer might push up the poverty line, resulting in a requirement for further increasing the transfer. However, in the current exercise we keep the poverty line fixed.

proportion of total net (non-equivalised) incomes to give an idea of the effort needed in relation to the remaining tax base.

Figure 1 exemplifies what closing the poverty gap, allowing for some leakage, would mean in terms of disposable household income, considering one-person households only. The x-axis represents current income, while the income including the hypothetical transfer is represented on the y-axis. Households with pre-transfer income below B (the at-risk-of-poverty threshold) and no earnings end up at the level of the poverty line (line A-B), while households with the same level of income, but only earnings move to the line A-C, as earnings are withdrawn from the transfer at a rate less than 100 per cent. The triangle A-B-C represents the amount of leakage: part of the transfer that is paid in excess of the poverty line, including households that were not below the threshold anyway (those in the area between B and C). For all households to the right of C (the break-even point), the transfer is zero and post-transfer income is always equal to pre-transfer income.

Figure 1. The impact on disposable household incomes of closing the poverty gap while allowing leakage, scatterplot of disposable household income of single-person households, before and after the hypothetical transfer, Belgium 2011



Source: EUROMOD simulated data 2011

Note: figures include only one-person households with positive disposable incomes

As shown in the two charts of Figure 1, the withdrawal rate of the hypothetical transfer defines the steepness of the line A-C, and the amount of leakage. It also determines where in the pre-transfer income distribution the intersection point C is located, above which no household would receive the transfer. At a withdrawal rate of 40 per cent, the triangle A-B-C is much larger than at a withdrawal rate of 60 per cent, implying greater costs. On the other hand, households with earnings below C end up at a higher post-transfer income, implying that incentives to work are stronger. In this way, the steepness and the intersection point defined by different withdrawal rates represent the trade-off between incentives and financial costs. Our methodology then boils down to i) finding the withdrawal rate that maintains average participation incentives at the bottom of the income distribution and ii) calculating the financial cost of closing the poverty gap with that amount of leakage.

3.2 Measuring work incentives

Financial work incentives are usually measured in two ways: participation tax rates (PTRs) and effective marginal tax rates (EMTRs) (e.g. Immervoll, Kleven, Kreiner, & Saez, 2007; OECD, 2005, 2009, 2014a). PTRs are used to measure the financial incentive to start working, in comparison to not working at all. This is often called the incentives at the ‘extensive margin’. It is also possible to look at the intensive margin on the basis of EMTRs, a measure of the financial incentive to work more hours. In this paper, we are primarily concerned with participation incentives, as they include jobless households who are the poorest ones and as changes in participation in many cases have a larger impact on household income. Also, behavioural responses at the extensive margin tend to be larger than at the intensive one (Bargain, Orsini, & Peichl, 2014). The general formula of PTRs is expressed in equation 2:

$$PTR = 1 - \frac{(\text{household net income in work}) - (\text{household net income out of work})}{\text{individual gross wage in work}} \quad (2)$$

PTRs can be understood as one minus how much disposable income people gain when entering/staying in the labour market in comparison with the income they receive when they are not working, in relation to their *individual* gross wages. Alternatively, they can be interpreted as how much of a person’s gross income is taxed away when a person enters/stays in the labour market, be it explicitly through income taxes and social insurance contributions or implicitly through the loss of benefits. We use this specific measure to represent the financial incentives constraint of the social trilemma. At least in Germany, Bartels and Pestel (2015) showed that PTRs indeed change the likelihood of a person taking up employment which supports their usage in this context.

To calculate the PTR of each person available for work, both the disposable household income in and out of work must be calculated. To do so, in each status we verify the benefits households and their members are entitled to and calculate the corresponding taxes and social contributions. PTRs are only calculated for persons available for the labour market (hereby excluding pensioners, students, disabled or sick, or family workers not available), living in households composed by either couples or singles, with or without children. The reason for selecting this subsample⁴ is that PTRs assume that decisions to work are based on pooled household incomes, an assumption which is difficult to make in other household types (e.g. how do households with two working parents and a working child pool their incomes?). Though we examine this subsample for the calculation of PTRs, the costs of eradicating poverty are calculated and presented for the full population. Note also that PTRs take into account household incomes but they represent an individual measure of incentives. Therefore, we calculate PTRs separately for each partner in a couple: one time modifying the labour income of one partner, keeping constant the labour income of the other partner, and then vice versa. Some additional assumptions and calculations must be made in each labour market status.

1. Calculating in-work incomes of persons currently out of work: it is necessary to make a prediction about the hourly wage that these persons would receive if they were working. This is done by a so-called Heckman selection model in which we use information of people currently in work to estimate an hourly wage for persons currently not working. A Heckman selection model is used to try to control for sample selection bias given that those currently in work might have

⁴ People living in households belonging to our subsample are the lowest in the UK where they represent 62 per cent of the total population, and the highest in Denmark where they represent 68 per cent. As a percentage of the people living in households with at least one person available for work, they represent from 77 per cent in the UK to 93 per cent in Denmark.

unobserved characteristics different from those currently out of work. We assume that persons currently out of work would work full-time (38 hours), and this for the whole year.

2. Calculating out-of-work incomes of persons currently out of work: for those indicated in the dataset as recipients of an unemployment benefit, we simulate the amount of this benefit. As unemployment benefits are earnings-related in Belgium and Denmark (not in the UK) and to be consistent with the previous step, for the simulation we utilise the predicted hourly wage recalculated to a full-time full-year basis. We assume that this wage equals the wage received in the previous year so we deflate it. For persons who are indicated in the dataset as not receiving an unemployment benefit, we verify whether their households are entitled to social assistance.
3. Calculating in-work incomes of persons currently in work: to make PTRs comparable between those not working and those working different amounts of hours or working only a part of the year, observed wages of people in work are also recalculated to a full-time full-year basis.
4. Calculating out-of-work incomes of persons currently in work: we verify whether these persons would be eligible to receive an unemployment benefit, taking into account work history. The amount of this benefit is calculated on the basis of their observed wage. To be consistent with previous steps, this wage is recalculated to a full-time full-year basis, deflated to the previous year and if a person is not eligible for unemployment benefit, we verify whether her households is entitled to social assistance.

Taken the different assumptions into account, we probably underestimate the height of the PTRs⁵. Extra details on PTRs calculations and results of the Heckman selection model can be found in Appendix A.

3.3 Data and the microsimulation model

In order to calculate the cost of closing the poverty gap (with some leakage), we make use of the EU-SILC data (wave 2012 version 3). Income data refer to the year before the survey year (except for the UK where it refers to the survey year), whereas information on the household composition refers to the survey year.

For calculating PTRs, information is required on both incomes in work, and incomes out of work, while we can observe only one of both. We simulate the missing information by making use of the microsimulation model EUROMOD⁶. With EUROMOD, it is possible to calculate net incomes, given people's gross wage and household characteristics. The most recent EUROMOD input datasets are generally available for the income year 2011, so we consider this year's fiscal and social policies. In the case of the UK, EUROMOD estimations rely on the Family Resource Survey (FRS) data of 2012/2013, rather than EU-SILC 2012 data. As FRS monetary values correspond to 2012, they are (downward) adjusted for inflation in EUROMOD. Negative self-employment incomes are bottom coded to zero in EUROMOD. When we estimate work incentives, we assume full take-up of benefits. We do this to estimate the hypothetical budget constraint as imposed by tax-benefit system, regardless whether or not people

⁵ It is presumable that not all the unemployed would work full-time full-year (FTFY) and that an important portion would do it not full-time full-year (NFTFY). PTRs for workers NFTFY tend to be somewhat higher than for FTFY workers (OECD, 2009). Therefore, assuming that potential and current NFTFY workers work FTFY probably replaces their PTRs for lower ones.

⁶ EUROMOD is a EU tax-benefit microsimulation model that operates on micro data and follows the country-specific tax-benefit rules (Figari, Paulus, & Sutherland, 2015; Sutherland & Figari, 2013).

make full use of it. The PTRs estimated with the help of EUROMOD are used to calculate the withdrawal rate that maintains the same average level of participation incentives for households at the bottom of the income distribution. To calculate the financial cost of closing the poverty gap using these withdrawal rates, we make use of the observed variables of the EU-SILC data. In this non-simulated data we also bottom code to zero negative self-employment incomes and, in contrast to Eurostat practice, do not include the imputed value of company cars as part of disposable income in order to be consistent with the EUROMOD simulated datasets.

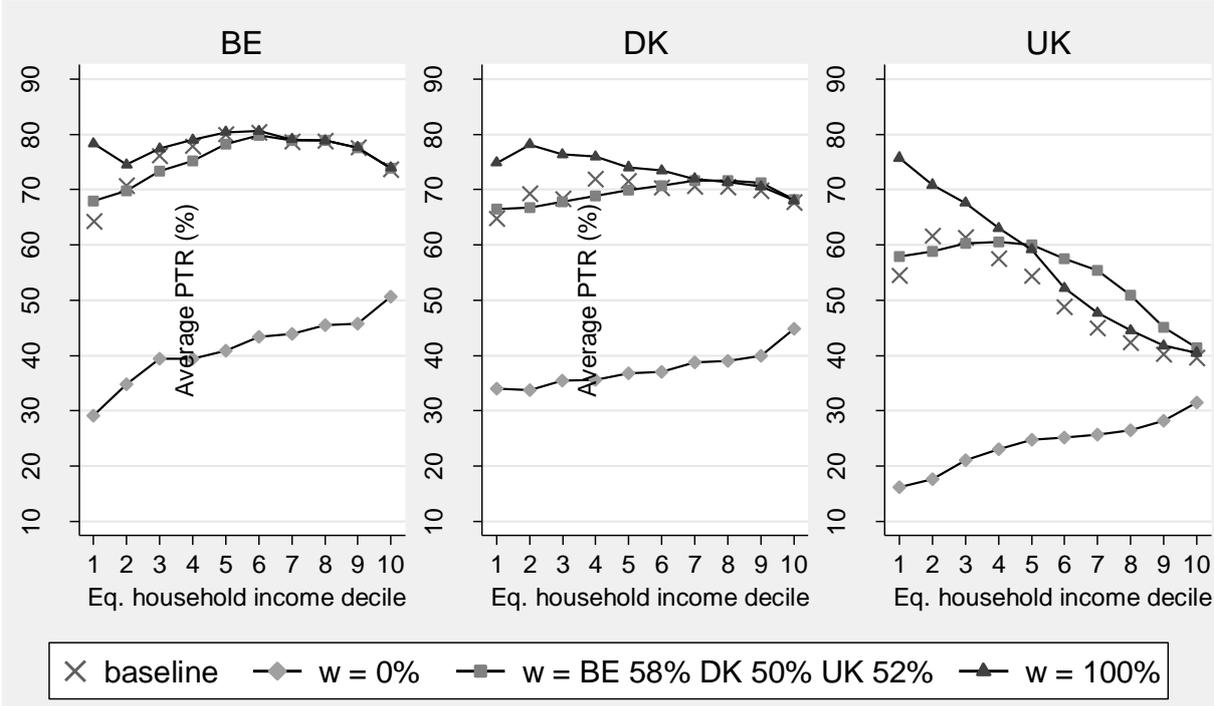
In equation 1 describing the hypothetical transfer we distinguished between earned and non-earned income components (see Appendix B). Allocating taxes and social contributions to net earned and non-earned incomes is not always possible. In those cases, we allocate them proportionally to gross earned and non-earned incomes⁷. In addition, in the EU-SILC data some earned and non-earned components are included in the same variable. For instance, in the UK tax credits are included in the same variable as social assistance. This implies that in the EUROMOD data tax credits in the UK are correctly treated as earned income when calculating financial incentives, whereas in the EU-SILC data they are considered as non-earned income when calculating financial costs. Consequently, for cases in which earned income components are included in a variable on non-earned income, we are underestimating the financial cost, as in that case they are fully deducted from the hypothetical transfer.

4 Results

We begin by showing in Figure 2 the impact on participation incentives of using different withdrawal rates of the hypothetical transfer to close the poverty gap. We remind that earned income components are withdrawn at a rate of less than 100 per cent from the basic entitlement set at the poverty line, whereas non-earned components - e.g. unemployment benefits and social assistance - are fully withdrawn. Thus, as the withdrawal rate increases, less households pass the 'income-test' (i.e. the withdrawn part surpasses the basic entitlement) and the difference between the remaining in- and out-of-work transfers becomes smaller, which increases PTRs (cf. equation 2). Withdrawal rates of 58, 50 and 52 per cent maintain current average PTRs for the first three income deciles in Belgium, Denmark and the UK.

⁷ The caveat of this approximation is that it does not include different treatments to both types of incomes which might provoke some misallocations in the hypothetical transfer. This can be caused by e.g. different tax schedules for each source of income or the fact that some benefits are fully or partially exempted from taxation.

Figure 2. Participation incentives when applying different withdrawal rates (w) of the hypothetical transfer to close the poverty gap, 2011

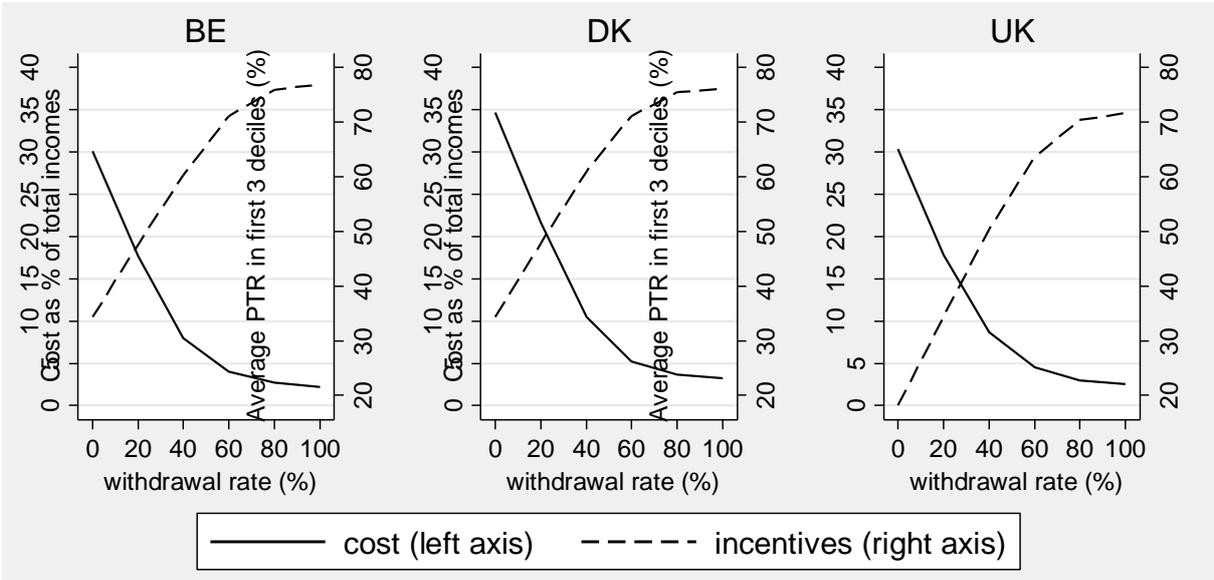


Source: EUROMOD simulated data 2011

At the same time, since higher withdrawal rates imply supplementing less in-work incomes and a more stringent ‘income-test’ (cf. Figure 1), they represent a lower cost⁸. Figure 3 shows that closing the poverty gap not withdrawing at all the transfer amounts to more than 30 per cent of total incomes, while closing the poverty gap without taking into account work incentives (with a withdrawal rate of 100 per cent) would amount to less than five per cent of total incomes.

⁸ For some non-earners in single-earner couples, PTRs can be decreasing in the withdrawal rate (see e.g. in Figure 2 the top half of the income distribution in the UK at withdrawal rates of 52 and 100 per cent). This is because from certain withdrawal rates and above, some single-earner couples would pass the ‘income-test’ only when the non-earner partner remains out of work. In those cases, a higher withdrawal rate would lower the overspill and hence the value of the out-of-work option, while the value of the in-work option would stay unaffected, therefore, resulting in higher PTRs.

Figure 3. Trade-off between participation incentives and costs when applying different withdrawal rates of the hypothetical transfer to close the poverty gap, 2011



Source: SILC 2012 and EUROMOD simulated data 2011

Note: costs are estimated as a proportion of current total (non-equivalised) incomes

Now we present the exact cost and impact on incentives of lifting all incomes just up to the poverty line compared to including the extra expenditure ('leakage') needed to maintain participation incentives at the bottom of the income distribution. In Table 1 we show the estimates of the poverty headcount rate, the cost of closing the poverty gap and average PTRs in the first three equivalised household income deciles. The first column presents the current situation, i.e. before estimating the cost of closing the poverty gap. The second column shows the 'mechanical' cost (in relation to total net incomes) of only closing the gap up to the poverty line. This means not taking work incentives into account which is equal to applying a withdrawal rate of 100 per cent. The third column includes the 'leakage' needed to maintain the average PTRs in the first three income deciles at their present level.

Table 1. The cost of closing the poverty gap and PTR (in %)

Country	Indicator	Current scenario	Closing poverty gap with w = 100%	Closing poverty gap with w = BE 58% DK 50% UK 52%
BE	Poverty	15.0 [14.0,16.0]		
	Cost		2.2 [1.9,2.5]	4.2 [3.8,4.6]
	Bottom PTRs	70.2 [69.2,71.2]	76.9 [76.1,77.8]	70.3 [69.8,70.9]
DK	Poverty	12.9 [11.7,14.0]		
	Cost		3.2 [2.4,3.9]	7.1 [6.2,8.0]
	Bottom PTRs	66.9 [65.2,68.6]	76.1 [74.7,77.5]	67.0 [66.4,67.5]
UK	Poverty	15.4 [14.6,16.2]		
	Cost		2.5 [2.2,2.8]	5.7 [5.4,6.1]
	Bottom PTRs	58.9 [58.9,59.5]	71.7 [71.1,72.3]	59.0 [58.6,59.3]

Source: SILC and EUROMOD simulated data 2011

Note: bottom means average in the first three equivalised household income deciles; costs are estimated as a proportion of current total (non-equivalised) incomes; in squared brackets 90 per cent confidence intervals (CI); CI of poverty estimates take into account the sample design of SILC (Goedemé, 2011; Zardo Trindade & Goedemé, 2016), while for PTRs we only assume the household as primary sampling unit due to lack of sample design variables.

If we focus on the current situation in the first column of Table 1 and the cost of lifting incomes up to the poverty threshold in the second column, we see that Denmark presents the lowest poverty headcount but the highest cost⁹, which implies that poverty is less frequent but deep in this country. However, if households composed solely by students are removed, the estimate of the cost of closing the poverty gap in Denmark would be just one percentage point higher than in the UK. Belgium presents a higher poverty headcount but the lowest estimate of the cost of closing the poverty gap, while poverty estimates are slightly worse in the UK but these differences are not statistically significant.

When we analyse participation incentives, we see that Belgium combines the lowest cost estimate of closing ‘mechanically’ the poverty gap with the highest current PTRs. The UK presents a slightly higher cost estimate combined with the lowest PTRs, while Denmark has the highest cost estimate but in-between PTRs. It is interesting to mention that when calculating the in-work components of the formula of PTRs, in the UK the high average ratio of net in-work incomes to gross wages is achieved with the lowest effective taxation (i.e. balance between taxes and benefits) on low gross incomes.

⁹ Although the cost difference with the UK is only statistically significant at an 85 percent confidence level.

Effective taxation on low incomes in the UK actually does not affect the ratio between in-work incomes and gross wages, compared to decreases of 15 and 27 per cent in Belgium and Denmark.

The ‘mechanical’ cost of closing the poverty gap displayed in column 2 of Table 1 does not take work incentives into account. As aforementioned and indicated in the same column, in this case PTRs would worsen. Since some households might work less or not at all after these changes, the estimates at a withdrawal rate of 100 per cent are very likely an underestimation of the true cost of closing the poverty gap. As a consequence, if we want to close the poverty gaps in the three countries while maintaining existing average participation incentives at the bottom of the income distribution, we need to allow an important ‘leakage’ above the poverty line to working households. Due to different poverty gaps and participation incentives imposed by tax-benefit systems, these leakage costs vary considerably between Belgium, Denmark and the UK. In the third column, the cost includes the leakage needed to maintain the average PTRs in the first three income deciles at their present level. This is achieved with the withdrawal rates presented in Figure 2 of 58 per cent in Belgium, 50 per cent in Denmark and 52 per cent in the UK. In Belgium, closing the poverty gap while keeping average PTRs unchanged at the bottom of the income distribution would come at lower budgetary cost (4.2 per cent of total net incomes) compared to Denmark (7.1 per cent) and the UK (5.7 per cent)¹⁰. We remind that the source of funding is left unspecified, so any effects of increased taxes or contributions needed to finance the hypothetical transfer are not taken into account.

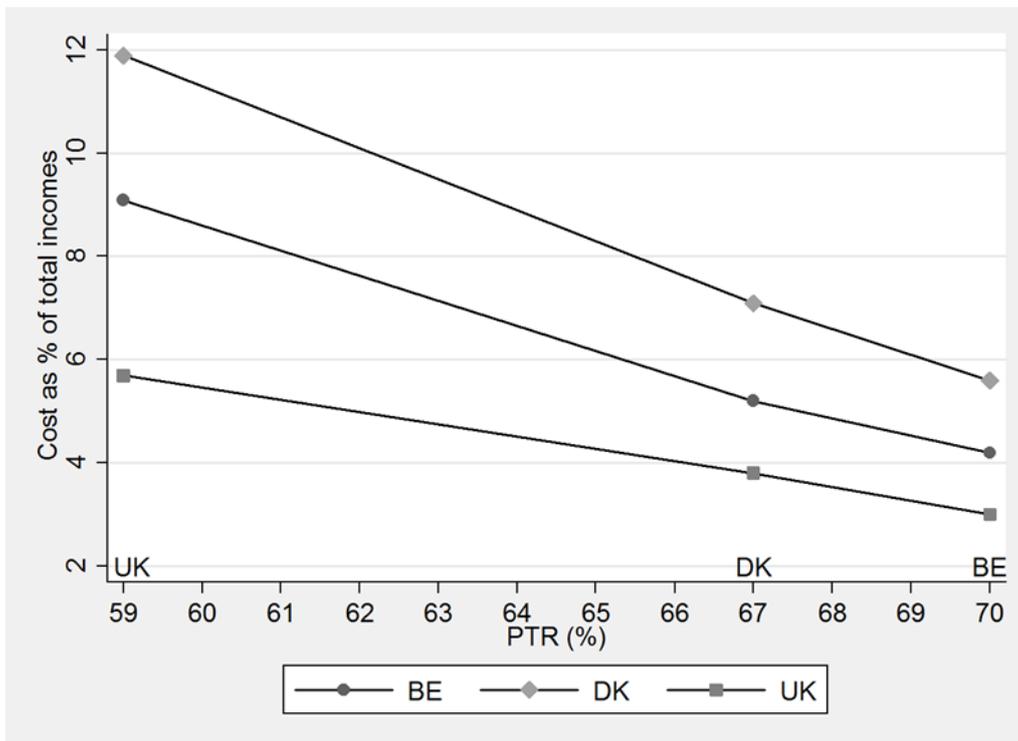
The cost would be the lowest in Belgium because currently this country presents the lowest cost of lifting incomes up to the poverty line and a comparatively low wedge between the in- and out-of-work incomes involved in the calculations of PTRs. As we close the poverty gap, the leakage needed to maintain low PTRs for working families is consequently relatively low - and can be achieved with a relatively high withdrawal rate. The opposite is the case for the UK, which has to maintain the largest wedge. Denmark presents the highest cost due to the relatively large cost of lifting incomes up to the poverty line and also because despite not having the largest wedge between in- and out-of-work incomes, it would allow the largest leakage. The reason why Denmark allows more leakage than the UK with an even slightly lower withdrawal rate is because the Scandinavian country would need to allocate around twice as much resources to household with earnings below the poverty line. As earnings are not fully withdrawn, having a higher density of earnings below the poverty threshold ends up being more costly.

The effort required to close the poverty gap maintaining participation incentives thus depends importantly on the current incentives in each country, which vary substantially. It is interesting to see in Figure 3 that at each level of PTRs, the withdrawal rate needed implies a cost of closing the poverty gap that is always the most costly in Denmark and the least in the UK. For example, achieving in all countries average PTRs of 50 percent at the bottom of the incomes distribution (without taking behavioural reactions into account), it requires withdrawal rates that imply costs of roughly 15, 20 and 10 per cent of total incomes in Belgium, Denmark and the UK. Similarly, in Figure 4 we look at the costs of closing the poverty gap in each country achieving its own and other countries’ average PTRs at the bottom of the income distribution. For instance, the required withdrawal rate for the UK to close the

¹⁰ As a percentage of GDP, amounts are around half: 1.8 in Belgium, 3.3 in Denmark and 2.9 in the UK. As a reference, social expenditure on cash benefits as a percentage of GDP in the branches of family (allowances and other), unemployment (compensation and severance pay) and other social policy areas (income maintenance and other) was 5.2 percent in Belgium and 2.9 per cent in Denmark and the UK (OECD, 2014b).

poverty gap without changing the average PTR of 59 per cent in the bottom deciles is 52 per cent. For Belgium and Denmark reaching the PTRs of the UK would be achieved at a withdrawal rate of 37 per cent, and therefore would be associated with substantially higher costs. The reason is that for reaching this average PTR, substantially more resources should flow to working (poor and non-poor) households in Belgium and Denmark as compared to current systems. In other words, the UK is already making a 'gross-to-net' effort that the other countries would need to make if they wanted to achieve stronger participation incentives. Defining what are appropriate incentives in each country is beyond the scope of this paper. However, the large differences suggest that in some countries, the magnitude of work incentives might be reconsidered.

Figure 4. The cost of closing the poverty gap to achieve other countries' average PTRs at the bottom of the income distribution



Source: SILC 2012

Note: Costs are estimated as a proportion of current total (non-equivalised) incomes. Country labels on top of x axis indicate current PTRs in the respective country.

Lastly, notice that keeping incentives at the extensive margin at the same level does not imply that those at the intensive margin will also remain constant: as earned income is withdrawn from the hypothetical transfer for working households, this is bound to increase EMTRs. To measure these incentives, EMTRs follow the same logic of PTRs but instead of a change in wages from not working to working, we use a marginal change in hours equal to five per cent, i.e. they represent how much of a person's gross income is taxed away when she works more hours¹¹. That being said, the effect of closing the poverty gap is rather different across countries due to important differences in current EMTRs. Average EMTRs in the lowest three income deciles are 45 per cent in Belgium, 40 per cent in Denmark and 63 per cent in the UK. Closing the poverty gap while allowing leakage to maintain average PTRs in the lowest three deciles of the income distribution would increase EMTRs to 68 per cent in

¹¹ Relevant assumptions of PTRs for people in work apply to EMTRs. The formula of EMTRs is $1 - \frac{y+5\%-y}{g+5\%-g}$.

Belgium, to 67 per cent in Denmark and just to 70 per cent in the UK. In this way, the results at both the intensive and the extensive margin reflect the nature of current tax-benefit systems and the interaction with the hypothetical transfer to close the poverty gap while allowing leakage. The UK system already follows the general logic of the transfer, meaning that in this country they already impose low PTRs and high EMTRs at the bottom of the income distribution. If Belgium and Denmark would want to increase work incentives at the extensive margin in the same way, this would come at the cost of worsening incentives to work more hours (higher EMTRs). Interestingly, among empirical studies there is a growing agreement that labour force participation is more responsive to taxes and transfers than hours worked¹², especially at the bottom of the income distribution (Bargain et al., 2014; Eissa, Kleven, & Kreiner, 2008; Immervoll et al., 2007). Therefore, it is relevant to bear in mind these different behavioural responses when thinking about potential trade-offs between incentives at the each margin.

5 Conclusion

If adequate social protection is to be taken seriously, it is important to offer adequate minimum incomes and wages in combination with well-designed work incentives. All this would require substantial additional welfare state effort. We found that the cost of closing the poverty gap without worsening average participation incentives at the bottom of the income distribution would be around two times the cost of just lifting all incomes to the level of the poverty threshold. This shows that a balance between activation and protection would not be cheap and that some leakage would be necessary. If instead of maintaining financial work incentives we would want to increase them, the cost would be considerably higher in countries with comparably lower incentives such as Belgium and Denmark. These countries would need to make ‘gross-to-net’ efforts for low income households that the UK is already partially doing.

On a broader level, our results also illustrate the complexity of countries’ attempts to simultaneously achieve each element of a ‘social trilemma’ – including reductions in poverty, expansions in employment, with decreased (or at least non-increasing) social spending. Although our analysis is static and we acknowledge that social investment might bring a reduction in social expenditures in the future, our results can be seen as a first minimum estimate of the cost of a strategy balancing social protection and financial work incentives (Vandenbroucke & Vleminckx, 2011). These findings point to the fact that anti-poverty strategies also have to look at the drivers of rising market income inequality, downward pressures on low wages and the issue of adequate work incentives.

¹² Labour supply elasticities in Bargain et al. (2014) are calculated as the responses in hours to a one percent increase in wages. As a reference, in 1998 in the countries we study, gross wage elasticities in the first quintile at the extensive margin were on average 0.36 and 0.15 for single and married people respectively, while just 0.02 at the intensive margin for both groups (the authors did not include the brake down of net wage elasticities).

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Appendix

Appendix A – Participation tax rates

Similar methods to calculate PTRs can be found in Adam and Browne (2010) and Decoster, Perelman, Vandelannoote, Vanheukelom, and Verbist (2015). As in the application of the latter, we do not differentiate between individuals working different numbers of hours. To build the Heckman selection model we need variables that are not included in the EUROMOD input file; therefore, we merge these files with SILC and FRS. It is relevant to mention that EUROMOD input files are not based on version 3 of SILC 2012 but on the Belgian version and on version 1 in Denmark. The resulting files using SILC present some inconsistencies to calculate hourly wages. First, the declared number of months working and gross wage from employment are not always coherent. Second, some people respond to be working both part- and full-time and the weekly amount of hours worked corresponds only to the main job. Third, some respondents declare to work for too many or too few hours, so we assume that working between 30 and 70 hours for full-time workers and less than 36 for part-time workers are realistic amounts. To deal with all these situations, in the model we only use the hourly wages from people with consistent information and we impute the wages of people without consistent data. In the UK we get from FRS the gross wage of employed people in their first job to use in the model and we make the same assumptions about realistic amounts of hours. The variables that we use for the wage equation in the Heckman model are education, age and experience (including squared terms), migration status, and for women region. The extra variables necessary for the selection equation are region for men and for women the presence of children younger than three years old, between four and six, between seven and 12 and between 12 and 18 (in Denmark we use the children variables for both genders as there is no region variable). With this information we predict log hourly wages separately for men and women. We bottom code hourly wages so they are not below legal minima. In Belgium we used six euros (following Decoster et al., 2015), in the UK six pounds (OECD, 2014b) and in Denmark 102 Danish Crones (lowest collective agreement in Kampelmann, Garnero, & Rycx, 2013 corrected by EUROMOD wages inflation index). We define as available for work people between 20 and 64 who are employed or self-employed. We do not calculate the PTR of households and individuals receiving non-simulated benefits because they cannot be adapted to changes in wages. In contrast, we do calculate PTR of workers whose partners are receiving non-simulated individual benefits as we believe that the benefits involved would not change much when partner's wages are modified. In Belgium and Denmark, if the partner of the person whose PTR is being calculated receives an unemployment benefit, we also simulate it using the predicted hourly wage recalculated to a full-time full-year basis. Self-employed people presents wages that are often below the aforementioned legal minima. Therefore, with the same wage equation of the Heckman model but using a simple regression, we impute in the same way self-employed hourly wages. We do the same for employed people without consistent data.

Table 2. Heckman selection model results

	BE				DK				UK			
	Men		Women		Men		Women		Men		Women	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
log hourly wage equation												
ISCED Education level 4	0.078	0.099	0.045	0.316	Omitted		Omitted		0.375	0.000	0.198	0.000
ISCED Education level 5	0.324	0.000	0.343	0.000	0.169	0.000	0.131	0.006	0.659	0.000	0.488	0.000
age	0.018	0.340	0.009	0.462	0.030	0.207	0.041	0.051	0.072	0.000	0.026	0.000
age squared	0.000	0.377	0.000	0.432	0.000	0.427	0.000	0.235	-0.001	0.000	0.000	0.000
(years of)experience	0.002	0.004	0.002	0.000	0.001	0.508	0.000	0.667	0.004	0.000	0.002	0.000
experience squared	0.000	0.189	0.000	0.010	0.000	0.041	0.000	0.132	0.000	0.103	0.000	0.000
immigrant 1	-0.105	0.029	-0.061	0.107	0.037	0.692	0.213	0.080	0.144	0.000	0.063	0.012
immigrant 2					-0.011	0.882	-0.050	0.453				
region 2			-0.083	0.004							-0.066	0.012
region 3			-0.078	0.015							-0.001	0.940
region 4											-0.072	0.001
constant	2.152	0.000	2.254	0.000	4.364	0.000	4.004	0.000	0.470	0.011	1.468	0.000
employment equation												
ISCED Education level 4	0.271	0.261	0.283	0.312	Omitted		Omitted		0.370	0.099	0.205	0.035
ISCED Education level 5	0.807	0.000	0.447	0.000	0.588	0.032	0.222	0.268	0.777	0.063	0.545	0.000
age	0.031	0.599	-0.028	0.393	-0.255	0.044	0.047	0.640	0.133	0.020	-0.066	0.000
age squared	-0.002	0.004	-0.001	0.017	0.003	0.038	0.000	0.679	-0.003	0.000	0.000	0.739
(years of)experience	0.012	0.000	0.015	0.000	0.010	0.088	0.001	0.816	0.005	0.001	0.012	0.000
experience squared	0.000	0.448	0.000	0.000	0.000	0.054	0.000	0.497	0.000	0.000	0.000	0.000
immigrant 1	-0.320	0.089	-0.488	0.000	-0.357	0.324	0.269	0.546	-0.027	0.063	0.090	0.078
immigrant 2					0.532	0.115	-0.240	0.444				
region 2	0.555	0.001	-0.001	0.991					0.137	0.062	0.107	0.215
region 3	0.213	0.206	-0.089	0.467					-0.020	0.041	0.055	0.235

region 4									-0.054	0.043	-0.004	0.946
children below 3			-0.346	0.000	0.819	0.020	0.081	0.591			-0.593	0.000
children between 3 and 6			-0.269	0.003	-0.022	0.905	0.199	0.219			-0.386	0.000
children between 6 and 12			-0.042	0.579	0.551	0.002	0.208	0.128			-0.227	0.000
constant	0.389	0.727	1.591	0.014	4.991	0.013	-0.021	0.991	-1.790	0.000	1.589	0.000
correlation between the error terms of equations (rho)												
	-0.032	0.711	0.043	0.636	-0.234	0.000	0.907	0.000	0.920	0.000	-0.110	0.050
number of observation	total	in work										
	1758	1496	2166	1496	1811	1754	1759	1658	7150	5428	8344	5608

Note: 95 per cent confidence level; reference categories are ISCED Education level 0-3, non-immigrant, region 1, children between 12 and 18; in Belgium immigrant 1 corresponds to non-EU, in Denmark to EU and immigrant 2 to non-EU and in the UK immigrant 1 to non-British; in Belgium region 1 is Brussels, 2 Flanders and 3 Wallonia, in the UK region 1 is England, 2 Wales, 3 Scotland and 4 Northern Ireland; omitted variables due to collinearity; results of the regression to impute the hourly wages of self-employed and employed people without consistent data are not included because they are rather similar.

Source: SILC and FRS 2012

Appendix B – Income components

Table 3. Income components of net non-earned and earned incomes in EUROMOD datasets

BE		FI		UK	
Non-earned	Earned	Non-earned	Earned	Non-earned	Earned
Net		Net		Net	
+ Gross	+ Gross	+ Gross	+ Gross	+ Gross	+ Gross
- proportional income & municipal tax and maintenance payments	- proportional income tax, municipal tax and maintenance payments	- proportional taxes and maintenance payments	- proportional taxes and maintenance payments	- proportional income tax and maintenance payments	- proportional income tax and maintenance payments
- Investment & property tax, pension & disability contributions	- Employee, special & self-employed contributions	- Capital & property tax	- Employee & self-employed contributions	- Council Tax	- Employee & self-employed contributions
	+ Work bonus				+ Working tax credit
Gross		Gross		Gross	
+ investment income	+ income from employment and self-employment	+ investment income	+ income from employment and self-employment	+ investment income	+ income from employment and self-employment
+ income of children under 16		+ income of children under 16		+ income of children under 16	
+ property income		+ property income		+ property income	
+ private pension		+ private pension		+ personal pension	
+ received transfers		+ received transfers		+ received transfers	
+ benefits		+ benefits		+ benefits	
				+ income from odd jobs	

Table 4. Income components of net non-earned income and net earned income in SILC datasets

Non-earned		Earned	
Net		Net	
+ Gross		+ Gross	
- proportional tax on income and social insurance contributions and maintenance payments (HY140G+HY130G)		- proportional tax on income and social insurance contributions and maintenance payments (HY140G+HY130G)	
- Investment & property tax (HY120G)			
Gross		Gross	
+ investment income (HY090G)		+ income from employment and self-employment (PY010G+PY050G)	
+ income of children under 16 (HY110G)			
+ property income (HY040G)			
+ private pension (PY080G)			
+ received transfers (HY080G)			
+ Benefits (PYG:90+100+110+120+130+140+ HYG: 50+60+70)			

Note: in parenthesis the name of the variables in SILC.