

# The design of in-work benefits: how to boost employment and combat poverty in Belgium

*Dieter Vandelannoote & Gerlinde Verbist*

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## Abstract

In-work benefits have received increased attention over the past decades in OECD countries, as a core part of making-work-pay policies. They have two main objectives: on the one hand, increase employment by creating additional financial rewards for remaining in work or for taking up a low-paid job. On the other hand, reduce poverty by increasing incomes of disadvantaged groups of workers and their families. Both objectives of enhancing employment and reducing poverty have been extensively analysed for several countries. Most papers in this domain have investigated existing in-work benefits (for an overview see e.g. Kenworthy, 2015). We take a different approach as we evaluate the impact of different design components on work incentives and poverty indicators by building step-by-step a stylised working tax credit. By different design components we mean: is the working tax credit individual or household based? What is the impact of using an income threshold? What happens when a tapering-out or a tapering-in is implemented? The main question of this paper is thus whether and how the design of a working tax credit has an impact on work incentives and poverty figures. The focus of our analysis is Belgium, a country with a less dispersed income distribution as e.g. the United Kingdom or the USA (which are the countries who first implemented in-work benefits and for which the bulk of the evaluations have been done). We make use of BE-SILC 2012 data and built a discrete labour supply model to evaluate the impact of the design of an in work-benefit on work incentives. Simulations are done using the microsimulation model EUROMOD.

**Keywords:** in-work benefits, microsimulation, EUROMOD, policy design, BE-SILC

**JEL codes:** D03, D13, D30

# 1 Introduction

Individuals with a low earnings potential or belonging to disadvantaged groups increasingly encounter difficulties in finding a job. They often face low work incentives and have a higher risk of being poor (Immervoll et al, 2009; Marchal et al, 2015). The introduction of making-work-pay policies has been put forward as a way to increase net incomes of these individuals without raising gross incomes and the cost of labour for the employer.<sup>1</sup> In-work benefits are at the core of these making-work-pay policies and have received considerable attention from both scholars and policy makers. The United Kingdom (Family Income Supplement, 1970) and the USA (Earned Income Tax Credit, 1975) were the first two countries to implement this type of making-work-pay policy. Although, in the recent decennia, more and more other European countries have implemented a kind of making-work-pay policy (for an overview see Kenworthy, 2015; OECD, 2010), the majority of evaluations focus on the Anglo-Saxon experiences (see, among others, Blank et al, 2000; Chetty et al, 2013 for the USA and Blundell et al, 2000; Brewer et al, 2006 for the UK). Compared to the UK and the USA, Belgium has a relatively compressed income and wage distribution (see e.g. Marx et al, 2012). Several studies indicate that a major challenge for Belgium is to improve work incentives at the bottom of the income distribution (Immervoll et al, 2009; Cantillon et al, 2015). Moreover, Belgium has, in comparison with other European countries, a moderate social floor and inadequate incomes for working households at minimum wage (Cantillon et al. 2015).

The attractiveness of in-work benefits lies in their combination of creating employment incentives for disadvantaged groups, as well as providing extra income to support their living standards. The effectiveness of in-work benefits on these two aims depends on many factors, notably the size and design of the benefit, as well as the wider policy and socio-economic context. This wider context refers to the tax-benefit system as a whole, the prevalence and level of a minimum wage, the existence and extent of childcare provisions, the distribution of incomes and wages, etc. In this paper we focus on the design of in-work benefits, while controlling for size and the wider context. What characteristics of an in-work benefit 'make it work', both in terms of poverty reduction and increasing employment among disadvantaged groups? In-work benefits can have very different design characteristics in terms of unit of assessment, income thresholds used, employment characteristics etc. We present an empirical analysis of implementing different types of in-work benefits in Belgium. In contrast with other studies, we analyse its impact using stylised design changes.

The paper starts with a literature overview and identifies the different design characteristics of in-work benefits that will be studied. We then describe the data and methodology, explaining the microsimulation approach and how we measure our outcomes, notably potential employment effects and the impact on poverty. The impact of the design characteristics on these outcomes are presented in section 4. The final section concludes.

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<sup>1</sup> Another option is to increase minimum wages and to lower the labour cost for the employer by introducing wage subsidies. These subsidies to employers can be seen as the flip-side of in-work benefits paid to employees (Immervoll and Pearson, 2009). While some insights of the evaluation of wage subsidies can be interesting for the evaluation of making-work-pay policies, the design of employer subsidies raises a number of additional and separate issues. The same holds for minimum wages, another policy instrument which can be used to make employment financially more attractive for low-skilled workers. The focus of this paper will be on in-work benefits only.

## 2 Literature

In-work benefits have received increased attention over the past decades in OECD countries, as a core part of making-work-pay policies. They can be defined as “permanent work-contingent tax credits, tax allowances or equivalent work-contingent benefit schemes designed with the dual purpose of alleviating in-work poverty and increasing work incentives for low-income workers” (OECD, 2011). Its main objectives can thus be described as on the one hand, to increase employment by creating additional financial rewards for remaining in work or for taking up a low-paid job and on the other hand to increase incomes of disadvantaged groups of workers and their families (Immervoll and Pearson, 2009).

Both objectives of enhancing employment and reducing poverty have been analysed for several countries. The effect of in-work benefits on employment is complex, as the impact may differ at the extensive and intensive margin and they may create even conflicting work incentives for different target groups. Most studies point towards positive effects on employment at the extensive margin, which means that employment rates among the target groups are raised due to the in-work benefit. Total employment effects are in general rather small (Immervoll, 2009). The most researched examples of in-work benefits are the US Earned Income Tax Credit (EITC) and the UK Working Families Tax Credit (WFTC). For both the EITC (e.g. Blank et al., 2000; Meyer and Rosenbaum, 2002; Eissa & Hoynes, 2006; Chetty et al. 2013) and the WFTC (e.g. Blundell et al., 2000; Brewer et al. 2006; Blundell & Sheppard, 2011) positive employment effects at the extensive margin have been found. The evidence at the intensive margin is more mixed. It is indeed possible that in-work benefits may reduce the number of hours worked, as one might decide to work fewer hours in order to qualify for the benefit (Saez, 2002; OECD, 2011).

As in-work benefits generate in principle positive employment effects, this redistribution instrument is considered to be relatively cost effective. Immervoll et al. (2007) showed that the cost to taxpayers of redistributing one euro in the form of an in-work benefit can be around one euro, implying an efficiency cost close to zero. This is a remarkable outcome compared to the sometimes large efficiency costs of other redistribution measures.

Apart from the employment effect, in-work benefits also aim to reduce in-work poverty. Studies, however, provide mixed evidence, and say that the design of the in-work benefit plays a big role, as well as its interaction with the income distribution. There are indications that the poverty impact is largest in countries with dispersed income distributions, as is the case in the USA and the UK. Far less research has been done on more condensed income distributions, like Belgium.

About half of the OECD countries use one or more permanent<sup>2</sup> in-work benefits (for an overview, see e.g. OECD, 2011). These benefits differ from one another in many dimensions (see e.g. Immervoll et al, 2009; Kenworthy, 2015): it can be granted in the form of a social benefit or through the tax system; through the tax system, it can be in the form of a refundable tax credit (i.e. when the tax credit exceeds tax liabilities the difference is paid out to the individual) or non-refundable. In this paper, we focus on the design characteristics and group them into four different categories:

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<sup>2</sup> We consider permanent in-work benefits only. In contrast to one-off or time-limited in-work benefits, these permanent benefits provide a recurrent work incentive and income support.

- 1) the unit of assessment (individual or household): previous studies have indicated the importance of having either the individual or the household as unit of assessment. An individual-based system is more set up with the intention of improving work incentives, while a household based system has a greater potential for reducing poverty.
- 2) income-related: i.e. the conditionality on income, the presence of a phase-in and phase-out range;
- 3) employment related characteristics (e.g. hours of work);
- 4) non-employment related characteristics (e.g. the presence of children).

We focus here on the characteristics that belong to the first three groups. Non-employment related characteristics are often on the border with other policy domains and will be the topic of further research that looks at the interaction of in-work benefits with other policies.

In-work benefits have been studied from theoretical and empirical angles. Optimal taxation theory has provided the most influential theoretical framework. Saez (2002) has e.g. derived theoretically that the shape of the optimal tax schedule, as proposed in the standard Mirrlees model, changes when extensive labour supply reactions are incorporated; subsidizing low-income workers then becomes desirable. In empirical analyses different tracks have been followed. OECD studies typically use the OECD tax-benefit model on hypothetical families (see e.g. Immervoll and Pearson, 2009), while other studies have worked with representative samples of the population, possibly in combination with a tax-benefit microsimulation model (e.g. Bargain & Orsini (2006); Figari (2009)). As already mentioned, the Anglo-Saxon in-work benefits are the ones that have received most scholarly attention. Few studies have taken an international comparative perspective, and have done so called “policy swaps”, namely introducing in-work benefits applicable in one country (mostly an Anglo-Saxon style tax-credit) into the tax-benefit system of other countries; examples of such studies include Bargain and Orsini (2006), Figari (2009); Marx et al. (2012). As is done in these studies, we also apply a tax-benefit microsimulation approach in this paper. But we follow a different track, in the sense that we introduce a set of stylized in-work benefits in one country, in order to identify which design characteristics are favourable to either employment or redistributive goals.

### **3 Data and methodology**

#### **3.1 Data and tax-benefit model EUROMOD**

Our empirical analysis is performed on data of the Belgian Survey on Income and Living Conditions (BE-SILC) of 2012. The SILC is a representative sample of private households and is used as the standard dataset for distributional and poverty analysis in the European Union (EU). It combines socio-demographic information with an array of income components at the level of the individual and the household. The Belgian version of EU-SILC is more detailed than the European version, as it contains more variables. The 2012 version contains over 14,000 individuals living in about 6,000 households; incomes refer to the previous year.

To assess the impact of design characteristics, we simulate counterfactual scenarios by using a fiscal microsimulation approach, which allows us to estimate household incomes under different tax options, holding everything else constant and, therefore, avoiding endogeneity problems

(Bourguignon and Spadaro, 2006). The policy reform simulations are performed on the BE-SILC income survey micro-data, using EUROMOD, the multi-country European wide tax-benefit microsimulation model. We use the policies as simulated in EUROMOD on the 1<sup>st</sup> of July 2014, whereby incomes of BE-SILC 2012 are updated to 2014, using the uprating factors as programmed in EUROMOD (see Hufkens et al, 2014 for more details).

EUROMOD simulates tax liabilities (direct taxes and social insurance contributions) and cash benefit entitlements on the basis of the tax-benefit rules in place and information available in the underlying dataset. The components of the tax-benefit system which are not simulated due to lack of information in the cross-sectional survey data (e.g. on previous employment) and which are used as input for EUROMOD (e.g. for the calculation of contributory benefits), as well as market incomes, are taken directly from the data. EUROMOD is a static model: the arithmetic simulation of taxes and benefits makes abstract of potential behavioural reactions of individuals. As such, EUROMOD is of value in terms of assessing the first order effects of tax-benefit policies and in understanding how tax-benefit policy reforms may affect income distribution, work incentives and government budgets in a partial equilibrium (see Sutherland and Figari (2013) & Figari et al. (2015) for further information). In order to measure the employment effects, we have enriched EUROMOD with labour supply reactions, thus enabling us to include second order effects in the analysis. The labour supply model used is presented in the following section.

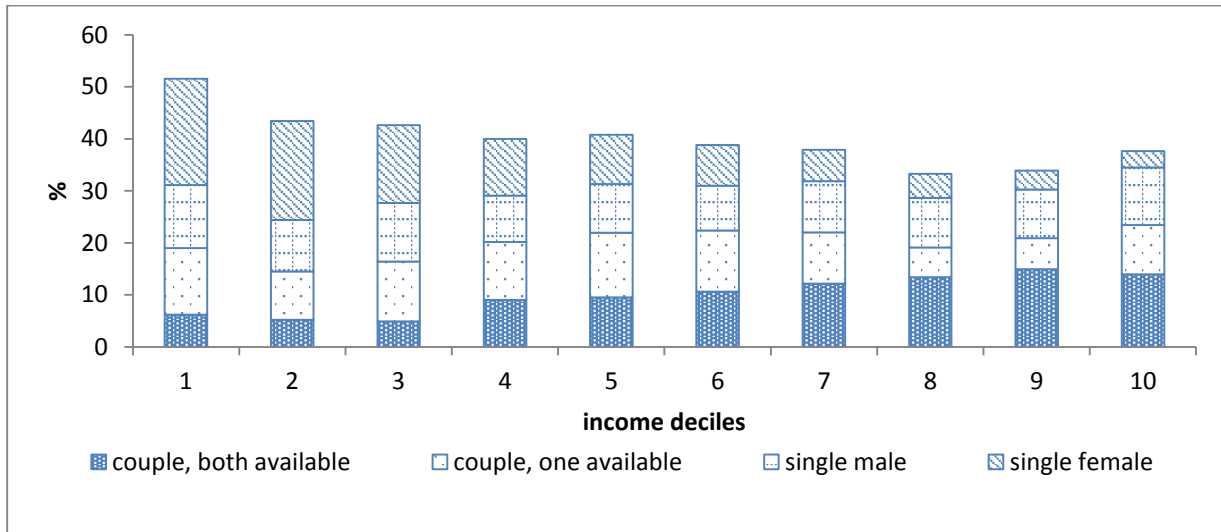
### ***3.2 Incorporating labour supply reactions: estimating a discrete labour supply model***

Labour supply effects are calculated on four different groups: 1. couples in which both partners are available for the labour market; 2. couples in which only one partner is available for the labour market; 3. single men who are available for the labour market; 4. single women who are available for the labour market. We only consider households with at least one person available for the labour market, i.e. aged between 18 and 65 and not in education, (pre)retired, disabled or ill. Self-employed individuals are excluded from the sample for two reasons: no reliable information about hours worked is available for them in the survey and labour supply decisions of self-employed people are possibly very different from those of salaried workers. Also households with children available for the labour market but still living with their parents are excluded from the sample. As it is not clear whether these households see their labour supply decisions as a collective or an individual process, their labour supply decisions may be different from households without working children. Also other households with more than two persons available for the labour market are excluded from our sample, as it is not clear how these families pool their incomes.

Couples where both partners are available for the labour market are more prevalent in the higher income deciles (Figure 1). Single women are mostly found in the bottom of the income distribution. Also couples where only one partner is available for the labour market are more found in the lower income deciles. Single men are quite evenly distributed over the whole income distribution. Table 1 provides basic descriptive statistics of the four subgroups. We estimate four different labour supply models, one for each group. In the rest of this section we look at the labour supply model of single females (the three other models are available from the authors upon request).



**Figure 1: Distribution of the four subsamples over the income deciles, Belgium 2012**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012) .

Note: Income deciles based on equivalent (using the OECD modified equivalence scale) disposable household incomes of the total sample.

**Table 1: Basic descriptive statistics of the four subsamples, Belgium 2012.**

	Couples, both available		Couples, one available	Single male	Single female
	Male	Female			
<b>Average working time/week (hours)</b>	37.0	27.0	22.3	31.2	26.0
<b>Average hourly gross wage (€)</b>	20.4	17.2	17.6	18.6	17.1
<b>Participation rate (%)</b>	91.1	80.2	63.2	77.9	76.4
<b>Average age (years)</b>	41.6	39.1	48.8	42.9	43.6
<b>Higher Education Degree (%)</b>	43.2	50.5	36.2	39.2	39.8
<b>Presence of child (0-18) (%)</b>	65.2		36.2	7.7	39.0
<b>Number of observations</b>	5,097		1,971	545	1,121

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012) .

Note: For the couples where one person is available for the labour market, statistics are shown for this person.

A discrete labour supply model, type Van Soest (1995), is used to evaluate the impact of the design of making-work-pay policies on work incentives. Van Soest (1995) assumes that each household is confronted with a limited amount of labour supply alternatives  $j = \{0,1,\dots,J\}$ . The utility of household  $i$  when supplying  $j$  hours of work per week is equal to:

$$V_{i,j} = U_i \left( (T - h_{i,j}), C_{i,j} \mid X_i \right) + \varepsilon_{i,j},$$

In which  $T$  stands for the total available time per week,  $h_{i,j}$  represents total labour supply of female  $i$  at alternative  $j$ ,  $X_i$  are household characteristics and  $C_{i,j}$  stands for the total disposable household income when the female works  $j$  hours per week. The utility  $V_{i,j}$  can be divided in two parts, a structural component of utility which is assumed to be known to both the researcher and the household and a random part ( $\varepsilon_{i,j}$ ), which is unknown to the researcher but is assumed to be known to each household individually. The parameters of the utility function  $U_i$  are estimated using maximum likelihood.

Looking at the specification of the model, we assume, in line with Blundell et al. (1999), a quadratic specification for the deterministic part of the utility function:

$$\begin{aligned}
 U_i \left( (T - h_{i,j}), C_{i,j} \mid X_i \right) \\
 &= \beta_c(X_i)[C_{i,j}] + \beta_{cc}[C_{i,j}]^2 + \beta_h(X_i)[T - h_{i,j}] + \beta_{hh}[T - h_{i,j}]^2 \\
 &+ \beta_{hc}[T - h_{i,j}] \cdot [C_{i,j}] - dpart
 \end{aligned}$$

We allow for interaction effects between non-working time and income. We also included a dummy variable for working part time (either 19 or 30 hours). We allow for heterogeneity in the estimated coefficients of consumption C and non-working time (T-h):

$$\begin{aligned}
 \beta_c(X_i) &= \beta_{c,0} + \beta'_c X_i^c \\
 \beta_h(X_i) &= \beta_{h,0} + \beta'_h X_i^h
 \end{aligned}$$

where  $X_i^c$  and  $X_i^h$  are vectors representing the observed heterogeneity,  $X_i^c$  in her work experience and  $X_i^h$  in her age and in the number and age of her children (if she has children).

The net disposable household income  $C_{i,j}$  of household i when supplying j amount of hours can be formally written as:

$$C_{i,j} = t(h_{i,j}, w_i, I_i),$$

Where the function  $t$  denotes the tax-benefit system,  $w_i$  stands for the hourly gross wage and  $I_i$  represents all non-labour income.

In our analysis, we only take labour supply effects into account. We assume that each person can work the amount of hours per week desired, thus without taking labour demand constraints into account. Also, possible other general equilibrium effects are out of the scope of this paper.

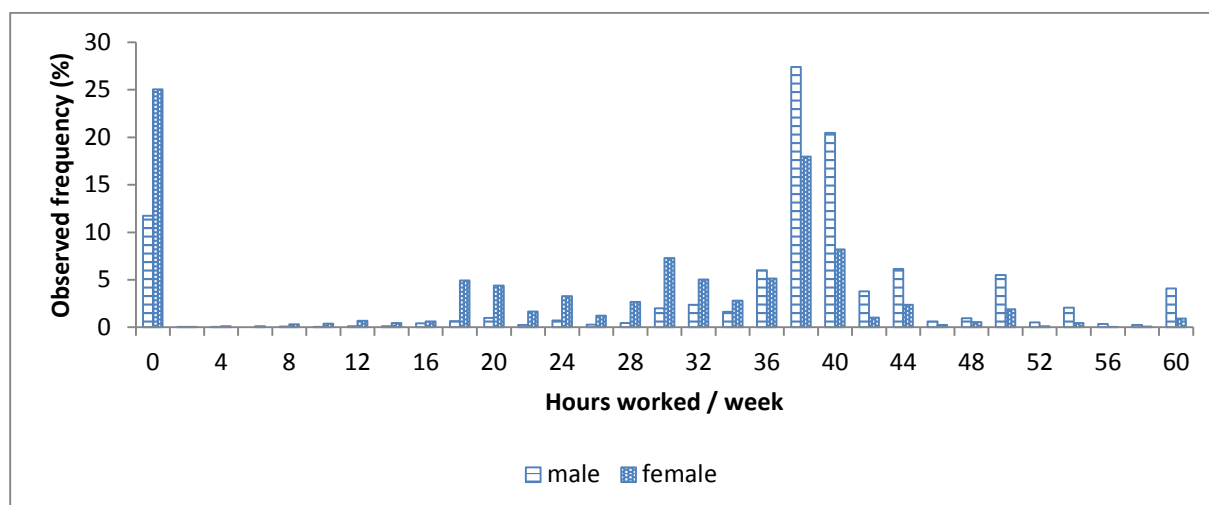
### 3.3 Discrete labour supply points

The Belgian SILC 2012 contains information on the weekly number of hours usually worked in the main job, as well as in the second and subsequent jobs. Figure 2 shows for both men and women in our subsample the pattern in hours of work, which form the basis for the choice of five discrete points for our estimations. In our discrete labour supply model, we assume that both males and females face a choice set of five discrete points: not working (0 hours), working part time (either 19 hours or 30 hours), working full-time (38 hours) or doing over-time (50 hours)<sup>3</sup>. Singles and households where one person is available can thus choose between 5 discrete working points. When two persons are available 25 different discrete points can be chosen: 5 possible points for the male partner combined with 5 for the female partner.

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<sup>3</sup> Not working equals the interval [0,4] hours per week, 19 hours work equals the interval [5,25] hours per week, 30 hours work equals the interval [26,34] per week, full-time equals the interval [35,44] hours per week and over-time equals the interval [44,60].

**Figure 2: Hours distribution of men and women, individuals available for the labour market, Belgium 2012**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: we only take individuals into account who are available for the labour market and are part of one of the four subsamples.

In each discrete point we now calculate total disposable household income. We apply the tax-benefit microsimulation model EUROMOD for the derivation of the budget constraints.

Gross earnings from employment are calculated by multiplying gross hourly wages by the respective working hours in each category. We hereby make the assumption that the hourly wage is independent of the amount of hours worked, implying that gross earnings increase linearly with hours worked. Thus, hourly wages are obtained by dividing observed gross income by the actual observed number of hours worked.

For individuals for whom no gross earnings are observed and who are available for the labour market we impute gross hourly wages on the basis of a Heckman selection model, with separate estimations for men and women. Results are in line with expectations: for both men and women, a higher age, more work experience and higher education lead to higher gross hourly wages (see Table 2). For women, having a child between 0-3 year old leads to a lower gross hourly wage. The likelihood ratio test of independent equations indicates that the selection bias is statistically significant in both wage equations, justifying the Heckman procedure. Wages are imputed for 319 inactive males (15% of our sub-sample) and 569 inactive females (21% of our sub-sample).

**Table 2: Wage equations male and female – Heckman selection model**

	Male			Female		
	Coefficient		Standard error	Coefficient		Standard error
<b>Hourly wage</b>						
<b>Lower secondary education <sup>(1)</sup></b>	-0.372	***	0.021	-0.367	***	0.020
<b>Higher secondary education <sup>(1)</sup></b>	-0.261	***	0.055	-0.337	***	0.047
<b>Work experience</b>	0.003	***	0.000	0.002	***	0.000
<b>Work experience square</b>	-0.001	***	0.000	0.000	***	0.000
<b>Constant</b>	2.63	***	0.042	2.65	***	0.047

<b>Selection equation</b>						
<b>Lower secondary education</b>	-0.260	***	0.059	-0.220	***	0.057
<b>Higher secondary education</b>	-0.205		0.154	-0.036		0.143
<b>Age</b>	0.098	***	0.022	-0.001		0.026
<b>Age square</b>	-0.001	***	0.000	0.001	***	0.000
<b>Presence of child 0-3y old <sup>(2)</sup></b>	/			-0.240	***	0.054
<b>Presence of child 4-6y old <sup>(2)</sup></b>	/			-0.066		0.065
<b>Presence of child 7-12y old <sup>(2)</sup></b>	/			-0.058		0.047
<b>Constant</b>	-1.24			0.079		0.0480
<b>Number of observations</b>	2,146			2,644		
<b>LR test of indep. Eqns (rho = 0):</b>						
<b>chi2(1)</b>						
<b>Prob &gt; chi2</b>	0.000			0.000		

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

Note: \*:  $p < 0.1$ ; \*\*:  $p < 0.05$ ; \*\*\*:  $p < 0.01$ . Excluded categories are <sup>(1)</sup> higher education and <sup>(2)</sup> presence of a child 13-18y old. "Work experience" is calculated based on variable pl200 ("number of years in paid work").

Gross household income is equal to the sum of both labour and non-labour incomes of all household members. Social security contributions and personal income taxes are deducted from gross income, while social transfers are added to obtain total disposable household income. Social transfers include child benefits, education benefits for students and housing benefits. If a person is not working, entitlement to social assistance benefits is checked. No unemployment benefits are simulated<sup>4</sup>.

Summary statistics of the budget constraint of single females can be found in Table 3<sup>5</sup>. Average disposable household income when not working equals 955 euro per month and increases up to an average of 2,811 euro per month when she decides to work 50 hours per week.

**Table 3: Disposable household income single females (Euro/Month), Belgium 2012.**

<b>Hours worked / week</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Minimum</b>	<b>Maximum</b>
<b>0</b>	955	727	0	8,703
<b>19</b>	1,637	731	344	10,571
<b>30</b>	2,079	853	558	11,327
<b>38</b>	2,383	966	762	14,065
<b>50</b>	2,811	1,160	990	18,296

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

<sup>4</sup> As we only look at labour supply effects, in which the persons themselves choose both whether to work or not and how many hours to work, we assume that they are not eligible to receive unemployment benefits.

<sup>5</sup> Summary statistics of the budgetary constraints of the three other sub-samples are available from the authors upon request.

### 3.4 Estimation results

Table 4 presents the estimated parameters of the quadratic utility function of the labour supply estimation for single females<sup>6</sup>. The estimated coefficients for disposable income clearly show heterogeneity in preferences. The parameter for work experience has a significant positive value and the quadratic term is significantly negative, meaning that mothers with more work experience attribute more value to the level of disposable household income. Higher income positively affects a mothers' utility and the quadratic term is negative, which is in line with theoretical predictions. Looking at the heterogeneity in non-working time, the presence of a young child (0-3y) has a significantly positive effect on the preference for leisure. Elder women also have a higher preference for leisure.

**Table 4: Estimated parameters of the quadratic utility function for single females**

	Coefficient		Standard error
<b>Disposable household income</b>			
Work experience	0.204	***	0.077
Work experience squared	-0.001	***	0.000
Constant	7.967	***	1.977
Disposable household income squared	-0.037	*	
<b>Non-working time</b>			
Presence of a child 0-3y <sup>(1)</sup>	0.019	*	0.010
Presence of a child 4-6y <sup>(1)</sup>	0.001		0.011
Presence of a child 7-12y <sup>(1)</sup>	0.004		0.006
Age	0.009	***	0.000
Age squared	-0.001	***	0.000
Constant	0.542	***	0.051
Non-working time squared	-0.003	***	0.000
Non-working time * consumption	-0.001		0.006
Dummy for working part-time	1.701	***	0.135

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

Note: \*:  $p < 0.1$ ; \*\*:  $p < 0.05$ ; \*\*\*:  $p < 0.01$ . Excluded category is presence of child 13-18y old

A comparison of observed and predicted frequencies of single females in each discrete labour supply point shows that the estimated model fits the data quite well (Table 5). The fit of the three other subsamples are also reassuring and can be found in Annex.

<sup>6</sup> The estimated parameters of the labour supply estimations for the three other sub-samples can be found in Annex.

**Table 5: Observed and predicted labour supply densities for single females, Belgium 2012**

Hours worked / week	Observed density	Predicted density
0	23.63	23.76
19	16.12	15.53
30	13.15	13.73
38	40.22	40.20
50	6.89	6.77

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

The structural form of a discrete labour supply model implies that there is no explicit labour supply function from where one can derive the wage elasticity. Therefore, we use a numerical method to analyse the sensitivity of labour supply with respect to wage changes. Gross wage is increased with 10% (if two partners are available for the labour market, the wage of one is increased with 10%, keeping the other partner's gross wage constant), keeping all other characteristics constant. The new budget constraints for each household are calculated using EUROMOD, and the new expected labour supply can be calculated, given the estimated coefficients. The participation elasticity is defined as the expected percentage change in labour market participation after a given percentage change in gross wages. The hours elasticity expresses the percentage change in total hours supplied with respect to a given increase in gross hourly wage. Both participation and hours elasticities for the four subsamples can be found in Table 6. The elasticities of women (either in a couple or single) are higher than those of men, a result often found in the literature (see e.g. Bargain et al., 2014). The labour supply elasticities by income decile show that persons living in a household at the bottom of the income distribution have higher elasticities (e.g. for single women, total hours elasticity goes from 0.59 in the first decile to 0.20 in the tenth). A similar pattern is found by Figari et al, 2015.

**Table 6: Participation and hours elasticities of the four sub-samples, Belgium 2012.**

	Couples, both available		Couples, one available	Single male	Single female
	male	female			
<b>Participation elasticity</b>	0.13	0.21	0.29	0.22	0.36
<b>Total hours elasticity</b>	0.20	0.32	0.40	0.31	0.42

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

### 3.5 Simulations

The aim of this paper is to look at the impact of the design characteristics of in-work benefits on both work incentives and poverty by looking at stylized policies. We consider the following elements: 1. the unit of assessment; 2. income related characteristics and 3. employment-related characteristics. With the unit of assessment we look at the distinction between individual and household based systems. As this is a crucial distinction, it is taken up in all the simulations of alternatives. For the income-related characteristics, we investigate the role played by an income threshold (either based on gross or hourly wage), as well as the impact of introducing a tapering-out phase and a tapering-in phase. Regarding the employment-related

characteristics, we look at the introduction of a measure based on hours of work. An overview of the simulations can be found in table 7.

**Table 7: Overview of simulations of design characteristics of in-work benefits**

	Individual	Household
<b>1. Lump sum: weight</b>	<ul style="list-style-type: none"> <li>Individual</li> </ul>	<ul style="list-style-type: none"> <li>Modified OECD equivalence scale</li> <li><i>Household</i></li> <li><i>Number of household members</i></li> </ul>
<b>2. Threshold based on gross income</b>	<ul style="list-style-type: none"> <li>1.5 times the minimum wage of a full-time worker</li> <li>Minimum wage of a full-time worker</li> </ul>	
<b>3. Threshold based on hourly wage</b>	<ul style="list-style-type: none"> <li><i>12€/hour</i></li> <li>15€/hour</li> </ul>	/
<b>4. Tapering out based on gross income</b>	<ul style="list-style-type: none"> <li><i>rate of 10%</i></li> <li>rate of 30%</li> <li><i>rate of 70%</i></li> </ul>	
<b>5. Tapering in based on gross income</b>	<ul style="list-style-type: none"> <li>rate of 20%</li> <li><i>rate of 30%</i></li> </ul>	
<b>6. Tapering in based on hours worked</b>	X	/

*Note: Scenarios in italics are sensitivity checks.*

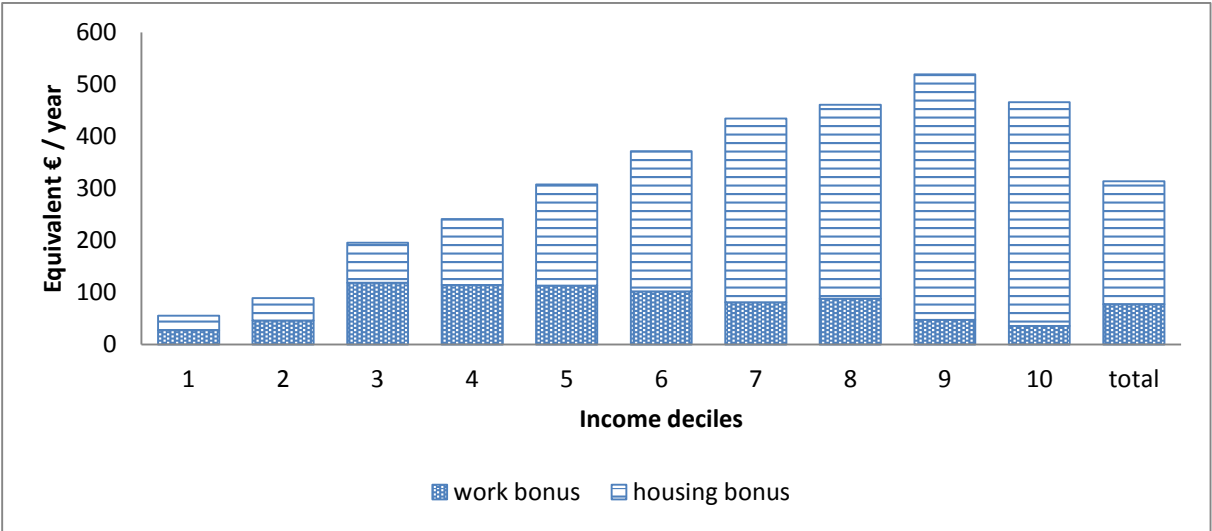
The simulations are performed in a step-by-step way, meaning that we start with a very simple lump sum for everyone at work, and then make the policy more complex by introducing an income threshold (based either on income or hourly wage), a tapering-out and a tapering-in phase (based either on income or hours worked). In order to make the simulations as ‘clean’ as possible, we introduce the stylized making-work-pay policy as a benefit, which has no interactions with the other elements of the Belgian tax-benefit system, with the exception of social assistance benefits (as these are income dependent in Belgium, we take the newly introduced benefit into account when calculating the amount of social assistance received). Beside a central scenario, we have also performed a number of sensitivity checks to test the robustness of our results.

In the evaluation of our policy changes, we study both first-order (i.e. without behavioural effects) and second-order effects (i.e. including the impact on labour supply). We impose budget neutrality on our simulations with respect to first-order effects. When we include labour supply reactions, no budget neutrality is imposed, which makes possible pay-back effects visible that follow from changes in labour supply. These pay-back effects are shown for each simulation. In a first instance, we have abolished the existing making-work pay policy in Belgium, which is the so called work-bonus (for an evaluation see Vanleenhove, 2014), which corresponds to 600 million euro’s in 2014. However, when performing our simulations, resulting impacts on poverty and employment are relatively small, thus showing little impact of changes in design characteristics<sup>7</sup>. In order to free up more budget for our in-work benefit, we have

<sup>7</sup> The results of these simulations are available from the authors upon request.

also abolished the housing bonus which accounts for another 1.6 billion euro's. Hence, we now have a budget of 2.2 billion euro (0.5% of GDP) available for the implementation of a new making-work-pay policy in Belgium. We have opted to abolish the housing bonus for the following reasons: 1) it is mainly beneficiary to richer households (see Figure 3) and 2) it has been criticised on several occasions for its distortionary effects on the housing market (see e.g. OECD, 2015), implying that the budget could be put to a better use. In sum, mainly the higher income deciles pay for the new making-work-pay policy.

**Figure 3: Distribution of the budget made available for the new in-work benefit (abolishing of the housing bonus and work bonus), Belgium, 2014.**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

We show the following outcome indicators of the different stylised in-work benefits: 1) decile distributions; 2) work incentives; 3) poverty head count; 4) second-order pay-back effects. The GINI index of inequality is presented in Annex. The decile distributions are constructed on the basis of equivalised disposable household income of the total population. The poverty head count shows the number of individuals below the poverty line, defined as 60% of median equivalent disposable income. Poverty rates are shown both on the basis of a fixed poverty line, as well as one that is recalculated on the basis of the changed income distribution (a so-called 'floating' poverty line), both with and without taking labour supply effects into account.

## 4 The impact of the design characteristics of an in-work benefit on employment and poverty

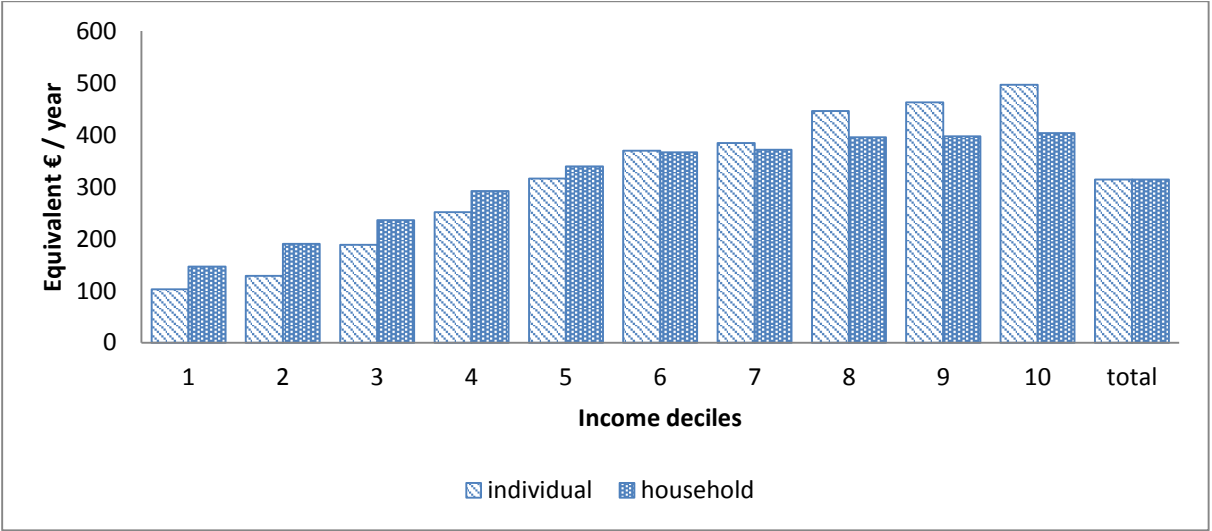
### 4.1 Lump sum

We start with a simple in-work benefit, namely a lump sum granted to every person who works at least one hour per week. This can be given on either an individual or a household basis. When the policy is given on a household basis, the benefit is granted to the family if at least one person in the household works minimum one hour per week. The benefit equals 39 euro per month when given on an individual



basis and 35.5 equivalent euro per month<sup>8</sup> when given on a household basis. Figure 4 shows the distribution of both the individual and household based lump sum benefit. Mainly households higher in the income distribution receive the benefit, which makes sense as working households are mainly found in the higher income deciles. An individual system is more beneficial for one person households and for couples where both partners work. A household system is better for large families and for couples with one working partner. The latter are more often found lower in the income distribution, and hence a household lump sum benefit is somewhat more targeted to persons lower in the income distribution in comparison with an individual benefit.

**Figure 4: In-work benefit, individual and household lump sum, yearly amount per income decile, first-order, Belgium, 2014**



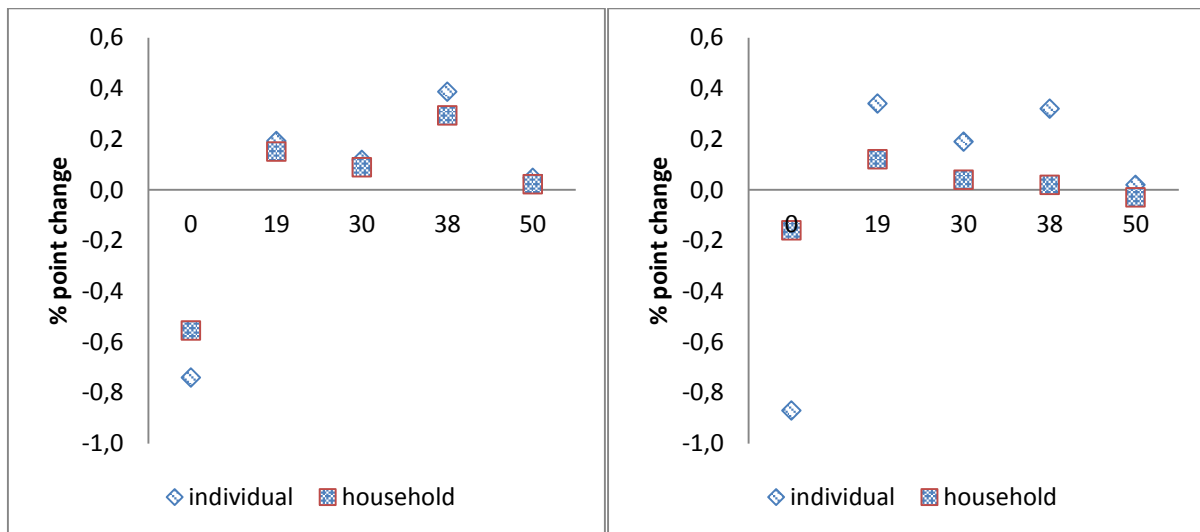
Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

Compared with giving no in-work benefit at all, the introduction of a simple lump sum benefit, both on an individual and a household level, generates positive work incentives (Figure 5). An individual lump sum seems to generate better work incentives than a household one. This can be explained by the fact that a household benefit does not give financial incentives to the second partner in the household to start working or to work more hours, as can be seen in panel (b).

<sup>8</sup> For each household, we calculate the equivalence scale, using the OECD modified equivalence scale (1 for the first adult, 0.5 for another adult in the household and 0.3 per child). The total amount of the benefit the family receives equals 35.5 \* equivalence scale of the family.

**Figure 5: Work incentives of an individual and household lump sum, Belgium, 2014**

**(a) Total (weighted sum of the four sub-samples) (b) Women in couple**

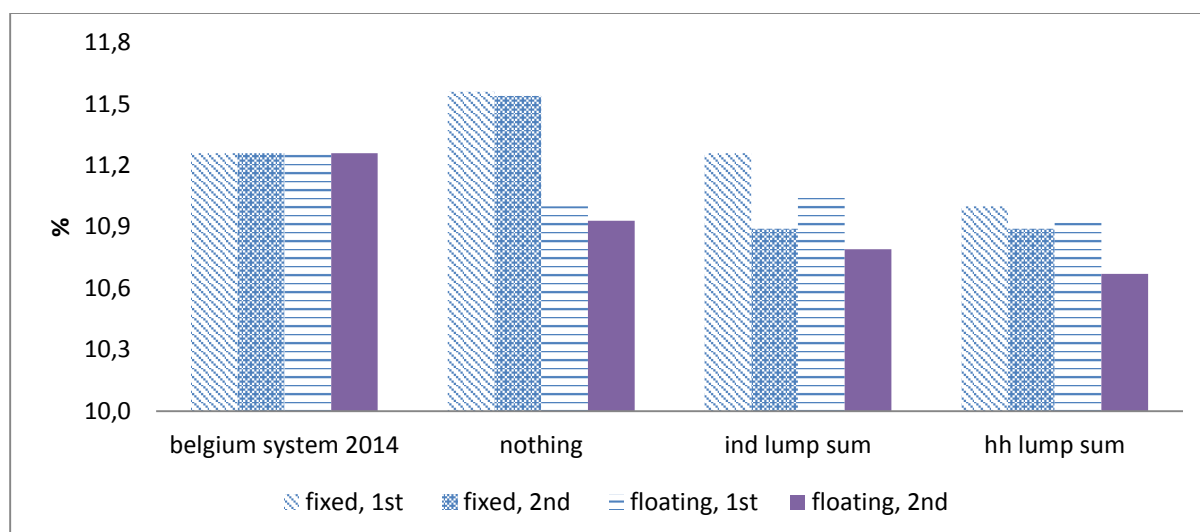


Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: how to interpret these (and subsequent) figures of work incentives? On the x-axis, we see the 5 different discrete working points. On the y-axis, we calculate, for each point, the percentage change in the probability that the persons in our sample who are available for the labour market choose that point. In this case, we notice that the average probability of working 0 hours diminished, and that the probability of working 19, 30 or 38 hours increases.

We look at the impact of both benefits on poverty in Figure 6. Keeping the poverty line fixed results in a poverty decrease for both the individual and the household lump sum. When only considering first order effects, the household lump sum generates the highest poverty reduction. However, when we take labour supply effects into account, the effect of an individual and a household lump sum is very similar. When we recalculate the poverty line and consider only the first order impact, an individual system increases poverty in comparison with giving no benefit, while a household system generates no effect. Taking labour supply into account, both an individual and a household system have a (limited) poverty reducing effect. Persons in the bottom of the income distribution have the highest labour supply elasticities, implying that changes in work incentives are highest among these persons which may yield the necessary income to get out of poverty. As a household system reaches more people at the bottom of the income distribution than an individual one (see Figure 4), the poverty reduction effect of the former is higher when taking labour supply effects into account. But still, overall, poverty changes are relatively limited.

**Figure 6: Poverty impact of an individual and household lump sum, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Notes: 1) 'No in-work benefit' refers to the situation after exclusion of the housing bonus and the work bonus and before the introduction of the alternative in-work benefits; 2) Poverty figures are calculated with a poverty line set 60% of median equivalised disposable income. Fixed poverty line are based on the current situation in Belgium anno 2014, with both the work-bonus and housing bonus included. 3) Poverty figures are always shown for households where the adults are between 20-64 years old.

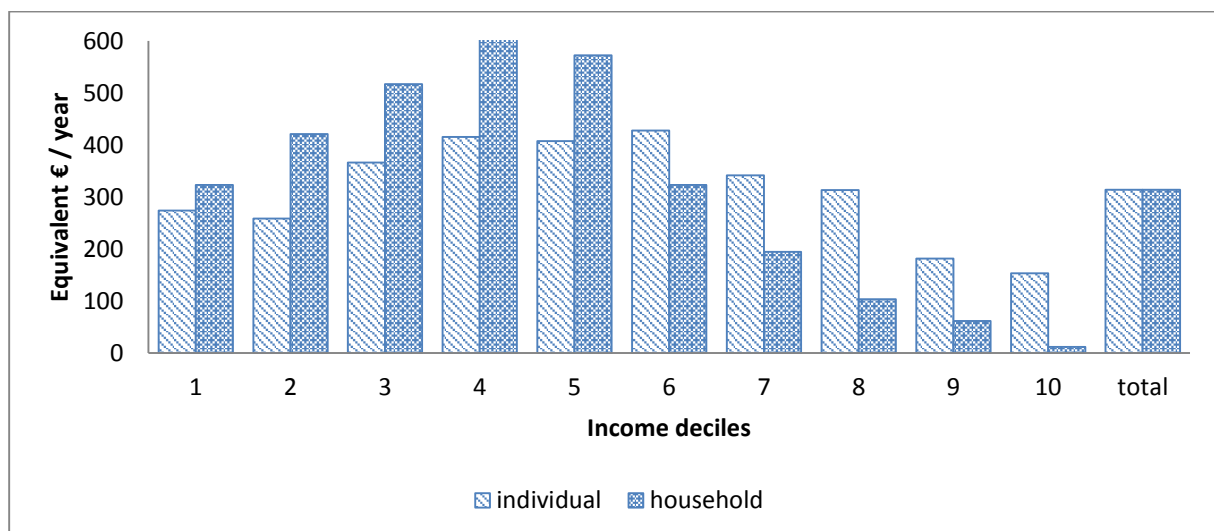
Finally, we looked at the budgetary impact for the government of both an individual and a household lump sum, due to possible labour supply effects (as people start working, the government has to pay less benefits and receives more revenues from social security contributions and taxes paid). The individual lump sum generates an extra budget of 300 million euro per year, while the employment impact of a household lump sum is smaller, generating an extra budget of 102 million euro per year.

We have also performed sensitivity checks for the equivalence scale used in our household based scenario. In the central scenario we have used the modified OECD scale to take account of household size when determining the level of the benefit. We now compare this with two 'extreme' scenarios, notably using an equivalence scale that equals the number of household members  $n$  (i.e. multiplying the monthly basic benefit with  $n$ ; budget neutrality results in a basic benefit of 23 euro per month) and using as equivalence scale 1 (i.e. each household receives the same amount, which is 62 euro per month). In comparison with the central scenario, using the 'equivalence scale 1' is more favourable for small families, where larger families receive a higher amount using 'equivalence scale  $n$ '. As larger households are more found in the bottom of the income distribution, this benefit is somewhat more going towards lower incomes. The opposite applies for the simulation with equivalence scale 1. For work incentives, the best results are found in the simulation with equivalence scale 1 (although the differences are limited). Reason for this is that, for smaller families, a higher benefit generates a relative higher impact on total disposable household income. The simulation with equivalence scale  $n$  is best in reducing poverty (both with a floating and a fixed poverty line) when only first order impact is considered. When we take second order effects into account, the poverty figures in all three scenarios are very similar. In sum, the impact of changing the equivalence scale when using a household lump sum has a limited effect on both employment incentives and poverty figures. Looking at the budgetary impact for the government due to labour supply effects, the simulation with equivalence scale 1 creates 45 million euro per year extra revenue, while the equivalence scale  $n$  simulation comes with a loss of 25 million euro per year (both compared to the central scenario).

## 4.2 Threshold based on gross income

The next step is to add an income threshold to the (individual or household) lump sum benefit as introduced above, meaning that only units with an income below this threshold receive the benefit. As we do a stepwise analysis, the results of these new simulations are compared with the lump sum simulations. In a first instance, the threshold is set at 1.5 times the gross minimum wage of a full-time worker in Belgium, equal to 2,253 euro per month. Using an individual threshold (i.e. only working individuals with a gross income below this threshold receive the benefit), 36.5% of the working individuals are eligible and receive a benefit equal to 107.5 euro per month. When we take a household perspective, the threshold equals 2,253 euro multiplied with the equivalence scale of each family: only households with at least one working person and with a total gross household income below this threshold receive the benefit. 40.6% of these households are eligible and the benefit equals 81 equivalent euro per month. Figure 7 shows that with an individual threshold, we mainly reach people in the middle, but also higher in the income distribution, meaning that persons with a limited gross wage are not always found in poorer households. When using the household threshold, recipients are found mainly in the middle and the bottom of the income distribution.

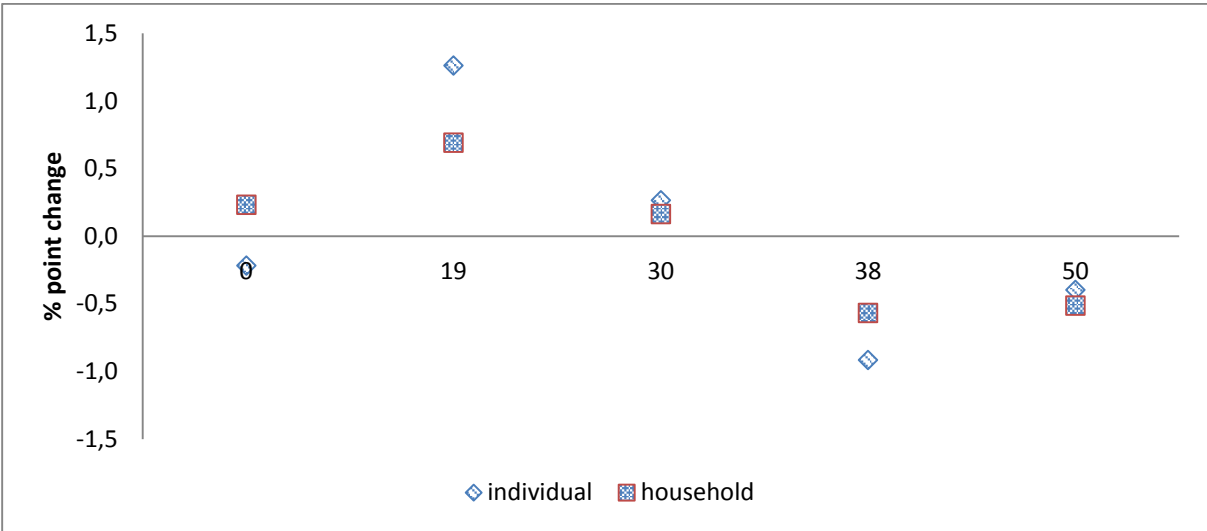
**Figure 7: In-work benefit with an income threshold equal to 1.5 times the gross minimum wage of a full-time worker, yearly amount per income decile, first order, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Figure 8 shows different effects at the extensive and at the intensive margin. At the extensive margin it becomes more interesting for persons below the income threshold to start working, as the difference in income between not working and working becomes larger (in comparison with the lump sum benefit). At the intensive margin, people decide to work fewer hours in order to remain below the threshold, and thus be eligible for the benefit. We thus see a lower probability of working 0 hours and full-time, and an increase in the probability of working part-time. Moreover, a household based system does not give an incentive for the second partner in a couple to start working, as total gross household income can more easily surpass the threshold if he/she starts working, resulting in the loss of the benefit.

**Figure 8: Work incentives of an in-work benefit with income threshold equal to 1.5 times the gross minimum wage of a full-time worker, Belgium, 2014**

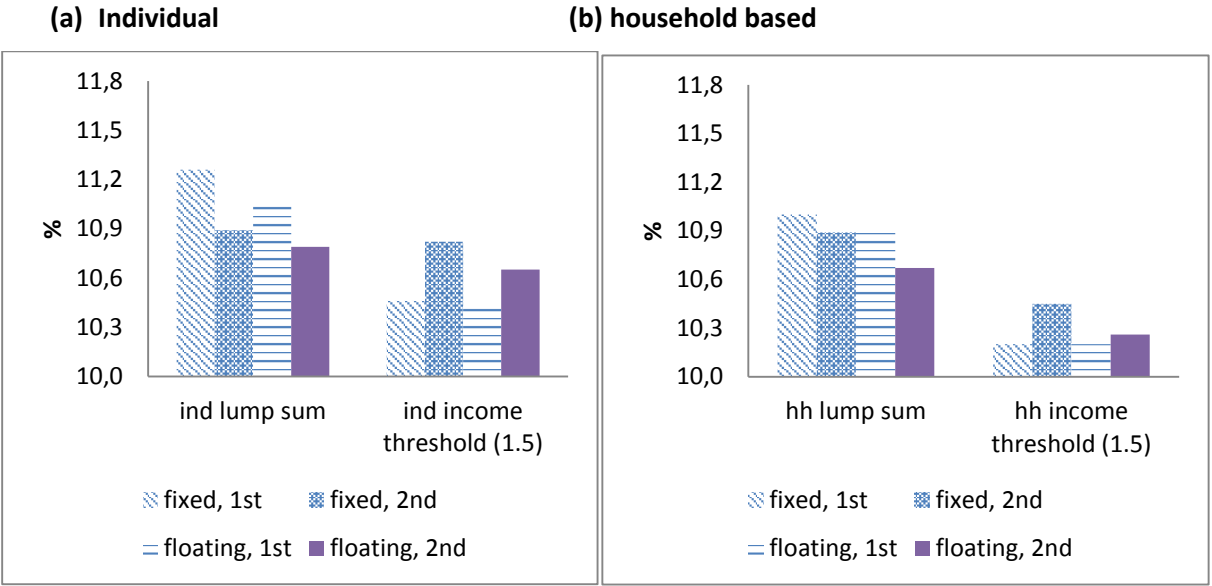


Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: work incentives always show the weighted sum of the four subsamples

When not taking labour supply effects into account, the income threshold has a positive effect on the poverty figures in comparison with the lump sum simulation (Figure 9). But, when taking second order effects into account, this positive effect disappears when using an individual threshold and keeping the poverty line fixed. The reason for the difference between the individual and household benefit lies in the work incentives they generate: a system with a household threshold targets more towards persons in the bottom of the income distribution, generating a positive effect on poverty figures, where an individual system targets towards individuals with a low individual wage, who are mainly found in the middle but also higher in the income distribution.

**Figure 9: Poverty impact of an in-work benefit with income threshold equal to 1.5 times the gross minimum wage of a full-time worker, Belgium, 2014**

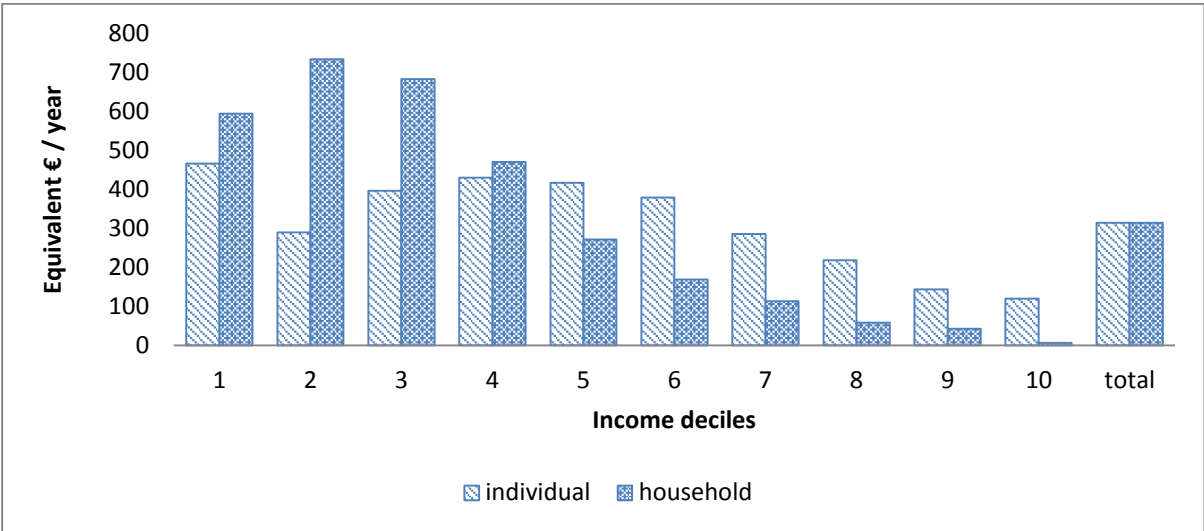


Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Accounting for labour supply effects results in a significant negative impact on government budgets. This is due to the fact that both systems encourage individuals to work less hours. The negative budgetary impact of individuals going from full-time to part-time work (intensive margin) is bigger than the positive impact of individuals who start working (extensive margin). The budgetary loss for the government, in comparison with a lump sum, equals 818 million per year in the individual based system and even 1,058 million euro per year in the household based system.

As a sensitivity check, we looked at the impact of lowering the income threshold by using as a threshold the gross minimum wage of a full-time worker in Belgium (equal to 1,502 euro per month), multiplied by the modified OECD equivalence scale when the benefit is based on the household unit. As can be expected, eligibility is considerably reduced: in the individual case, 19% of the working individuals in Belgium are eligible, while in the household scenario this is 20.7% of the households with at least one working person. Benefit levels are 203 euro per month in the individual scenario and 150 equivalent euro in the household based. Compared to the scenario with the more generous threshold, we find especially for the household based variant that the advantage is higher for lower income households (Figure 10).

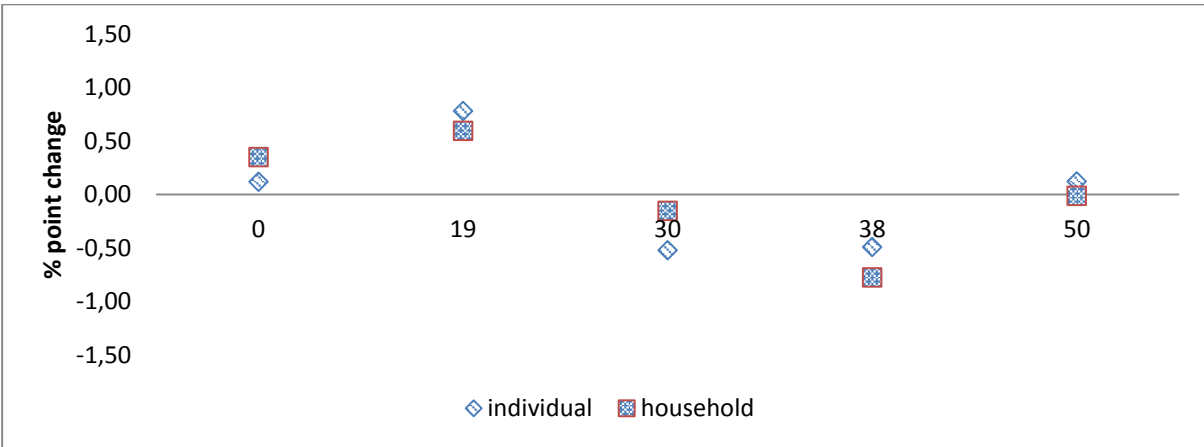
**Figure 10: In-work benefit with an income threshold equal to the gross minimum wage of a full-time worker, yearly amount per decile, first order, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

In Figure 11 we compare work incentives with the previous step, namely a benefit with an income threshold equal to 1.5 times the gross minimum wage of a full time worker in Belgium (either on an individual or household basis). Making the threshold narrower does not result in positive labour supply effects. In both systems, households are encouraged to diminish their amount of hours worked, in order to remain eligible for the benefit. We hardly see an effect at the extensive margin of persons who start working with the individual variant; there is a small positive effect with the household scenario. For single females, who are mainly found at the bottom of the income distribution, the probability of working zero hours decreases, while for couple households we find a disincentive for the second partner to start working, as the in-work benefit they may receive when staying below the threshold is getting larger. These two opposing trends result in a small total increase in the probability of working zero hours.

**Figure 11: Work incentives of an individual and household benefit with income threshold equal to the gross minimum wage of a full time worker, Belgium, 2014**

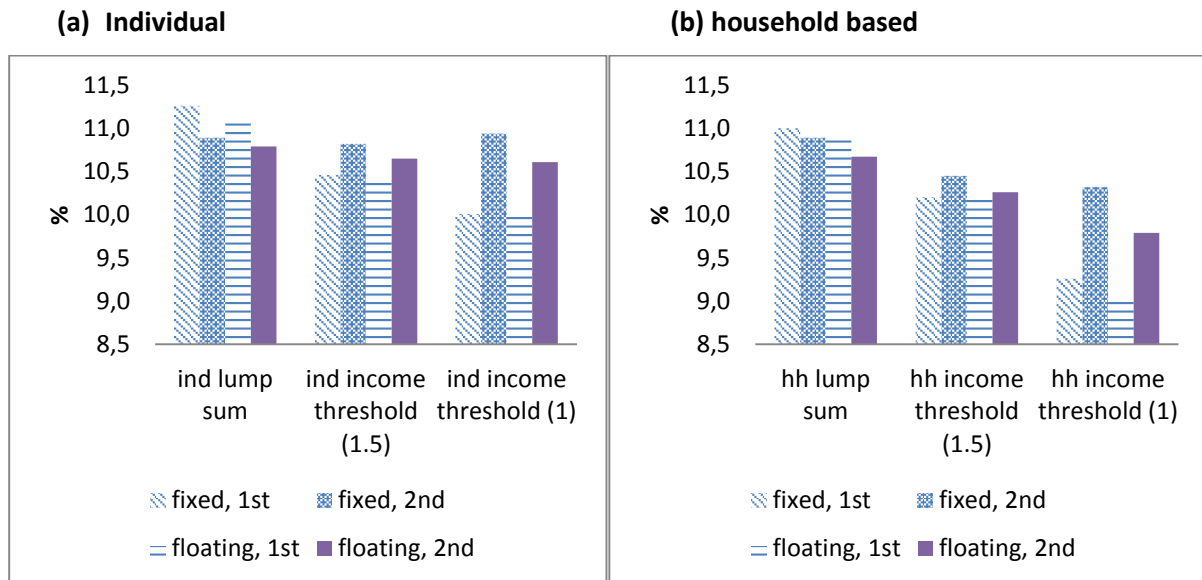


Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Figure 12 describes the impact on poverty of both simulations. Lowering the income threshold in an individual system reduces poverty. But when we take labour supply effects into account, this positive

effect disappears and the poverty figures remain constant. With the household system, narrowing the income threshold has a positive effect on the poverty head count, both without and with taking labour supply effects into account. For the most vulnerable group of single women, poverty goes down from 27% in the lump sum simulation to 25% with the poverty threshold equal to 1.5 time the gross minimum wage of a full time worker and to 21% with the stricter threshold.

**Figure 12: Poverty impact of an individual, resp. household benefit with an income threshold equal to the gross minimum wage of a full time worker, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

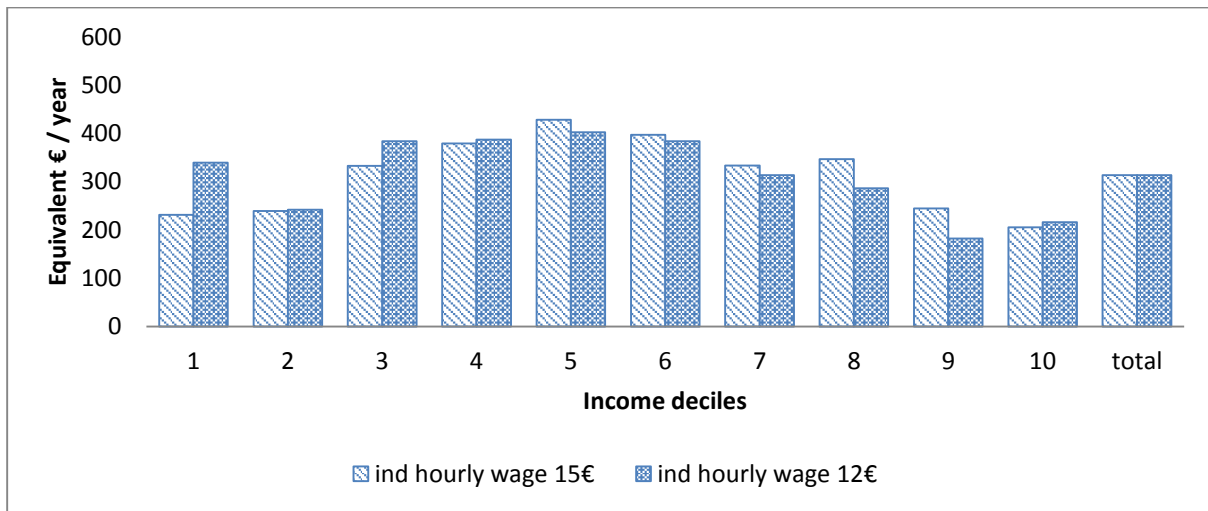
Looking at the budgetary impact for the government taking labour supply effects into account, making the threshold tighter has a negative impact on the governments' budget. For the individual system, this comes down to an extra loss of 289 million euro per year. For the household system the extra loss equals 493 million euro per year (both in comparison with the less tighter threshold simulated above).

### 4.3 Threshold based on hourly wage

One way to avoid the negative impact on work incentives at the intensive margin of introducing an income threshold is to use a threshold based on individual hourly wages. In this case the in-work benefit is independent of the number of hours worked. We implement two different thresholds: a hourly gross wage of 15 euro per hour (41.9% of all individuals at work in Belgium have an hourly gross wage below this amount and receive a benefit of 93 euro per month), and a sensitivity check, using a threshold of 12 euro per hour (27.4%, receiving a benefit of 143 euro per month). The benefit mainly goes to people in the middle in the income distribution (Figure 13), illustrating that individuals with a low hourly wage are not necessarily concentrated in the lowest income deciles. With the 12 euro threshold, the benefit is somewhat more directed to lower incomes than with the 15 euro threshold.



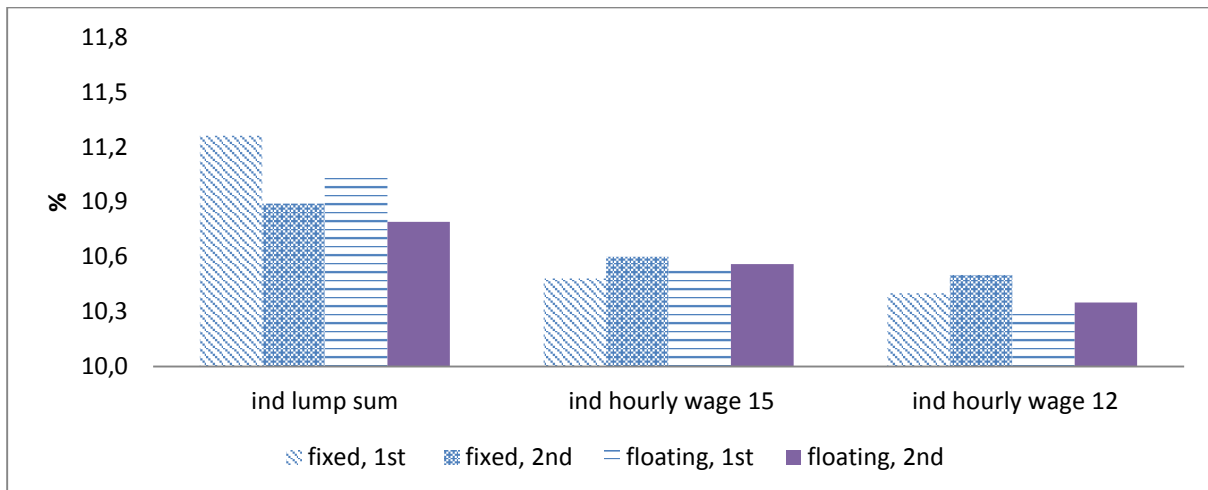
**Figure 13: Income distribution of an individual benefit with a threshold based on gross hourly wage, Belgium, yearly amount per income decile, first order, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

As the introduction of a threshold based on gross wages does not create (positive or negative) work incentives<sup>9</sup> at the intensive margin, we do not show this indicator. The introduction of a gross hourly wage threshold has a positive impact on poverty (in comparison with a lump sum benefit) (Figure 14). The stricter you make the hourly threshold, the more you aim towards person at the bottom of the income distribution and the higher the benefit you can grant; hence the larger the poverty impact will be. As work incentives are very limited (no impact at the intensive margin), first order and second order effects are very similar.

**Figure 14: Poverty impact of an individual benefit with a threshold based on gross hourly wage, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

The second order budgetary impact of introducing a threshold based on an hourly wage is negative but limited. The extra governmental cost with a threshold of 12, resp. 15 euro equals 31, resp. 12 million euro per year (in comparison with introducing an individual lump sum).

<sup>9</sup> This is of course an assumption we make in the labour supply model we are using. In reality, it is possible that you will receive a higher (or lower) gross hourly wage when you decide to work more / less hours.

#### **4.4 Tapering out based on gross income**

In a fourth step, we introduce a tapering out of the gross income threshold, both on an individual and a household level. The results are compared with the simulations done in step 4.2. The impact of introducing a tapering out crucially depends on the choice of the threshold. With a high threshold, there will be many recipients and the amount of the benefit is relatively low in order to remain budgetary neutral; hence, introducing a tapering out will have little impact. The exact opposite is true for a lower income threshold. We introduced a tapering out both with a threshold equal to the gross minimum wage of a full time worker and to 1.5 times this minimum wage. We only present here results from the former, as the impact on employment and poverty figures of the latter are limited (results available from authors upon request).

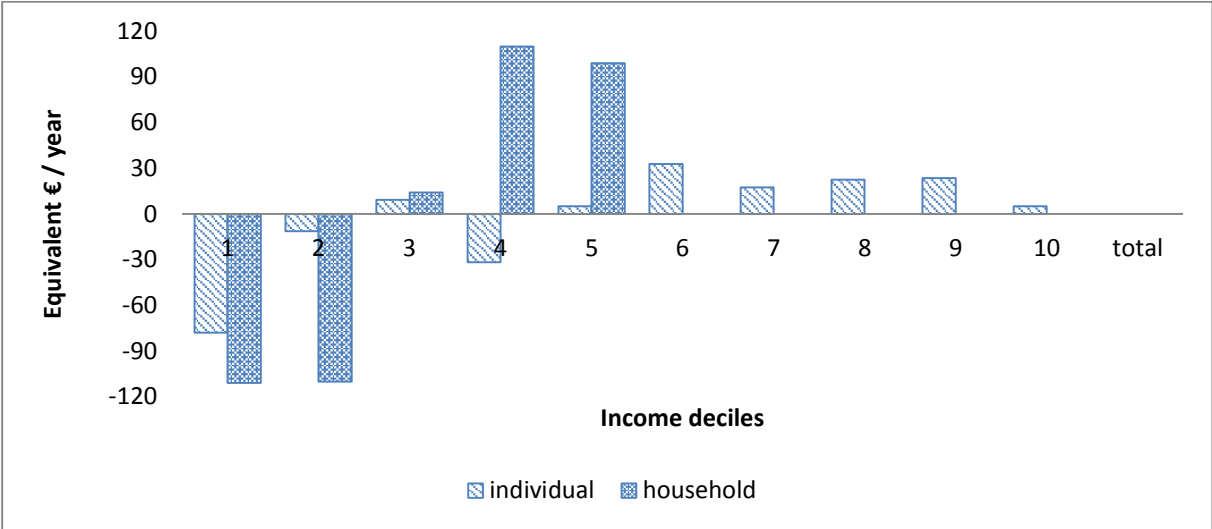
We apply three tapering out percentages, namely 70%, 30% and 10% (i.e. for every gross euro earned above the income threshold, the in-work benefit will diminish with respectively 0.7, 0.3 or 0.1 euro, until the in-work benefit reaches zero). When introducing a tapering out, the base amount of the benefit need to be lowered in order to remain budget neutral: in an individual system the benefit is reduced from 203 to 180, resp. 160 and 119 euro per month when using a tapering out of 70%, resp. 30% and 10%. In a household system the benefit is reduced from 150 equivalent euro to 134, resp. 122 and 96 equivalent euro per month when using a tapering out of 70%, resp. 30 and 10%<sup>10</sup>.

Introducing a tapering out of 30% (Figure 15) in an individual system has mainly a negative effect on the first income decile. The impact on the other income deciles is very limited (as both winners and losers are found in each decile, the average effect per decile is small). If the tapering out is slower (10%), mainly decile 1, but also deciles 2 and 4 will lose, while all other deciles are small winners. Looking at the household system, the introduction of a tapering out of 30% causes income deciles 1 and 2 to lose, decile 3 contains both winners and losers (making the average effect for this decile very small), and deciles four and five are now part of the tapering out zone and will receive a part of the benefit. If a tapering out of 10% is used, also income deciles 5 and 6 are in the tapering out zone and also gain.

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<sup>10</sup> Another option would be to release the budget neutrality restriction. This would come at an additional cost for the government (first-order cost) of respectively 326 million (70%), 774 million (30%) or 2.9 billion (10%) euro per year in the individual system and 279 million (70%), 623 million (30%) or 1.9 billion (10%) euro per year in the household system.

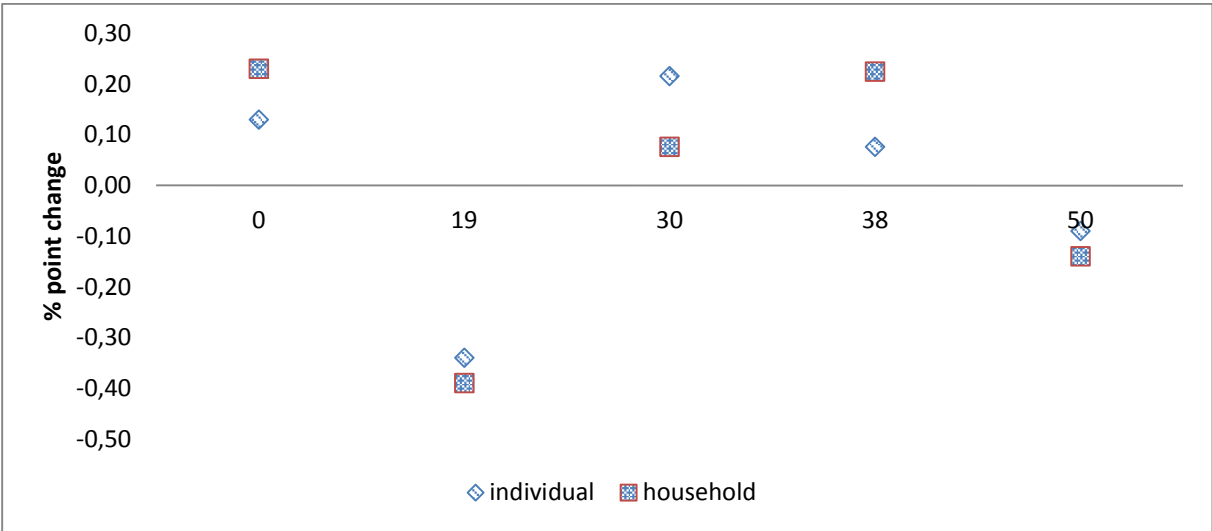
**Figure 15: Income distribution of an individual and household benefit with an income threshold equal to the gross minimum wage of a full-time worker and a tapering out of 30% , Belgium, yearly amount per income decile, first order, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).  
 Note: as the impact on the income distribution of introducing a tapering out is limited, we show here the equivalent gain/loss for each decile in comparison with the previous simulation, namely an individual/household system with an income threshold equal to the gross minimum wage of a full-time worker and without a tapering out.

For work incentives (Figure 16) two elements are at play: first, tapering out results in a lower maximum amount of the in-work benefit, giving a negative incentive at the extensive margin, mainly for persons at the bottom of the income distribution. We thus see an increase in the probability of working zero hours. Second, the introduction of a tapering out gives an incentive to work more hours, illustrated by the increase in the probability of working full-time. The slower one tapers out, the larger the negative incentives at the extensive margin, but also the larger the positive incentives at the intensive margin. A household system generates larger work incentives than an individual one, both at the extensive margin (as the benefit for households at the bottom of the income distribution is lowered), but also at the intensive margin (introducing a tapering out has a positive effect on income deciles 4 and 5, deciles who still have relatively high labour supply elasticities).

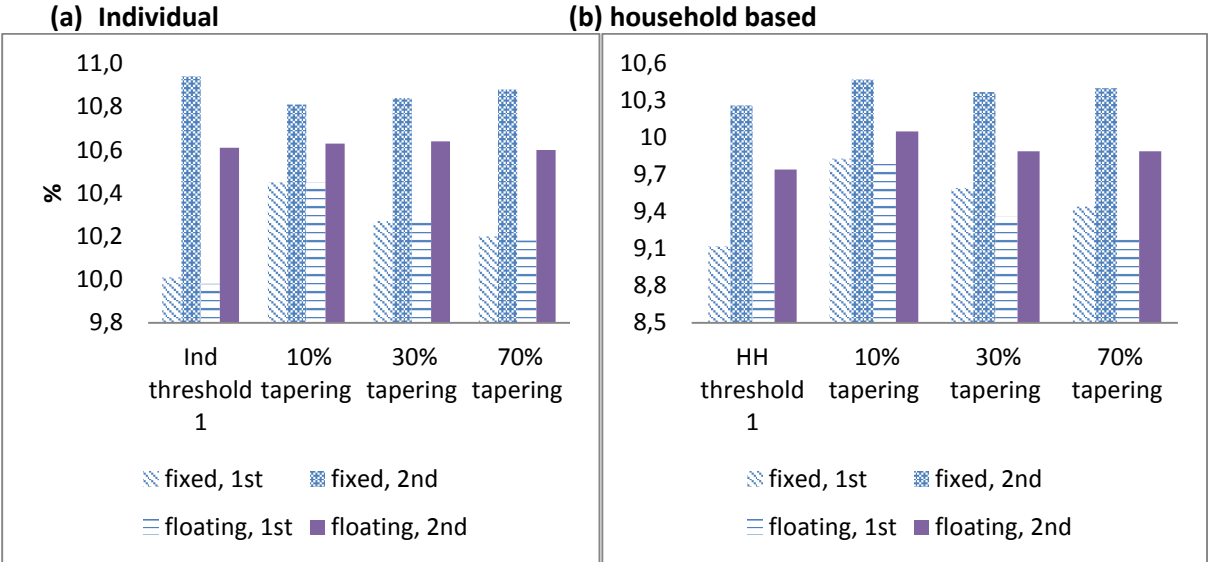
**Figure 16: Work incentives of an individual and household benefit with an income threshold equal to the gross minimum wage of a full-time worker and a tapering out of 30%, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Introducing a tapering out has a negative effect on poverty figures (mainly in a household system) (Figure 17). The slower you taper out, the more poverty increases. But when we take second order effects into account, the poverty impact remains limited over the different simulations (both in an individual and a household system).

**Figure 17: Poverty impact of an individual and household benefit with an income threshold equal to the gross minimum wage of a full-time worker and a tapering out of 10%, 30% or 70%, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

The second order budgetary impact for the government of the individual system is positive when a tapering out of 10% is used, with 98 million euro per year extra budget. If the tapering out equals 30%, resp. 70% government budget goes down with 31, resp. 57 million euro per year (all in comparison with no tapering out). For the household system, introducing a tapering out of 10% has a positive budgetary impact of 304 million euro per year; for a tapering out of 30%, resp. 70%, the budget goes up with 101, resp. 57 million euro per year. To sum up, introducing a tapering out has a positive effect

on the governmental budget when taking labour supply effects into account. This is due to the fact that the financial gains at the intensive margin (persons often higher in the income distribution decide to work more hours) are larger than the budgetary losses at the extensive margin (persons in the bottom of the income distribution decide to stop working).

#### **4.5 Tapering in based on gross income**

As a fifth step, we introduce a tapering in, both on the individual and household level. Tapering in is introduced in some work benefits in order to avoid that too small incomes benefit from the system, assuming that these small income are often (second-earner) additional earnings. We compare these results with the previous step, using a tapering out of 30%. Just as with the tapering out, the impact of a tapering in depends on the threshold used: if the benefit is relatively low, the tapering in zone will be limited, generating limited effects on work incentives and poverty. The exact opposite is true when using a tighter threshold so that your maximum benefit is higher, resulting in a longer tapering in zone. We only show results for a threshold equal to the gross minimum wage of a full-time worker in Belgium<sup>11</sup>.

We use two percentages of tapering in, namely 20% and 30% (meaning that for every gross euro you start to earn, you will receive 0.2, resp. 0.3 euro of the benefit, until the maximum amount of the benefit is reached. For the individual system, the maximum amount of the benefit can be raised, from 160 euro per month (no tapering in) to 184 euro, resp. 199 euro when a tapering in of 30% resp. 20% is introduced. For the household system the original benefit of 122 equivalent euro per month (no tapering in) is raised to 128, resp. 133 equivalent euro (tapering of 20%, resp. 30%)<sup>12</sup>.

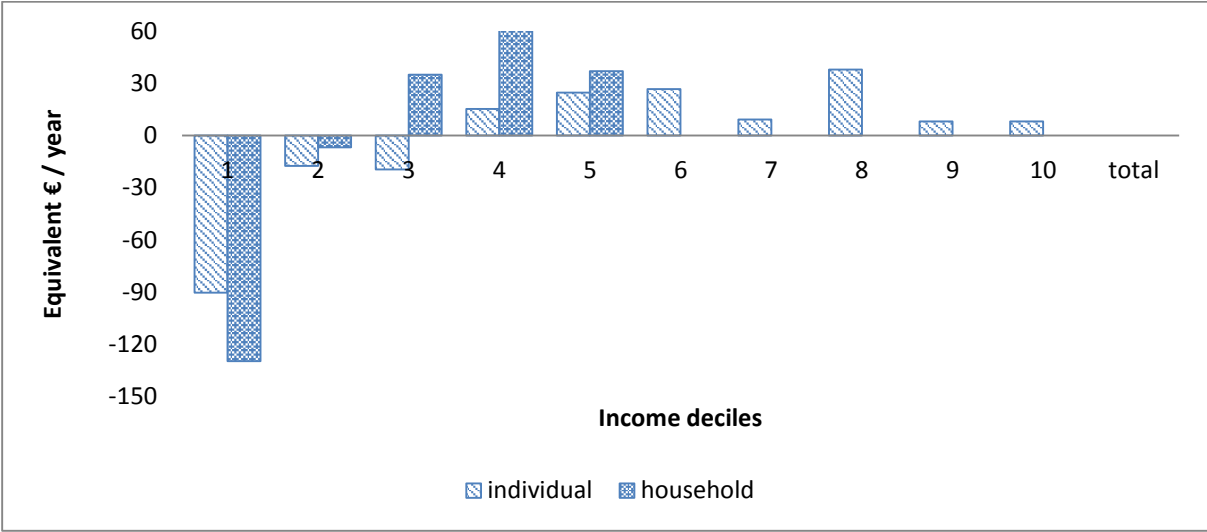
Introducing a tapering in of 30% has a negative effect on mainly the first income decile and also on deciles 2 and 3 (Figure 18). The lower the tapering in percentage, the bigger the negative effect for these income deciles. Individuals higher in the income distribution are small gainers (due to the fact that the maximum amount of the benefit increases). Looking at the household system, introducing a tapering in has mainly a negative effect on the first income decile. Deciles 3, 4 and 5 are winners. A lower tapering in percentage has negative effects for income deciles 1 and 2, income deciles 3, 4 and 5 will win due to the higher maximum amount of the benefit.

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<sup>11</sup> Results of the simulations using a threshold equal to 1.5 times the gross minimum wage of a full-time worker are available from the authors upon request.

<sup>12</sup> An alternative is to leave the benefit amount unchanged at 160 euro in an individual system and 122 equivalent euro in a household system. This would come at a budgetary gain for the government of respectively 321 million euro (tapering in of 30%) or 460 million euro per year (20%) in an individual system and 197 million euro (30%) or 127 million euro per year (20%) in a household system.

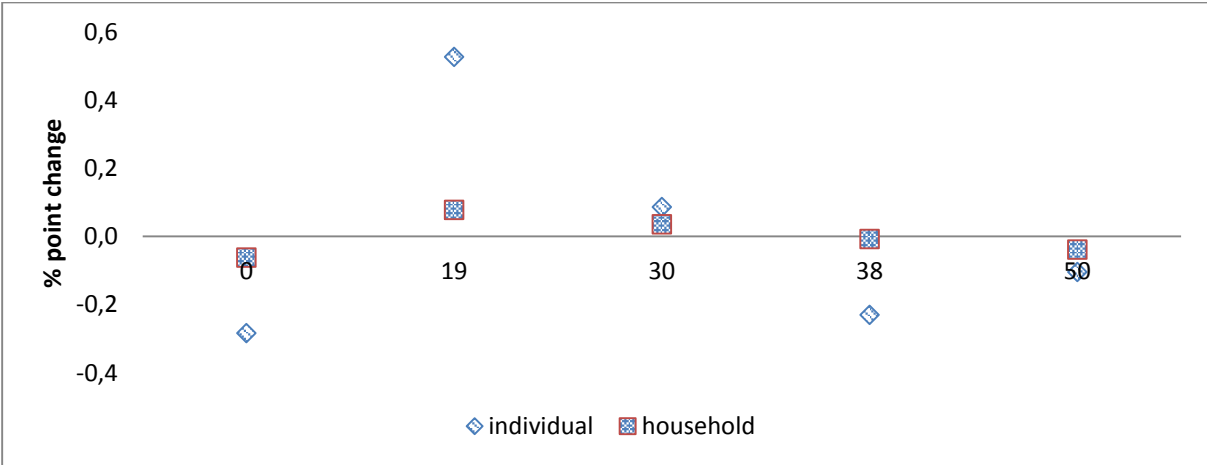
**Figure 18: Income distribution of an individual and household benefit with an income threshold equal to the gross minimum wage of a full-time worker, a tapering out of 30% and a tapering in of 20%, yearly amount per decile, first order, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).  
 Note: as the impact on the income distribution of introducing a tapering in is limited, we show here the equivalent gain/loss for each decile in comparison with the previous simulation, namely an individual/household system with an income threshold equal to the gross minimum wage of a full-time worker and with a tapering out of 30%.

The impact on work incentives (Figure 19) is higher for the individual than for the household system, where it is almost negligible. The introduction of a tapering in gives mainly an incentive for individuals to increase their working hours when they work only few hours and are in the tapering in phase (working more hours not only generates a higher income from work but also a higher in-work benefit). We also find a disincentive for persons who work full-time: as the maximum amount of the benefit increases due to the introduction of a tapering in, it becomes more interesting to lower the amount of hours worked in order to become/remains eligible for the benefit.

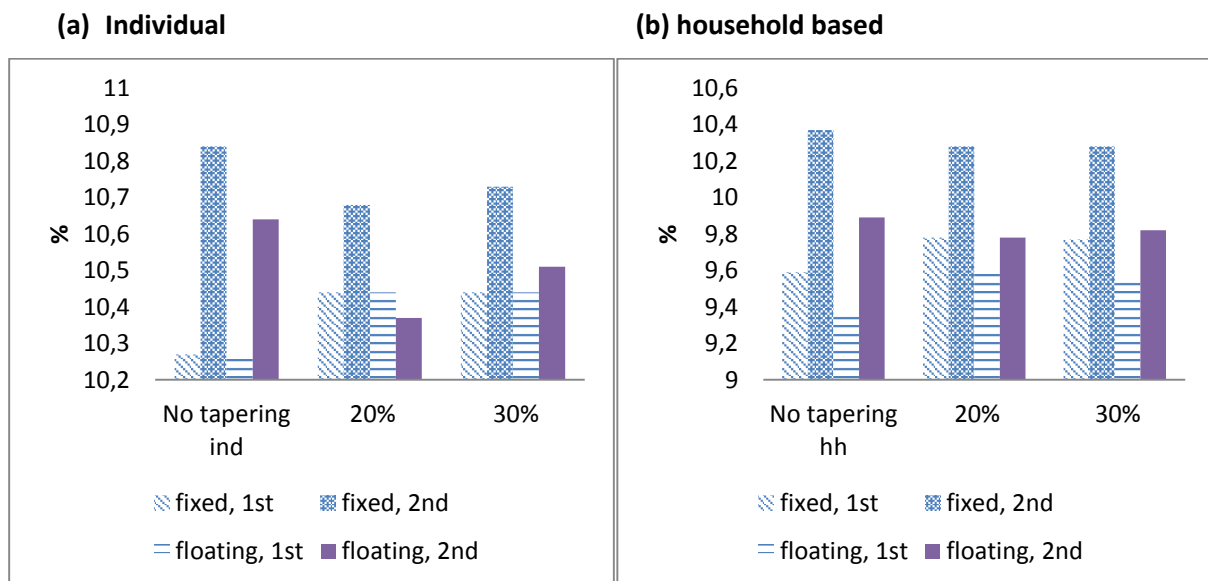
**Figure 19: Work incentives of in-work benefit with an income threshold equal to the gross minimum wage of a full-time worker, a tapering out of 30% and a tapering in of 20%, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Both the individual and the household system have a negative impact on poverty (Figure 20) when no labour supply effects are taken into account. The lower the percentage of tapering in, the larger this negative impact will be. When labour supply effects are taken into account, we find a small drop in the poverty rate. This is due to the fact that a tapering in gives an incentive to work more hours for persons who work a limited amount of hours and are thus found in the tapering in zone. As they start working more hours, they will jump over the poverty line and the poverty head count will drop.

**Figure 20: Poverty impact of an individual and household benefit with an income threshold equal to the gross minimum wage of a full-time worker, a tapering out of 30% and a tapering in of 20% or 30%, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Introducing a tapering in has a negative effect on the second order budgetary impact for the government. This is mainly due to the fact that full-time working individuals lower their working hours in order to become eligible for the benefit. The budgetary loss for the government equals 75 resp. 98 million euro (tapering in of 30%, resp. 20%) in an individual system and 35, resp. 42 million euro (tapering in of 30%, resp. 20%) in a household system.

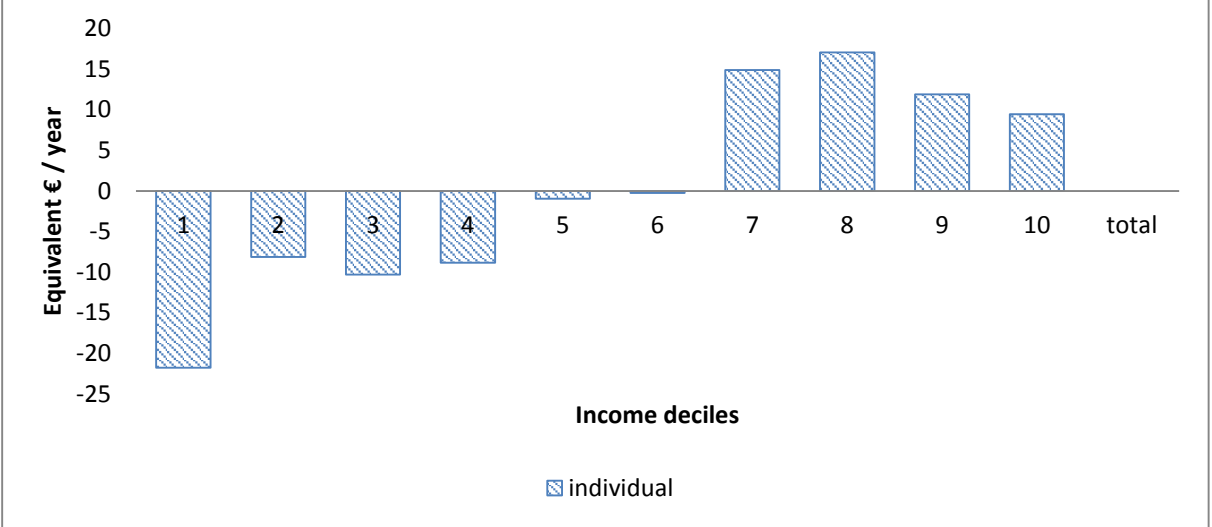
#### 4.6 Tapering in based on hours worked

In order to avoid the adverse work incentive effect of the tapering in, one can introduce a requirement of minimum hours work (so somebody working e.g. half-time will only receive 50% of the benefit). We present outcomes for such an individual based scenario. We do this as an extension of the simulation in which we implement an individual threshold based on hourly wage (section 4.3). We compare our results with a simulation with an individual threshold of an hourly wage of 15 euro and a tapering out of 30%. Due to the introduction of a tapering in based on hours worked, the maximum amount of the benefit can be increased from 83 to 90 euro per month.

The introduction of a tapering in based on hours worked has a small negative impact on individuals lower in the income distribution (Figure 21). This is due to the fact that part-time workers are more

often found lower in the income distribution. But as winners and losers are found in every income decile, the average effect per income decile is limited.

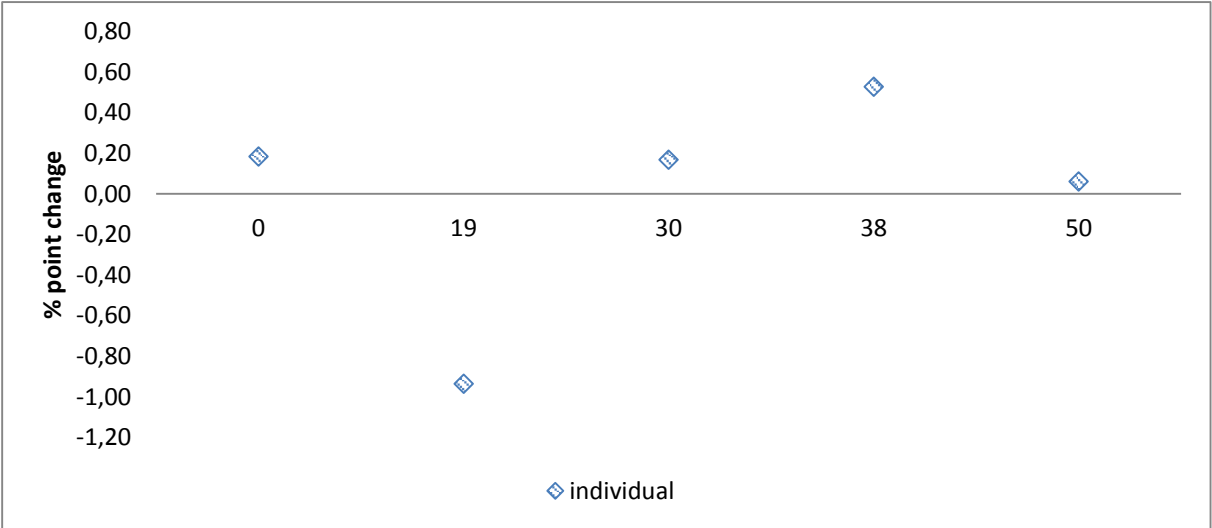
**Figure 21: Income distribution of an individual benefit with a threshold based on gross hourly wage (15 euro), a tapering out of 30% and a tapering in based on hours worked, yearly amount per income decile, first order, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).  
 Note: as the impact on the income distribution of introducing a tapering in based on hours worked is limited, we show here the equivalent gain/loss for each decile in comparison with a previous simulation, namely an individual system with an income threshold equal to 15 euro per hours and without a tapering out of 30%.

Figure 22 shows a trade-off for work incentives: at the intensive margin, individuals receive a positive incentive to work more hours, as the amount of the in-work benefit received increases proportionally. At the extensive margin, it become less interesting to start working part-time, resulting in an increase in the probability of working zero hours.

**Figure 22: Work incentives of an individual benefit with a threshold based on gross hourly wage (15 euro), a tapering out of 30% and a tapering in based on hours worked, Belgium, 2014**



Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).



Introducing a tapering in based on hours worked has no significant impact on poverty figures. When we look at the budgetary impact for the government taking labour supply effects into account, we notice that the gain in the intensive margin is more important than the loss at the extensive margin, resulting in a governmental gain of 158 million euro per year.

## Conclusion

In this paper we have built up, step-by-step, an in-work benefit, in order to show the impact of the different design features on work incentives and poverty. In general, we often found trade-offs between both aims. Some design characteristics are more favourable for work incentives, whereas other are better in reducing poverty. We summarize the main outcomes along these two objectives in the table below:

**Table 8: Overview of the impact of different design characteristics of an in-work benefit on work incentives and poverty figures.**

Scenario		Work incentives			Poverty	Gov. budget
		Extensive	Intensive margin		Floating, second order	
		$\Delta$ no work	$\Delta$ part-time	$\Delta$ full-time		
<b>Lump sum</b>	I	😊😊	😊	😊😊	😊	😊😊
	HH	😊	😊	😊	😊	😊
<b>Threshold gross income</b>	I	≈	😊😊	😞😞	😊	😞😞
	HH	😞	😊	😞	😊😊	😞😞
<b>Threshold hourly wage</b>	I	≈	=	=	😊	≈
<b>Tapering out (gross income)</b>	I	😞	≈	😊	≈	😊
	HH	≈	😞	≈	≈	😊
<b>Tapering in (gross income)</b>	I	😊	😊	😞	≈	😞
	HH	≈	≈	=	≈	😞
<b>Tapering in (hours worked)</b>	I	😞	😞	😊	≈	😊

Note: I: Individual; HH= household

If one has the improvement of work incentives as primary focus, the following considerations need to be born in mind:

1. In general, an individual in-work benefit seems to generate better work incentives than a household one, as the latter does not give financial incentives to the second partner in the household to start working or to work more hours.

2. A household in-work benefit, however, is more suitable to generate work incentives at the bottom of the income distribution, which is more difficult with an individual benefit.
3. Introducing a threshold based on (gross) income generates additional work incentives mainly at the intensive margin for part-time work. This may entail a budgetary cost when taking labour supply effects into account.
4. Implementing a threshold based on hourly wage removes the negative work incentive in the intensive margin. The downside is that you can no longer aim at persons in the bottom of income distribution.
5. A tapering out based on (gross) income introduces a trade-off: the lower the tapering out percentage, the lower the maximum amount of the in-work benefit and the lower the incentive to work at the extensive margin. But at the intensive margin there is an extra incentive to work more hours. When taking second order effects into account, the budgetary gain at the intensive margin is larger than the budgetary loss at the extensive margin.
6. A tapering in based on (gross) incomes gives an incentive for individuals to increase their working hours, mainly for persons who work a limited amount of hours and are found in the tapering in phase. We also notice an incentive for persons who work full-time to lower their amount of hours work in order to become eligible for the benefit.
7. A tapering in based on hours worked gives a trade-off between the intensive margin (it becomes more interesting to work more hours, due to the fact that the in-work benefit increases linearly with the amount of hours worked) and the extensive margin (disincentive to start working, as the difference in the height of the in-work benefit received between not working and working part-time is now smaller).

If ones primary focus is on improving poverty figures, the following design elements are of importance:

1. A household in-work benefit seems to generate better poverty results than an individual system, due to the fact that one can target much better towards persons in the bottom of the income distribution.
2. Introducing a threshold based on (gross) income has a positive impact on poverty figures, as more budget is directed towards lower incomes. The tighter the threshold, the better the poverty results.
3. Introducing a tapering out or a tapering in has a negative impact on poverty figures in the first order. But, when you take second order effects into account, this negative effect disappears and the poverty head count remains stable.

And finally, we have shown that the design of an in-work benefit is of crucial importance, but of course, in order to get a sizeable effect, sufficient budget is needed.

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## Annex

Table A1: Estimated parameters of the quadratic utility function for households where both partners are available for the labour market

	Coefficient		Standard error
<b>Disposable household income</b>			
Work experience male	-0.0007		0.001
Work experience squared male	0.000		0.000
Work experience female	0.007	***	0.001
Work experience squared female	-0.001	***	0.000
Constant	2.19	***	0.310
Disposable household income squared	-0.071	***	0.008
<b>Non-working time male</b>			
Presence of a child 0-3y	0.009	**	0.004
Presence of a child 4-6y	0.006		0.005
Presence of a child 7-12y	-0.001		0.004
Age	0.006	***	0.001
Age squared	-0.001	***	0.000
Constant	0.489	***	0.044
Non-working time male squared	-0.003	***	0.001
<b>Non-working time female</b>			
Presence of a child 0-3y	0.020	***	0.004
Presence of a child 4-6y	0.022	***	0.004
Presence of a child 7-12y	0.014	***	0.003
Age	0.006	***	0.001
Age squared	-0.000	***	0.000
Constant	0.497	***	0.037
Non-working time female squared	-0.004	***	0.000
Non-working time male * consumption	-0.007	**	0.003
Non-working time female * consumption	0.001	***	0.000
Dummy for working part-time male	2.718	***	0.101
Dummy for working part-time female	1.412	***	0.086

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: \*:  $p < 0.1$ ; \*\*:  $p < 0.05$ ; \*\*\*:  $p < 0.01$ . Excluded categories is presence of a child 13-18y old.

**Table A2: Estimated parameters of the quadratic utility function for households where one partner is available for the labour market**

	Coefficient		Standard error
<b>Disposable household income</b>			
Work experience	0.011	***	0.002
Work experience squared	-0.000	**	0.000
Constant	0.654		0.594
<b>Disposable household income squared</b>	-0.125	***	0.036
<b>Non-working time</b>			
Presence of a child 0-3y	0.011	*	0.006
Presence of a child 4-6y	0.017	*	0.007
Presence of a child 7-12y	0.009		0.006
Age	0.004		0.002
Age squared	-0.001	***	0.000
Constant	0.284	***	0.068
<b>Non-working time squared</b>	-0.002	***	0.000
<b>Non-working time * consumption</b>	-0.004		0.004
<b>Dummy for working part-time</b>	1.368	***	0.137

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: \*:  $p < 0.1$ ; \*\*:  $p < 0.05$ ; \*\*\*:  $p < 0.01$ . Excluded category is presence of a child 13-18y old.

**Table A3: Estimated parameters of the quadratic utility function for single males**

	Coefficient		Standard error
<b>Disposable household income</b>			
Work experience	0.289	***	0.082
Work experience squared	-0.001	***	0.000
Constant	1.782	***	0.671
<b>Disposable household income squared</b>	-0.034		0.036
<b>Non-working time</b>	0.294	***	0.048
<b>Non-working time squared</b>	-0.002	***	0.000
<b>Non-working time * consumption</b>	0.016	**	0.007
<b>Dummy for working part-time</b>	2.879	***	0.196

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

Note: \*:  $p < 0.1$ ; \*\*:  $p < 0.05$ ; \*\*\*:  $p < 0.01$ . Excluded categories are higher education and presence of a child 13-18y old.

**Table A4: Observed and predicted labour supply densities for households where both partners are available for the labour market**

Hours worked / week	Observed density	Predicted density	Observed density	Predicted density
	Male		Female	
0	8.89	8.69	19.84	19.09
19	2.99	3.87	16.72	20.03
30	6.17	5.28	20.17	16.87
38	61.45	61.47	37.23	37.31
50	20.50	20.68	6.04	6.71

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).

**Table A5: Observed and predicted labour supply densities for**

Hours worked / week	Observed density	Predicted density
<b>(a) Households where one partner is available for the labour market</b>		
0	36.79	36.90
19	13.43	12.92
30	10.22	10.73
38	28.76	28.75
50	10.80	10.70
<b>(a) Single men</b>		
0	22.12	22.31
19	4.65	3.82
30	3.54	4.37
38	53.76	53.74
50	15.93	15.76

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012)

**Table A6: GINI coefficients of disposable household income, population 20-64y old**

Simulations			1 <sup>st</sup> order	2 <sup>nd</sup> order
<b>Belgium system 2014</b>			0.2256	0.2256
<b>No in-work benefit</b>			0.2262	0.2268
<b>Lump sum</b>	Individual		0.2256	0.2247
	Household	Modified OECD eq. scale	0.2243	0.2242
		Household		0.2244
<b>Threshold based on gross income</b>	Individual	Number of hh members	0.2242	0.2242
		1.5	0.2205	0.2220
	1	0.2191	0.2230	
Household	1.5	0.2176	0.2209	
	1	0.2159	0.2220	
<b>Threshold based on hourly wage</b>	Individual	12€/hour	0.2206	0.2222
		15€/hour	0.2207	0.2220
<b>Tapering out based on gross income</b>	Individual	Rate of 10%	0.2190	0.2230
		Rate of 30%	0.2200	0.2230
		Rate of 70%	0.2200	0.2220
	Household	Rate of 10%	0.2160	0.2220
		Rate of 30%	0.2160	0.2220
		Rate of 70%	0.2170	0.2220
<b>Tapering in based on gross income</b>	Individual	Rate of 20%	0.2200	0.2220
		Rate of 30%	0.2200	0.2220
	Household	Rate of 20%	0.2170	0.2210
		Rate of 30%	0.2170	0.2220
<b>Tapering in based on hours worked</b>	Individual		0.2200	0.2230

Source: own calculations based on EUROMOD (underlying data BE-SILC 2012).



## **ImPRovE: Poverty Reduction in Europe. Social Policy and Innovation**

Poverty Reduction in Europe: Social Policy and Innovation (ImPRovE) is an international research project that brings together ten outstanding research institutes and a broad network of researchers in a concerted effort to study poverty, social policy and social innovation in Europe. The ImPRovE project aims to improve the basis for evidence-based policy making in Europe, both in the short and in the long term. In the short term, this is done by carrying out research that is directly relevant for policymakers. At the same time however, ImPRovE invests in improving the long-term capacity for evidence-based policy making by upgrading the available research infrastructure, by combining both applied and fundamental research, and by optimising the information flow of research results to relevant policy makers and the civil society at large.

The two central questions driving the ImPRovE project are:

How can social cohesion be achieved in Europe?

How can social innovation complement, reinforce and modify macro-level policies and vice versa?

The project runs from March 2012 till February 2016 and receives EU research support to the amount of Euro 2.7 million under the 7<sup>th</sup> Framework Programme. The output of ImPRovE will include over 55 research papers, about 16 policy briefs and at least 3 scientific books. The ImPRovE Consortium will organise two international conferences (Spring 2014 and Winter 2015). In addition, ImPRovE will develop a new database of local projects of social innovation in Europe, cross-national comparable reference budgets for 6 countries (Belgium, Finland, Greece, Hungary, Italy and Spain) and will strongly expand the available policy scenarios in the European microsimulation model EUROMOD.

More detailed information is available on the website <http://improve-research.eu>.

Bea Cantillon (Coordinator)

E-mail: [bea.cantillon@uantwerpen.be](mailto:bea.cantillon@uantwerpen.be)

Phone: +32 3 265 53 98

Address: University of Antwerp – Sint-Jacobstraat 2 (M.177) – 2000 Antwerp - Belgium

Tim Goedemé (Manager)

E-mail: [tim.goedeme@uantwerpen.be](mailto:tim.goedeme@uantwerpen.be)

Phone: +32 3 265 55 55

Mobile: +32 494 82 36 27

Address: University of Antwerp – Sint-Jacobstraat 2 (M.185) – 2000 Antwerp - Belgium