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IN-WORK TAX CREDITS IN BELGIUM: AN ANALYSIS OF THE *JOBKORTING* USING A DISCRETE LABOUR SUPPLY MODEL*

ANDRE DECOSTER ** **(CES-KUL) AND**
PIETER VANLEENHOVE *** **(CES – KUL)**

ABSRACT:

The Flemish government implemented in 2007 an in-work tax credit in order to increase the employment rate and to make working financially more attractive. This paper investigates how total labour supply changes and checks if the cost reductions due to these behavioral reactions are large enough to defend such expensive policies. It appears that married women alter their labour supply decision the most. However, due to the small tax credit, total labour supply effects are of minor size and hardly offset the large costs. Only a more generous tax credit leads to a higher activations of inactive people, however the budgetary cost is huge.

JEL CLASSIFICATION: H31, J22, C25.

KEYWORDS: Public economics, Taxation, Labour supply, Discrete choice.

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** Center for Economic Studies (CES), Katholieke Universiteit Leuven.

*** Corresponding author : Pieter Vanleenhove, Pieter.vanleenhove@kuleuven.be, Center for Economic Studies (CES), Katholieke Universiteit Leuven.

INTRODUCTION

For many countries, the tax wedge is very high which often leads to an unemployment trap where inactive people don't have strong financial incentives to enter the labour market. This wedge reflects which percentage of gross earnings (when moving from a period of unemployment to a new job), is absorbed as a result of the combined effect of increased tax and social contribution rates and benefits withdrawal. As a consequence, due to the negligible financial difference between working and being inactive, people lack the incentive to participate in the labour market and this is partly reflected in the unemployment rate.

During the last decades, many countries tried to construct policies which main goal is to increase the incentives for the inactive to take up work. By reforming the tax benefit system, policymakers try to stimulate unemployed to participate in the labour market. As stated in Orsini (2006), these reforms have followed two major ways. On the one hand, these new policies reduce the tax burden by reforming the income taxation scheme. On the other hand, the focus is put on the working poor by introducing more generous benefit schemes in order to increase their labour income. This latter group of reforms is known in the literature as “Making Work Pay” policies. Examples of such MWP-instruments are the *Earned Income Tax Credit (EITC)* in the United States, the *Working Family Tax Credit (WFTC)* in the UK, the *Arbeidskorting* in the Netherlands and the *Mini-Job reform* in Germany. All these instruments have in common that their main goal is to increase the participation in the labour market by making working financially more attractive for the low skilled workers. For a complete comparison and in depth discussion of these instruments, see Orsini (2006).

Belgium also implemented in the last decades some major reforms aimed at reducing unemployment by changing the tax-benefit scheme. In 2001, the Belgian parliament implemented a major tax reform that is defined in the Act of August 10th and is published in the Belgian statue book on September 20th.[1] In order to reduce the fiscal burden on labour income, the government implemented 4 changes in the tax legislation. First, they increased the amount of deductible professional expenses in the first tax bracket.[2] Second, the tax rates in the central brackets were redesigned. Third, the highest tax rates were decreased from 55% to 50%. Last, but maybe the most important change in light of MWP-policies, the Belgian government introduced a refundable earned income tax credit that is gradually phased in and phased out, conditional on working at least 13 hours a week.[3]
Before the full implementation of the 2001 tax reform, this tax credit has been replaced by a reduction on social security contributions for low wage workers.[4]

[1] The reform was gradually phased in between 2001 and 2005.

[2] Note that this is known as the *Federal Jobkorting* which is completely different than the *Flemish Jobkorting* which will be analyzed in this paper.

[3] The tax credit phased in when net earned yearly income is between 3850 and 5130 euro with a rate of 40.5%. Up to a net income of 12840, the benefit was just above 500 euro/year and phased out between 12840 and 16680 euro with a taper rate of 13.5%.

[4] Note that there was already a reduction of the social security contribution of low skilled workers since 1999. The reform of 2004 enlarged the total amount.

This *Workbonus* would be more effective in terms of increasing the participation in the labour market of low skilled workers. In contrast to the originally implemented tax credit where eligibility depends on actual earnings, the eligibility of the *Workbonus* is related to the individual's earning capacity.[5] Instead of looking at the actual earned income, one has to transform earnings into full time equivalent earnings. As such, this instrument does not create negative labour supply incentives at the intensive margin of the labour market, an issue that is not guaranteed in a system where eligibility depends on actual earnings.[6]

As the federal government has the majority of fiscal authority at its disposal, most MWP-reforms come from the Federal level. Due to the increased fiscal autonomy attributed to the different Belgian regions in 2001 in the *Lambermont agreements*, the regions gained some fiscal freedom in the personal income taxation scheme.[7] As such, they have the ability to implement MWP-reforms in order to make working more attractive for the inactive. In 2007, the Flemish government implemented such a MWP-policy, the *Jobkorting*. As stated in the *Vlaams Actieplan Werkloosheidsvallen 2007,* the main purpose of this instrument is to reward the take-up of work for inactive people. As will be explained in detail below, the *Jobkorting* gives a tax credit to those people who earn more than 5500 euro/year. However, this credit suffers from the same weakness of the first federal income tax credit as eligibility depends on actual earnings which might induce people to lower labour supply in order to become eligible for the benefit.

The purpose of this paper is to conduct an in-depth analysis of the effectiveness of this Flemish MWP-instrument by applying a standard discrete choice labour supply model for Belgium. From a methodological point of view, this paper is similar to Orsini (2007) which analyses the labour supply effects of the Belgian tax reform of 2001 and 2004 and to Decoster et al (2006) which investigate the labour supply responses of the Belgian *Generatiepact*. This paper differs from the aforementioned by the usage of the Belgian EU-SILC dataset and the concentration on a Flemish policy instrument.

The paper is structured as follows. Section 1 discusses three different forms of the *Jobkorting* and analyses how these affect the budgetconstraint of households. Section 2 presents the data and microsimulation model that is applied and derives the discrete labour supply model and the results of estimation. Section 3 employs this model to analyse potential labour supply effects of the implementation of the

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[5] In 2010, individuals with a full time equivalent monthly income under 1415,24 euro are eligible for the maximum rebate on social security contributions of 175 euro/month. When full time equivalent earnings lie in between 1415,24 euro and 1727,37 euro the maximum social security reduction is tapered away at a rate of 27,43 %. The Workbonus decreases to 143 euro if full time equivalent earnings lie between 1727,7 euro and 2247,83 euro and a taper rate of 17,18% is applied. The Workbonus is completely vanished when full time earnings exceed the threshold of 2247,83 euro/month.

[6] When eligibility depends on earned income, one might have incentives to reduce labour supply in order to become eligible. Because the *Workbonus* first transforms all earning into full time equivalents, lowering labour supply does not affect the eligibility condition. For an in depth analysis of the *Workbonus* see Dagsvik et al. (2011).

[7] See legislation nr 2-709/1 of the Belgian Senate of March 29th 2001.

Jobkorting and investigates whether this policy reform is actually self-financing, as many policymakers claim them to be. The last section concludes.

1. In-Work Tax Credit : The *Jobkorting*

This section starts by explaining how the *Jobkorting* is assigned in the years it has been implemented and discusses the main differences between them. The second part investigates the influence of this credit on the budgetconstraint of households and discusses the potentially induced labour supply effects of implementing the *Jobkorting*.

1.1. The *Jobkorting*

Table 1 gives an overview of the *Jobkorting* from 2007 until 2010. In income year 2007 (for tax year 2008) every worker who lives in the Flemish region and earns less than 5.500 euro/year is not entitled to the tax deduction.[8] Every worker who earns between 5.500 and 21.000 euro/year receives a yearly tax credit of 125 euro. After reaching a yearly income of 21.000 euro, the credit begins to phase out and each additional euro earned reduces the credit by 10 cents. This formula implies that the credit completely disappears once the worker earns 22.250 euro/year. The formula that specifies the amount of *Jobkorting* in 2008 is similar to that of 2007. For 2009, the credit did not phase out after reaching a certain yearly income. Every worker who lives in the Flemish region and earns between 5.500-22.000 euro/year receives a yearly credit of 300 euro and this reduces to 250 euro if the yearly earned income is higher than 22.000 euro. There is a second difference between the *Jobkorting* of 2007/2008 and 2009. In 2007 and 2008, every month the worker received a share of the total yearly amount of the tax deduction. For example, if one is entitled to receive a yearly tax credit of 200 euro, the worker gets a monthly tax deduction of 16,6 euro. In 2009 the payment was not monthly but the yearly amount was given entirely in the second month of the year.[9]

The main goal of the introduction of the *Jobkorting* by the Flemish government is twofold. First, the tax credit will lead to a reduction of the tax burden for all Flemish workers. Secondly, it aims at an increase of the employment rate of low skilled workers because only workers who earn at least 5.500 euro/year are entitled to the *Jobkorting*. In other words, the tax credit is launched to induce labour supply effects at the extensive margin of the labour market as inactive people start to work in order to receive the *Jobkorting*.[10]

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[8] Income year refers to the calendar year in which the income is earned. Tax year refers to the year in which the individuals report and pay their taxes. In Belgium, these two years differ by 1 year.

[9] Note, however, that the effect of this difference will not be analyzed in this paper. The focus lies entirely on the effects of the financial incentives on the labour supply of households.

[10] However, as can be seen in Table 1, the amount of tax credit is rather small compared to, for example, the WFTC where the yearly tax credit is equal to 4934 £ (Strickland (1998)).

TABLE 1. JOBKORTING 2007-2010

Yearly labour income (euro)	Tax credit/year (euro)
	***Jobkorting* Income year 2007- Tax year 2008**
Less than 5500	0
5500 - 21000	125
21000 - 22250	125 -((income - 21000) * 0.10)
22250 or more	0
Payment: monthly (total yearly tax credit/12)	
	***Jobkorting* Income year 2008- Tax year 2009**
Less than 5500	0
5500 - 21000	200
21000 - 23000	200 -((income - 21000) * 0.10)
23000 or more	0
Payment: monthly (total yearly tax credit/12)	
	***Jobkorting* Income year 2009- Tax year 2010**
Less than 5500	0
5500 - 22000	300
22000 or more	250
Payment: Once in February the total amount of tax credit	
	***Jobkorting* Income year 2010- Tax year 2011**
Less than 5500	0
5500 – 17250	125
17250 - 18500	125 -((income - 17250) * 0.10)
18500 or more	0
Payment: monthly (total yearly tax credit/12)	

***Source*:** Belastingportaal Vlaanderen.

1.2. EFFECT ON THE BUDGETCONSTRAINT AND LABOUR SUPPLY

Tax credits lead to a change in total disposable income of households, as discussed in the previous section. This part illustrates empirically, by using the microsimulation model EUROMOD, how the budgetconstraint of households alter when the government implements a policy with tax credits. A budgetconstraint is the locus of all combinations of net income at the different hours points available for a specific household. Obviously, this income is household dependent as disposable income is determined by the presence of children, being married or earning a high wage. In order to be able to illustrate how budgetconstraints look like, we opted to calculate the budgetconstraints of a single person without children who works full time and has an hourly wage of 20,2 euro. EUROMOD is able to derive the budgetconstraints of all types of households, but only this type is shown for informational purposes.

Four different budgetconstraints are shown in Figure 1 where three different examples of tax credits are implemented. The first tax credit was actually implemented in 2009 and is called *Jobkorting 2009*. However, because this tax credit is rather small, we also choose to simulate a more generous tax credit that is equal to 1747 euro/year, which represents 10% of the average yearly income of the working people in the sample. The third type of tax credit is the same as the second, i.e. 1747 euro/year, but is more selective as only people with a yearly income below 22.000 euro are eligible for this credit. For the remaining part of the paper, this former credit is called *High Jobkorting* and the latter *Selective High Jobkorting*.

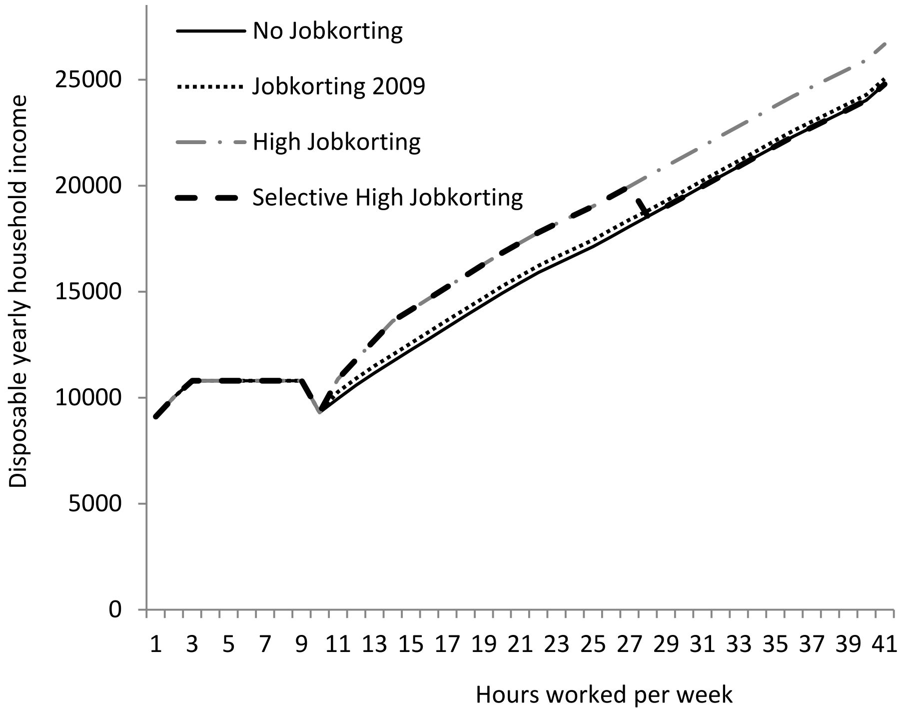
Looking at the budgetconstraint in the scenario where no tax credit is implemented, net disposable income does not increase linearly with working hours but has several kinks, especially when working few hours a week. The horizontal part of the budgetconstraint points at a marginal tax rate of 100%, which means that disposable income does not increase when working more hours a week. This is due to the fact that social assistance reduces when one earns more income from working. At some point, total net disposable income even slightly decreases.[11] Implementing the *Jobkorting 2009* hardly affects the budgetconstraint of this household as its size is negligible. The two alternative tax credits, *High Jobkorting* and *Selective High Jobkorting*, have a much larger effect on the budgetconstraint of this individual and one can already expect in advance that they will alter labour supply in a more considerable way.

Looking at this figure, several potential labour supply effects can arise after the implementation of some sort of tax credit. First, when working only a few hours a week (10-13 hours interval), one sees that the slope of all the budgetconstraints increases compared to the situation in which there is no tax credit. This higher wage results in a substitution effect where leisure is more expensive and more labour is supplied. However, next to this effect, a negative income effect might arise which leads to a decrease in labour supply. Combining both effects leads to an ambiguous effect on total labour supply. Second, when working more than 15 hours a week, one sees that all the budgetconstraints are shifted outwards in a parallel way which induces only a negative income effect which reduces labour supply. Third, the budgetconstraint of the Selective High *Jobkorting* returns to the original budgetconstraint when working more than 27 hours a week. This individual actually receives less income when working 30 hours than when he or she works 27 hours a week. So, including this selective tax credit might result in negative labour supply effects when working a lot of hours a week. Combining all these potential effects lead to an ambiguous result on total labour supply for each type of tax credit. It is expected that some individuals reduce and others increase their labour supply after the introduction of such tax credits.

As clearly stated in Orsini (2006), implementing a tax credit where eligibility depends on actual earnings might induce full-time workers to reduce their labour supply. When the eligibility condition depends on the productivity of workers, i.e. their full time equivalent earnings, these negative labour supply responses at the intensive margin can be avoided. Orsini (2006) and Dagsvik et al (2011) show that the implementation of the *Workbonus* in Belgium does not suffer from these negative responses as eligibility depends on worker’s productivity.

[11] In this example, the loss in social assistance cannot be completely balanced by the gain in income from work. In fact, if one is eligible for social assistance, one receives a small additional yearly premium. If income from work is too high and the individual is no longer eligible for social assistance, one also loses this yearly premium. This loss explains the small drop in net disposable income at this specific point. Important to stress here is that these budgetconstraints are individual specific and not everyone will face such a drop in disposable income at this point.

FIGURE 1. BUDGETCONSTRAINTS FOR 3 DIFFERENT TYPES OF TAX CREDIT



2. MODELING LABOUR SUPPLY

In order to analyze how the implementation of different types of *Jobkorting* affects the Belgian labour supply, a proper model needs to be developed. The first section discusses and reviews literature on the modeling of labour supply in general. Secondly, the EU-SILC dataset is presented and the third section derives in detail a discrete labour supply model.

2.1. MODELING LABOUR SUPPLY IN GENERAL

In order to evaluate the potential labour supply effects of policy reforms, a proper labour supply model needs to be developed. Two alternative ways can be followed. The first method that is frequently used is ex-post, meaning that the effects of a policy reform can only be estimated once the reform has taken place. These ex-post evaluations can in turn be divided in two different subcategories: experimental and quasi-experimental. In the former, target groups are randomly extracted from the population and are subjected to the new policy, for example a new tax-benefit system.

The effect of the reform is estimated as the difference between this treatment group and the control group that are not subjected to the new policy. Examples of such evaluations are Todd and Wolpin (2006), Attanasio et al (2005) and Lise et al (2005).[12] Unfortunately, such experiments are rare, mostly expensive and time-consuming. In quasi-experiments, the treatment and control group are not randomly selected, resulting in the need for more sophisticated statistical techniques to control for both observable and unobservable characteristics of both groups that might have an influence on the treatment effect. Examples of such analysis include Eissa (1995) and Klevmarken (2000). Note that in ex-post approaches, in contrast to ex-ante evaluations, the modeling and estimation of labour supply itself is not strictly necessary. The main goal is to measure the labour supply effects of policy reforms as the difference between two equilibrium situations, i.e. before and after the implementation. Estimation is only used to filter out changes due to other factors than the reform itself.

A second way of modeling labour supply is ex ante. In such evaluations, labour supply has to be explicitly modeled and estimated in order to determine the potential effects of policy reforms.[13] Up to the nineties, the traditional way of ex-ante labour supply modeling was in a continuous way, see Hausman and Ruud (1984) and Arrufat and Zabalza (1986), where the household chooses from a continuous set of hours. The household selects the best combination of labour supply and consumption so as to maximize its utility function, given a time and budgetconstraint. However, this way of modeling labour supply has some problems. The maximization problem is very complex because the tax function is often nonlinear which leads to non-convex budget sets. Maybe the most important drawback of this methodology is the unrealistic assumption that individuals may choose their optimal point anywhere along the budgetconstraint. As pointed out by Aaberge et al (1999), the structure of labour costs makes it less attractive to firms to offer contracts that allow for flexible work schedules. Consequently, the choice set available for the individual may be severely reduced.

In order to overcome these problems, researchers have made use of a discrete random utility maximization model (RUM) initiated by Daniel McFadden (1974).[14] Two distinct features can be observed when comparing this method with the continuous one. In this methodology the household's hours choices can be approximated by a discretized set instead of a continuous one. Secondly, the optimal labour supply choice is modeled in terms of a comparison of the different utility levels of the discrete choices. Introducing a random utility term which is assumed to be distributed according to an extreme value distribution leads to an easy expression for the probability that any particular discrete labour supply point is chosen. These models are structural in a sense that there is no reduced form labour supply function which depends on wages and the amount of hours worked but that the structural parameters for preference for consumption and leisure are identified out of an a priori functional

[12] For a more complete overview of the existing literature, see Leite et al (2011).

[13] A common feature in ex ante labour supply models is the hypothesis that employment levels are exclusively supply side driven. As such, these models often work with a partial equilibrium model instead of a full equilibrium model, which is in contrast to most ex-post approaches.

[14] McFadden applied these random utility models to several transport and occupational choices. He considered these choices as discrete.

form of the utility function. Examples of studies that estimate discrete random utility models are Van Soest (1995) and Aaberge et al (1999).[15] Both studies restrict the choice set but differ substantially in two ways. A first issue concerns the procedure by which the authors include the different discrete alternatives in the choice set of each individual. Van Soest (1995) chooses in a non probalistic way a set of fixed points which are identical for each individual. Aaberge et al (1999) on the other hand, adopt a sampling procedure. Secondly, and most importantly, Van Soest (1995) assumes that each discrete labour supply point is equally available and accessible for each individual. Aaberge et al (1999) consider that each point is available for the individual but not equally accessible. This leads to different opportunity sets for each observation and these sets depend on both observable and non-observable characteristics of the household. Note, however, that Van Soest (1995) includes alternative specific constants for part-time work in order to account for the lack of availability of these jobs. This paper applies a random utility discrete labour supply model similar to Van Soest (1995).

2.2. DATA FOR ESTIMATION

This paper uses the Belgian database of the European Union Statistics on Income and Living Conditions (EU-SILC), which is constructed in a two-step sampling procedure and is representative for the Belgian population in private households. The data was collected in the second half of 2006 and contain information on income received in 2005. The sample consists of 5860 households or 14329 individuals. Only private households are included, so all persons living in collective households and institutions are excluded from the target population. The survey provides detailed information on earnings as well as on socio-demographic characteristics of each household.

The labour supply model presented in this paper is estimated on three different sub-samples of couple, single females and single males. Being available for the labour market is the basic condition to belong to one of these specific subgroups. This means that the individual is aged between 16 and 65 years and is not sick, in education, disabled or (pre)retired. Analogous with the bulk of literature, self-employed are not modeled due to the lack of reliable information of hours worked. Households whose children are already available for the labour market but are still living with their parents are also excluded from the sample. It is reasonable to assume that their labour supply decisions are different than the ones of a normal household without working-children because it is not clear whether these households see their labour supply decision as a collective or as an individual process.[16] The 'mixed' households where only one of the partners is available for the labour market are also excluded. Examples are households where the female is self-employed and the male is an employee or households where the male is already retired and the female still works as an employee. Descriptive statistics for the selected subsamples can be found in Table 2.

[15] More specific for Belgium, see Orsini (2006), Decoster et al (2007) and Dagsvik et al (2011).

[16] The labour supply model assumes that the labour supply decision is collective, as discussed in the next section.

Looking to the observed densities of labour supply, a clear pattern of concentration can be observed around inactivity, marginal part-time, part-time, full time and overtime. Therefore, the discrete structural labour supply model, which is discussed in the next section, assumes that each household chooses among 5 different discrete hour points; i.e. non-participation, marginal part-time, part-time work, full-time and over-time.[17]
We use EUROMOD as microsimulation model to obtain the budgetconstraint of each household. It models the tax benefit system of Flanders and is able to generate net disposable income from gross income by applying the appropriate tax benefit rules.

TABLE 2. DESCRIPTIVE STATISTICS

	Couples			
	Female	**Male**	**Single female**	**Single male**
Average working time/week	26	38	25	30.3
Average hourly gross wage	13.3	16.3	13.1	15.7
Participation	80.3%	93.9%	74.1%	76.9%
Average age	38.2	40.1	41.2	41.0
Primary education	12.3%	14.6%	14.6%	24.5%
Secondary education	43.1%	40.5%	39.7%	38.6%
High education	44.6%	44.9%	45.7%	36.9%
Average household members	2.3		1.2	1.1
Presence of child 0-3	23.4%		6.3%	1.2%
Presence of child 3-6	18.2%		7.4%	2.2%
Presence of child 6-9	14.6%		10.1%	2.2%
Presence of child 9-12	17.7%		11.5%	2.0%
Presence of child 12-16	21.5%		15.8%	1.7%
Amount of observations	968		556	417

Source : own calculations.

As will be discussed in the next section, the model necessitates the net disposable income at each discrete labour supply point. The survey, however, does not contain this information; it only observes total gross income at the actual observed level of labour supply. It is frequently assumed in literature that the hourly wage rate is independent of the amount of hours worked, which implies that gross earnings increase linearly with working time. Consequently, gross income at each discrete hours point can be calculated by multiplying every hours point with the hourly wage of each individual. In most datasets, the hourly wage is not given and has to be derived in order to calculate the gross income for each discrete hours point. Due to the assumption of constant hourly wages, one obtains the hourly wage of each individual by dividing the observed gross current income by the actual observed number of hours worked. Once this hourly wage is calculated, one can derive the gross earnings at each discrete hours point and the budget constraints for the households are calculated in EUROMOD.

However, there are also households where gross earnings are not observed, for example unemployed or inactive households. If their wages would be estimated based on a wage equation of the currently employed individuals, biased estimates would be obtained due to sample selection. It might be that the average wage for someone in the labour market might be substantially different than for someone who is out of work. Participants in the labour market may have (un)observable characteristics that

[17] Inactivity is equal to 0 hours (0-5 interval), marginal part-time to 15 hours (5-20 interval), part-time to 25 hours (20-30 interval), full-time to 40 hours (30-45 interval) and over-time to 50 hours (>45 hours).

determine wages and that are different from the ones of the inactive. In order to avoid such sample selection problems and in line with the literature, this paper applies a Heckman correction model for the hourly wages of inactive women. For men, this censoring effect was not significant and therefore we used a standard wage regression estimated on the sample of individuals with observed wages.

Table 3 and Table 4 present the estimated coefficients for the hourly wage for respectively men and women. The amount of work experience, the age of the individual, the education level and the region are the independent variables of the wage equation. Most coefficients have the expected sign. Looking at the wage equation, the relation between experience and hourly wage is concave. Higher experience leads to a higher hourly wage but the increase in wages declines the higher the level of experience. For men, age and hourly wage rate have a convex relationship whereas for women this relation appears to be concave. Higher education leads to a higher hourly wage for both men and women.

Table 5 gives the results for the selection equation for women which controls for possible selection bias. The independent variables that determine the probability of working are the age of the individual, the marital status, education level, region and the presence of children in the household. As expected, having children has a significant negative effect on the probability of being observed in the labour market. Lambda (inverse Mill's ratio) points at a significant selection bias for women and therefore necessitates a Heckman correction model.[18] The imputed wages are only assigned to these individuals for whom there is no hourly wage observed, the other individuals receive their observed hourly wage. In 35% of all cases, imputed wages are used for women.[19]

TABLE 3. HOURLY WAGES MALE

	Coefficient.	Std. Error	P-value
Experience	0.438	0.090	0.000
Experience squared	-0.012	0.001	0.000
Age	-0.564	0.191	0.003
Age squared	0.011	0.002	0.000
Education: no degree	-2.231	1.060	0.035
Education: high school	1.353	0.436	0.002
Education: higher education	6.402	0.463	0.000
Flanders	-1.204	0.491	0.014
Wallonia	-1.406	0.518	0.007
Constant	15.540	3.392	0.000

Source **:** own calculations.

[18] This lambda was not significant for men and therefore we estimated the hourly wages for inactive men by applying a standard wage regression without Heckman correction.

[19] Note that some authors use the estimated wage for both groups of individuals, as discussed in Van Soest (1995). They assert that using observed wages for working individuals and predicted wages for non-working observations might lead to inconsistent estimates since it assumes that wage rates of non-workers are estimated without error. However, in line with other studies for Belgium (e.g. Orsini (2006)), we opted for the other alternative in which we only use predicted wages for non-workers.

TABLE 4. HOURLY WAGES FEMALE

	Coefficient.	Std. Error	P-value
Experience	0.254	0.044	0.000
Experience squared	-0.003	0.000	0.000
Age	0.833	0.119	0.000
Age squared	-0.010	0.001	0.000
Education: no degree	-3.328	0.898	0.000
Education: high school	2.976	0.386	0.000
Education: higher education	9.249	0.385	0.000
Flanders	-0.409	0.407	0.316
Wallonia	-0.745	0.432	0.085
Constant	-11.517	2.248	0.000

Source **:** own calculations.

TABLE 5. SELECTION EQUATION FEMALE

	Coefficient	Std. Error	P-value
Age	0.203	0.016	0.000
Age squared	-0.002	0.000	0.000
Married	-0.054	0.034	0.119
Education: no degree	-0.523	0.128	0.000
Education: high school	0.444	0.060	0.000
Education: higher education	1.212	0.064	0.000
Flanders	0.141	0.068	0.040
Wallonia	-0.033	0.072	0.647
Child between 0- 3 year	-0.108	0.048	0.027
Child between 3-6year	-0.159	0.049	0.001
Child between 6-9 year	-0.118	0.049	0.016
Child between 9-12 year	-0.019	0.046	0.678
Child between 12-15 year	-0.187	0.042	0.000
Constant	-3.793	0.323	0.000
Rho	0.973	0.004	
Sigma	6.615	0.118	
Lambda	6.438	0.131	
Number of observations		3253	
Censored/Uncensored		1149/2104	
LR test (rho = 0) :	chi2(1)= 379.970	Prob > chi2 : 0.000	

Source **:** own calculations.

2.3. STRUCTURAL MODEL OF LABOUR SUPPLY

2.3.1. Specification of the model

Labour supply of each household is modeled as a Random Utility Model (RUM), as in Van Soest (1995). The amount of hours worked by the male and female of household i is, respectively, equal to h_{imj} and h_{ifk} where the male and female work respectively j and k hours. In such models, the utility V_{ijk} faced by household i, when working (h_{imj}, h_{ifk}) hours, contains a structural and a random component. This structural component of utility can be measured or approximated by the researcher, whereas the random component of utility is unknown, at least for the researcher. This utility can be written as follows:

$$V_{ijk} = U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i) + \varepsilon_{ijk} \tag{2.1}$$

The first element reflects the structural or deterministic component of utility of household i and is a function of hours worked (h_{imj}, h_{ifk}) or amount of leisure, consumption C_{ijk} when working (h_{imj}, h_{ifk}) hours and household characteristics X_i. As discussed before, it is assumed that each household is restricted to choose between a limited discrete set of hours. Total consumption C is equal to total disposable income because the model is static and does not allow for savings in the future. The actual utility level V_{ijk} differs from the measured utility $U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i)$ with a random term ε_{ijk}, which depends on the number of hours worked (h_{imj}, h_{ifk}) by both male and female in household i. It arises from factors such as measurement errors concerning the variables in X_i, unobserved preference characteristics or optimization errors of the household. Without this random component, the model would be deterministic. This means that once the functional form of utility and the household's characteristics are known, one would be able to determine the exact utility-maximizing choice of hours level. Taking this random component into account leads to a probability distribution over the available hours levels.

Assuming that this random term is identically and independently distributed according to an extreme value distribution, McFadden (1974) proves that the probability that household i chooses a combination of hours (h_{imj}, h_{ifk}) out of the discrete set (h_{imz}, h_{ify}) with $z = 0,...,Z$ and $y = 0,...,Y$ is given by:[20]

$$\begin{aligned} P_{ijk} &= \Pr(U_{ijk} \geq U_{izy}, \forall z = 0,...,Z, \forall y = 0,...,Y) \\ &= \frac{\exp U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i)}{\sum_{z=0}^{Z} \sum_{y=0}^{Y} \exp U(h_{imz}, h_{ify}, C_{izy} \mid X_i)}. \end{aligned} \tag{2.2}$$

In line with Keane and Moffit (1998) and Blundell et al. (1999), a quadratic functional form with interaction between both spouses is assumed:[21]

[20] This notation allows differentiating discrete choice points between male and female. This paper, however, assumes the same discrete labour supply points for both genders.

[21] It is assumed that the total amount of available hours a day is equal to 16 hours. Therefore, total leisure time a week equals (80-hour worked).

$$\begin{aligned}
&U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i) = \beta_c(X_i).(C_{ijk}) + \alpha_{cc}(C_{ijk})^2 + \\
&\beta_f(X_i).(80 - h_{ifk}) + \alpha_{ff}(80 - h_{ifk})^2 + \\
&\beta_m(X_i).(80 - h_{imk}) + \alpha_{mm}(80 - h_{imk})^2 + \\
&\alpha_{fc}.(80 - h_{ifk}).(C_{ijk}) + \alpha_{mc}(80 - h_{imk}).(C_{ijk}) + \\
&\alpha_{fm}(80 - h_{ifk}).(80 - h_{imk}) + \\
&\alpha_{df} Part_f + \alpha_{df} Part_m
\end{aligned} \tag{2.3}$$

The preference parameters depend on personal and household characteristics. Factors such as education, number and age of children, the individual's own age and the region of residence affect the preference for work. This observed heterogeneity will be introduced linearly in the model:

$$\begin{aligned}
&\beta_c(X) = \beta_{c0} + \beta_c^{'} X_i^c \\
&\beta_f(X) = \beta_{f0} + \beta_f^{'} X_i^f \\
&\beta_m(X) = \beta_{m0} + \beta_m^{'} X_i^m
\end{aligned} \tag{2.4}$$

In line with Van Soest (1995), this model includes an alternative specific constant for part time work for both men and women, $Part_m$ and $Part_f$. Van Soest (1995) states that a basic discrete labour supply model without alternative specific constants is not able to capture the data as the density of part time jobs is most often over-predicted. In reality, part-time jobs can be rationed and one has to take this fact explicitly into account in the model. For a detailed overview of the possible reasons of this rationing, see Van Soest (1995) or Aaberge et al (1999). We include alternative specific constants for the alternatives in which either the female of male works part-time. As stated in Van Soest (1995), these constants reflect drawbacks of working part-time such as search costs or other unattractive aspects of part-time work.

2.3.2. Estimation of the model

The structural model of labour supply is estimated using the method of maximum likelihood. The basic idea of maximum likelihood is that it estimates the parameters of the labour supply model in such a way that the joint probability of observing the actual hours points for the selected sample is maximized. Equation (2) gives the probability associated with the chosen hours level of household i. The joint probability, or the likelihood, of all households, say H households, is given by the product of these individual probabilities:

$$L = \prod_{i=1}^{H} \frac{\exp U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i)}{\sum_{z=0}^{Z} \sum_{y=0}^{Y} \exp U(h_{imz}, h_{ify}, C_{izy} \mid X_i)} \tag{2.5}$$

Equation (2.5) is a function of the unknown parameter values, given the available data and reflects the likelihood function. Taking logarithms gives the log-likelihood function of the structural labour supply model:

$$\log L = \sum_{i=1}^{H} [U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i) - \log(\sum_{z=0}^{Z} \sum_{y=0}^{Y} \exp U(h_{imz}, h_{ify}, C_{izy} \mid X_i))] \tag{2.6}$$

The method of maximum likelihood maximizes equation (2.6), given the available data. This means that the parameter values are estimated in such a way that it produces the highest probability of observing the actual hours values.

Once model (2.6) is estimated, one can calculate the expected labour supply of each household, respectively for male and female:

$$\begin{aligned} E(h_{im}) &= \sum_{z=0}^{Z} \sum_{y=0}^{Y} p_{izy} . h_{imz} \\ E(h_{if}) &= \sum_{y=0}^{Y} \sum_{z=0}^{Z} p_{izy} . h_{ify} \end{aligned} \tag{2.7}$$

2.3.3. Results of estimation

Table 6 gives the parameter estimates of the structural labour supply model for couples, single females and single males and reveals some intuitive results from which only the most important ones are discussed. Looking at the estimated coefficients for couples, we clearly see that disposable income positively affects utility and that the quadratic term is significantly negative. Consequently, marginal utility of income is positive for all households who live in a couple and there exists a concave relation between utility and consumption.[22] Looking at the estimates for the amount of leisure of men who live in a couple, a significant negative effect and a significant positive effect is found for respectively the linear and the quadric term of the age of men. This results in the familiar convex function. The region of residence also appears to play a significant role. Having young children affects the preference of leisure for female who live in a couple. Similar conclusions can be made when looking to the subsample of single men and women.

Given these parameter estimates, we are able to calculate expected labour supply of each household, see equation (2.7) and compare them to the actual observed labour supply. Table 6 presents the observed labour supply of single men and women and both male and female in a couple, combined with the aggregate probabilities for each

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[22] Note that, in contrast to the subsample of single female en male, we have not included observed heterogeneity in the coefficient for consumption for couples. Including heterogeneity variables did not improve the estimation results and were not significant. Hence, we decided not to include heterogeneity in the coefficient for consumption of couples.

category. For each subsample, this model is able to predict the labour supply densities in a correct way.

Instead of looking at the fit with the observed labour supply, one can calculate the wage elasticities in order to make a judgment of the performance of the model. The structural basis of this discrete labour supply model implies that there is no explicit labour supply function where one can derive the wage elasticity from. Therefore, numerical methods are used to analyze the sensitivity of labour supply with respect to wage changes. The individual's gross wage is increased by 10%, keeping all the other characteristics constant. EUROMOD simulates the new budgetconstraint of each household and the new expected labour supply can be calculated, given the estimated coefficients. Table 8 presents the wage elasticities for both male and female in a couple and for single female and male. The hours elasticity reflects by how much total labour supply changes and the participation elasticity is defined as the expected percentage change in labour market participation after a 10 % increase gross wages. The results are in line with the expectations and literature; see for example Blundell and MaCurdy (1999). Female elasticities are, on average, higher than the elasticity of men and are bigger for female in a couple than for single female. The same quantitative conclusion was found for Belgium in Orsini and Decoster (2007), where hours elasticity for females and males in a couple is, respectively, equal to 0.30 and 0.08, which only slightly differs from the results estimated in Table 8.[23]

[23] Their model is estimated on the household budget survey of 2001.

TABLE 6. ESTIMATION RESULTS

Variables	Couples Coefficient	Couples St. Error	Single Female Coefficient	Single Female St. Error	Single Male Coefficient	Single Male St. Error
Consumption:	5.0184*	1.5271	/	/	/	/
Age male	/	/	/	/	0.2317*	0.02045
Age male squared	/	/	/	/	-0.0031*	0.00024
Age female	/	/	0.4491**	0.2430	/	/
Age female squared	/	/	-0.0050**	0.0030	/	/
Children 0-3	/	/	-0.3786	0.9926	0.1072	5.5370
Children 3-6	/	/	1.4528	1.4856	-4.3736	10.3960
Children 6-9	/	/	-1.3184**	0.7535	-2.4098	3.4572
Children 9-12	/	/	-1.6150	0.7755	4.6385	4.4241
Large city	/	/	0.7290	1.2341	-2.2456	1.4639
Median city	/	/	0.7305	1.3525	-1.5892	1.4664
Wallonia	/	/	0.5959	0.6756	0.1291	0.8440
Brussels	/	/	1.2020	0.9429	-0.1867	0.8197
Constant	/	/	-4.1111	5.6470	-0.6590	1.2679
***Consumption squared*:**	-0.3425*	0.1168	-0.9280*	0.4064	-0.1406*	0.04126
Leisure male:			/	/		
Age male	-0.0062*	0.0029	/	/	0.0036	0.0068
Age male squared	0.0001*	0.0000	/	/	0.0000	0.0001
Children 0-3	0.0011	0.0055	/	/	0.0717	0.1976
Children 3-6	0.0141*	0.0070	/	/	-0.1422	0.3970
Children 6-9	-0.0198*	0.0094	/	/	-0.0951	0.4350
Children 9-12	0.0006	0.0079	/	/	0.0497	0.0923
Large city	0.0424	0.0258	/	/	0.0028	0.4573
Median city	0.0318	0.0256	/	/	0.0097	0.4575
Wallonia	0.0262*	0.0078	/	/	0.0358	0.0284
Brussels	0.0317*	0.0094	/	/	0.0136	0.0285
Constant	0.5411*	0.0874	/	/	0.4121	0.4952
Leisure sq. male	-0.0043*	0.0003	/	/	-0.0043*	0.0007
Leisure female:					/	/
Age female	-0.0015	0.0024	0.0067	0.0074	/	/
Age female squared	0.0000	0.0000	-0.0001	0.0001	/	/
Children 0-3	0.0065	0.0045	0.0025	0.0290	/	/
Children 3-6	0.0187*	0.0054	0.0293	0.0319	/	/
Children 6-9	0.0164*	0.0050	-0.0151	0.0213	/	/
Children 9-12	0.0020	0.0052	-0.0297	0.0230	/	/
Large city	0.0101	0.0136	0.0313	0.0336	/	/
Median city	0.0093	0.0134	0.0238	0.0373	/	/
Wallonia	0.0082	0.0057	0.0261	0.0195	/	/
Brussels	0.0152**	0.0087	0.0201	0.0284	/	/
Constant	0.6593*	0.0748	0.4464*	0.1753	/	/
Leisure sq. female:	-0.0057*	0.0004	-0.0047*	0.0006	/	/
Cross term consumption and leisure male:	-0.0027	0.0106	/	/	-0.0073*	0.0299
Cross term consumption and leisure female:	-0.0056	0.0074	-0.0137*	0.0280	/	/
Cross term leisure male and female:	0.0011*	0.0004	/	/	/	/
Dummy part time men	3.9306*	0.1775	/	/	3.7054	0.2405
Dummy part time female	2.6332*	0.1687	2.8080	0.2105	/	/

Source **:** own calculations.

TABLE 7. OBSERVED AND PREDICTED WEEKLY HOURS DISTRIBUTION

Observed:	***Male in couple***	***Female in couple***	***Single. Female***	***Single Male***
Inactivity(0-5)	6.19	19.76	25.9	23.02
Marginal part-time (5-20)	1.97	14.85	11.15	3.84
Part-time (20-30)	2.85	17.31	11.33	4.08
Full-time (30-45)	74.43	44.74	47.12	58.51
Overtime (>45)	14.55	3.34	4.5	10.55
Predicted :	***Male in couple***	***Female in couple***	***Single Female***	***Single Male***
Inactivity (0-5)	5.99	19.41	26.44	21.60
Marginal part-time (5-20)	1.57	13.62	9.1	3.40
Part-time (20-30)	3.16	18.25	13.42	4.45
Full-time (30-45)	74.58	45.27	46.52	59.73
Overtime (>45)	14.70	3.45	4.48	10.73

Source **:** own calculations.

TABLE 8. ESTIMATED LABOUR SUPPLY ELASTICITIES

	Hours elasticity	***Participation elasticity***
Female in couple	0.301	0.198
Male in couple	0.109	0.090
Single female	0.271	0.232
Single male	0.059	0.047

Source **:** own calculations.

3. IMPLEMENTING THE JOBKORTING

This section evaluates the potential labour supply effects of the *Jobkorting* by using the structural labour supply model that has been described above. Instead of presenting the probabilities of each hours category, this section follows the method of calibration and presents the effects of the reforms by using transition matrices, as recommended by Creedy and Kalb (2005). The method of calibration draws error terms from the extreme value type I distribution and adds them to the structural part of utility. If this results in the observed labour supply being the optimal choice for the individual, the draw is accepted; otherwise, another set of error terms is drawn and checked. This is repeated until 100 sets of error terms are drawn and produces a baseline which corresponds perfectly to observed labour supply behaviour. These error terms are used to compute a distribution of labour supply after the implementation of different tax reforms, for example tax credits. Such credits lead to a change in disposable household income and consequently in the structural part of utility $U(h_{imj}, h_{ifk}, C_{ijk} \mid X_i)$.

Combining the new structural utility with the error terms from calibration, makes it possible to calculate probabilities of being in each of the discrete hours points after the reform, conditional on the pre-reform labour supply. Given this information, transition matrices can be derived and potential labour supply responses can be analysed. We only look the subgroup of Flemish households as this is a Flemish tax instrument.
The last subsection discusses whether these tax credits are actually self-financing, as many policymakers claim them to be. They argue that these credits lead to a decrease in unemployment and to an increase in number of hours worked by the currently active population. This should lead to positive effects on government revenue through higher

personal income taxation, higher social security contributions and lower unemployment benefits and hence partly cover the original cost of the implementation of the tax credits.

3.1. LABOUR SUPPLY EFFECTS

The potential labour supply responses of implementing the *Jobkorting* of 2009 are presented in Table 10 and Table 11 in appendix. The former displays all the transitions between the different discrete hours points (for example, the percentage of people going from inactivity to part-time work) and the latter calculates the change in labour supply in Full time Equivalents.

The first impression confirms the prediction made earlier that labour supply responses are relatively small. At the extensive level of the labour market, 97.76% of all inactive single women remain unemployed, i.e. only 2.24% start to work after the implementation of the *Jobkorting*. 96.78% (95.59%) of all inactive women (men) in a couple remain unemployed whereas we see no effects for inactive single men. Table 11 expresses these changes in Full time Equivalents (FTE). We see that the total labour supply effects at the extensive level of labour market for single women and women and men who live in a couple are respectively equal to 985 FTE, 2437 FTE and 871 FTE. There are also positive labour supply effects of people who are already participating in the labour market, i.e. at the intensive margin. For example, 1.46% of all single women who work marginal part-time before the tax reform change their labour supply status to full-time work after the implementation of the *Jobkorting*. This can be expressed as a change in FTE with 168 units. We observe a similar effect for women and men who live in a couple with a change in FTE of respectively 224 and 53 units. Total labour supply of single women, single men, female and men in a couple increases with respectively 873 FTE, 20 FTE, 1131 FTE and 395 FTE. Summing over all categories and four subsamples, total labour supply increases by 5146 FTE. Note that it is not surprising that labour supply of women who live in a couple change the most compared to single women and men. This was already seen in the estimated elasticities, where total labour supply elasticity is the largest for women who live in a couple.

However, the introduction of this tax credit also produces some negative labour supply effects at the intensive margin of the labour market. The model predicts, for example, that 0.56% of all single women who work overtime before the implementation of the tax credit reduce their labour supply to part-time. For men in a couple, 1.77% of all men who work overtime reduce their labour supply to full-time work. Combining all these negative effects over the four subsamples and the categories results in a total decrease of 2726 FTE. Eventually, the introduction of the *Jobkorting*, like it was actually implemented in 2009, leads to a very small net increase in labour supply of 2420 FTE, which is approximately 0.21% of total FTE before the tax reform.[25]
This limited effect on total labour supply is not surprising as the amount of tax credit is very low and hardly influences the incentives of households, as was discussed when

[25] One must be cautious with these interpretation of the exact size of these results. Including standard errors is beneficial here to derive more robust confidence intervals.

presenting the budgetconstraints. Therefore, this paper analyses the labour supply effects of a fictitious tax credit which is substantially higher than that of 2009.

Table 12 and Table 13 present the labour supply effects when the tax credit is increased up to 1747 euro/year, which is approximately 10% of the average yearly disposable income. Compared to the *Jobkorting* of 2009, a larger increase from inactivity into the labour market is observed for all four subsamples. For example, 87.75% of all inactive single women remain out of work after the implementation of this higher tax credit. This is considerably less than 97.76% in the first scenario with the *Jobkorting* of 2009. The same is also observed for single men and both female and men who live in a couple. Next to these larger positive extensive effects, higher positive intensive labour supply effects are also observed. For example, 6.51% of all women who live in a couple increase their labour supply from marginal part-time to full-time, compared to 1.46% in the case of the lower tax credit. This type of tax credit also produces negative intensive labour supply effects, which are in line with the ones observed in the case of the tax credit of 2009. Eventually, this higher tax credit induces net 23479 more Full Time Equivalents, which is almost ten times as large as the net effect of the *Jobkorting* of 2009. Total labour supply increases with 2.06% in comparison to the pre-reform state.[26]

The third simulation is the implementation of the same higher tax credit, but instead of making every worker eligible, it is now limited to all workers who earn a yearly income between 5500 and 22000 euro.

Table 14 and Table 15 present the labour supply effects of this selective tax credit. As expected, the negative intensive effects are substantially higher as more people lower their labour supply in order to be eligible for the tax credit. For example, 5.43% of all single women who are working overtime before the implementation of the credit reduce their labour supply to part-time. The total net effect is considerably less than the non-selective version of the tax credit and is equal to 9302 FTE or an increase with 0.81%, which is still higher than the labour supply effects of the *Jobkorting* of 2009.

3.2. COMPENSATORY COSTS EFFECTS

It is frequently assumed by policymakers that in-work tax credits create large compensatory cost effects due to the increase in labour supply and decrease in unemployment. Therefore, they defend these costly policies by asserting that these types of credits are, to a great extent, self-financing. This section derives this amount of self-financing and discusses which type of the three presented in-work tax credits is the most beneficial for the government.

Let X be the gross income of the individuals in the selected sample, Y the net income, R the total amount of revenues for the government, S_g and S_n respectively the social contributions of the employer and the employee and T the total amount of

[26] Note, however, that the budgetary cost is substantially higher in this case. These costs, and the amount compensatory effects are discussed in the next subsection.

net taxes paid to the government, i.e. taxes minus benefits. The total amount of governmental revenues R can be written as follows:

$$R = T + S_g + S_n \tag{3.1}$$

The net income of an individual can be written in terms of gross income, net taxes and social security contributions:

$$Y = X - T - S_n \tag{3.2}$$

Rewriting equation (3.1) and (3.2) in terms of changes due to the inclusion of a specific policy reform, for example an in-work tax credit:

$$\begin{aligned} \Delta R &= \Delta T + \Delta S_g + \Delta S_n \\ \Delta Y &= \Delta X - \Delta T - \Delta S_n \end{aligned} \tag{3.3}$$

Equation (4.3) leads to an expression for the change in government revenue due to the inclusion of the policy reform:

$$\Delta R = \Delta X - \Delta Y + \Delta S_g \tag{3.4}$$

This paper defines the total amount of compensatory costs of the tax credits as the difference between the change in revenue for the government in the situation in which labour supply does not change and in the case in which labour supply changes. This difference can be seen as the total amount of recovery of budgetary costs due to behavioral labour supply responses induced by the in-work tax credit. Therefore, if labour supply does not change, this means that only net income of individuals change due to the tax credit. Gross income and the amount of social security contributions of the employer remain unchanged. The total change in revenue without behavioral responses can be written as follows:

$$\Delta R = -\Delta Y \tag{3.5}$$

In the other scenario in which behavioral responses arise, both gross income and social security contributions of the employer change, which leads to the following change in government revenue:

$$\Delta R = \Delta X - \Delta Y + \Delta S_g \tag{3.6}$$

The difference between (3.5) and (3.6) can be seen as the total amount of recovery of budgetary costs for the government and can be expressed in terms of newly created FTE. Table 9 presents both the budgetary cost without and with behavioral responses of the three different types of tax credits and their decomposition. As expected from the small positive labour supply effect of the *Jobkorting* 2009, the compensatory effect represents only 7.07% of the budgetary cost without behavioral responses. The second alternative, the high *Jobkorting*, has a more favorable compensatory cost effect of 15.16% due to the larger increase in FTE. However, in order to arrive at this increase, total budgetary cost is almost six times as large as the original tax credit. Both tax credits lead to almost the same cost per additional FTE; i.e. 69426 euro and 69055 euro for respectively the *Jobkorting* of 2009 and the high *Jobkorting*.

TABLE 9. COMPENSATORY EFFECTS OF DIFFERENT TYPES OF TAX CREDIT

	Jobkorting 2009	*Jobkorting High*	*Selective Jobkorting High*
Cost no behaviour (billion euro):	*180.79*	*1911.00*	*883.50*
Change in net income (Y) (billion euro)	180.79	1911.00	883.50
Change in gross income (X) (billion euro)	/	/	/
Change in SSC employer (Sg) (billion euro)	/	/	/
Cost with behaviour (billion euro):	*168.01*	*1621.33*	*915.54*
Change in net income (Y) (billion euro)	344.43	2170.70	1003.42
Change in gross income (X) (billion euro)	128.91	424.64	49.56
Change in SSC employer (Sg) (billion euro)	47.51	124.73	37.36
Compensatory effect (pct) :	7.07	15.16	-3.74
Cost per new FTE (euro):	69426	69055	98524

Source **:** own calculations.

CONCLUSION

During the last decades, many countries constructed "Making Work Pay" policies which main goal is to increase the incentives for the inactive to take up work. At the Belgian federal level, several MWP-reforms have been implemented and their effectiveness has been analyzed in several studies. Due to the increased fiscal autonomy attributed to the different Belgian regions in 2001 in the *Lambermont agreements*, the regions gained some fiscal freedom and have the ability to implement MWP-reforms themselves. The Flemish government implemented in 2007 an in-work tax credit, the *Jobkorting*, in order to increase the employment rate and to make working financially more attractive.

This paper investigates how total labour supply changes and checks if the compensatory costs are large enough to defend such expensive policies. In line with more recent literature about labour supply, this paper assumes that households choose among a discrete set of hours instead of a continuous one. Based on the observed labour supply in the Belgian EU-SILC data, 5 discrete hours points are chosen; inactivity, marginal part-time, part-time, full-time and over-time work. It appears that the *Jobkorting* that was actually implemented in 2009 leads to only minor changes in labour supply. In line with the estimated wage elasticities, married women alter their labour supply the most. This small result is not surprising as the amount of in-work tax credit is negligible. Therefore, this paper also investigates how two other tax credits, which are considerably larger in size, affect the labour supply decision. If the tax credit is increased to 1747 euro/year instead of 250 euro, total change in labour supply equals 23479 Full Time Equivalents (FTE), instead of 2420 FTE. Consequently, the compensatory effect is much larger and equals 15.16% instead of 7.07% but the budgetary cost is huge.

However, the results show that in all three types of tax credits negative labour supply reactions arise at the intensive margin. If eligibility depends on earned income, one might have incentives to reduce labour supply in order to obtain the tax credit or to work less for the same income. As discussed in Dagsvik et al (2011), an instrument where eligibility is related to the individuals earning capacity does not create these negative labour supply responses. Hence, this might serve as a recommendation to policy makers to carefully take these potential labour supply reactions into account.

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APPENDIX

TABLE 10. TRANSITION MATRIX JOBKORTING 2009

Pre-reform	*Post-reform*					
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	97.76	0.17	0.46	1.51	0.10	100
Marginal part-time (5-20)	0.00	98.03	0.38	1.46	0.13	100
Part-time (20-30)	0.00	0.05	99.95	0.00	0.00	100
Full-time (30-45)	0.00	0.21	0.30	99.49	0.00	100
Overtime (>45)	0.00	0.10	0.56	0.82	98.53	100
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	100.00	0.00	0.00	0.00	0.00	100
Marginal part-time (5-20)	0.09	99.58	0.00	0.32	0.00	100
Part-time (20-30)	0.37	0.00	99.63	0.00	0.00	100
Full-time (30-45)	0.05	0.00	0.01	99.93	0.00	100
Overtime (>45)	0.00	0.00	0.00	0.00	100.00	100
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	96.78	0.40	0.91	1.81	0.10	100
Marginal part-time (5-20)	2.610	96.326	0.471	0.559	0.034	100
Part-time (20-30)	0.010	0.075	99.874	0.040	0.000	100
Full-time (30-45)	0.430	0.260	0.226	99.075	0.008	100
Overtime (>45)	0.000	0.335	0.437	0.520	98.707	100
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	95.59	0.19	0.24	3.26	0.72	100
Marginal part-time (5-20)	0.00	98.49	0.00	1.26	0.25	100
Part-time (20-30)	1.53	0.14	98.33	0.00	0.00	100
Full-time (30-45)	0.03	0.03	0.09	99.64	0.21	100
Overtime (>45)	0.03	0.03	0.12	1.77	98.05	100

***Source* :** own calculations.

TABLE 11. CHANGES IN FTE BY CATEGORY JOBKORTING 2009

Pre-reform	*Post-reform*					
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	31	143	748	62	985
Marginal part-time (5-20)	0	0	18	168	31	217
Part-time (20-30)	0	3	0	0	0	3
Full-time (30-45)	0	124	105	0	0	229
Overtime (>45)	0	3	28	65	0	96
Total single female	0	162	294	982	93	1530
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	0	0	0	0	0
Marginal part-time (5-20)	0	0	0	23	0	23
Part-time (20-30)	0	0	0	0	0	0
Full-time (30-45)	0	0	4	0	1	6
Overtime (>45)	0	0	0	0	0	0
Total single male	0	0	4	23	1	28
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	138	521	1665	112	2437
Marginal part-time (5-20)	628	0	76	224	19	947
Part-time (20-30)	6	0	0	14	0	19
Full-time (30-45)	1009	0	0	0	5	1014
Overtime (>45)	0	0	0	0	0	0
Total female couple	1642	138	597	1903	136	4417
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	14	30	649	179	871
Marginal part-time (5-20)	0	0	0	53	15	68
Part-time (20-30)	80	0	0	0	0	80
Full-time (30-45)	99	0	125	0	206	430
Overtime (>45)	33	0	60	354	0	447
Total male couple	212	14	215	1056	400	1896

Source **:** own calculations.

TABLE 12. TRANSITION MATRIX JOBKORTING HIGH

Pre-reform			*Post-reform*			
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	87.75	0.40	2.06	8.92	0.86	100
Marginal part-time (5-20)	0.13	88.62	1.84	8.56	0.84	100
Part-time (20-30)	0.00	0.37	97.47	2.07	0.10	100
Full-time (30-45)	0.05	0.37	0.95	98.63	0.00	100
Overtime (>45)	0.00	0.18	1.20	2.90	95.72	100
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	99.87	0.00	0.00	0.13	0.00	99.87
Marginal part-time (5-20)	0.27	97.78	0.00	1.94	0.00	0.27
Part-time (20-30)	1.39	0.00	98.61	0.00	0.00	1.39
Full-time (30-45)	0.39	0.04	0.04	99.52	0.01	0.39
Overtime (>45)	0.10	0.10	0.04	0.10	99.67	0.10
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	85.56	1.12	3.01	9.74	0.57	100
Marginal part-time (5-20)	1.53	89.37	2.26	6.51	0.32	100
Part-time (20-30)	0.09	0.15	98.19	1.50	0.07	100
Full-time (30-45)	0.13	0.45	0.81	98.58	0.02	100
Overtime (>45)	0.16	0.67	1.18	2.69	95.30	100
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	78.54	0.49	0.90	17.39	2.68	100
Marginal part-time (5-20)	0.26	82.47	0.61	13.77	2.89	100
Part-time (20-30)	1.39	0.10	97.65	0.77	0.10	100
Full-time (30-45)	0.10	0.11	0.18	98.99	0.62	100
Overtime (>45)	0.08	0.12	0.38	5.72	93.70	100

***Source* :** own calculations.

TABLE 13. CHANGES IN FTE BY CATEGORY JOBKORTING HIGH

Pre-reform			***Post-reform***			
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	74	639	4417	532	5661
Marginal part-time (5-20)	9	0	85	990	136	1220
Part-time (20-30)	0	34	0	189	15	238
Full-time (30-45)	48	129	559	0	0	736
Overtime (>45)	0	5	60	232	0	298
Total single female	57	243	1344	5828	682	8153
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	0	0	24	0	24
Marginal part-time (5-20)	12	0	0	137	0	148
Part-time (20-30)	0	0	0	0	0	0
Full-time (30-45)	513	21	31	0	3	567
Overtime (>45)	0	10	8	27	0	45
Total single male	524	31	38	188	3	784
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	387	1730	8951	656	11724
Marginal part-time (5-20)	369	0	363	2613	180	3526
Part-time (20-30)	49	0	0	513	40	601
Full-time (30-45)	305	0	0	0	14	319
Overtime (>45)	39	0	0	0	0	39
Total female couple	761	387	2093	12077	890	16208
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	36	112	3459	667	4275
Marginal part-time (5-20)	7	0	10	583	171	771
Part-time (20-30)	72	0	0	24	5	101
Full-time (30-45)	400	264	255	0	601	1520
Overtime (>45)	85	0	188	1145	0	1418
Total male couple	564	301	565	5211	1444	8084

Source **:** own calculations.

TABLE 14. TRANSITION MATRIX SELECTIVE JOBKORTING HIGH

Pre-reform	*Post-reform*					
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	90.21	0.51	2.19	6.58	0.51	100
Marginal part-time (5-20)	0.13	90.57	1.88	7.18	0.24	100
Part-time (20-30)	0.00	0.34	97.50	2.07	0.10	100
Full-time (30-45)	0.13	1.33	3.28	95.27	0.00	100
Overtime (>45)	0.00	0.78	5.43	2.21	91.58	100
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	100.00	0.00	0.00	0.00	0.00	100
Marginal part-time (5-20)	0.18	97.58	0.00	2.23	0.00	100
Part-time (20-30)	1.30	0.06	97.63	0.91	0.09	100
Full-time (30-45)	0.10	0.02	0.16	99.59	0.14	100
Overtime (>45)	0.00	0.00	0.18	1.02	98.81	100
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	87.20	0.92	2.96	8.45	0.47	100
Marginal part-time (5-20)	1.68	90.59	2.36	5.14	0.23	100
Part-time (20-30)	0.06	0.21	97.90	1.76	0.07	100
Full-time (30-45)	0.14	1.35	2.86	95.62	0.03	100
Overtime (>45)	0.31	2.08	3.61	4.26	89.74	100
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	88.35	0.53	0.73	9.34	1.06	100
Marginal part-time (5-20)	0.37	93.22	0.58	5.19	0.64	100
Part-time (20-30)	1.59	0.33	97.58	0.49	0.00	100
Full-time (30-45)	0.15	0.21	0.56	98.32	0.77	100
Overtime (>45)	0.07	0.22	0.61	7.67	91.43	100

Source **:** own calculations.

TABLE 15. CHANGES IN FTE BY CATEGORY SELECTIVE JOBKORTING HIGH

Pre-reform	*Post-reform*					
Single female:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	95	679	3256	314	4343
Marginal part-time (5-20)	9	0	87	829	38	964
Part-time (20-30)	0	21	0	189	15	224
Full-time (30-45)	120	779	1153	0	0	2052
Overtime (>45)	0	55	272	44	0	371
Total single female	129	949	2191	4318	367	7954
Single male:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	0	0	0	0	0
Marginal part-time (5-20)	8	0	0	157	0	165
Part-time (20-30)	77	1	0	32	5	116
Full-time (30-45)	127	16	76	0	45	264
Overtime (>45)	0	0	31	72	0	103
Total single male	211	18	107	261	50	647
Female in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	317	1702	7767	536	10322
Marginal part-time (5-20)	403	0	379	2062	130	2974
Part-time (20-30)	34	48	0	600	40	721
Full-time (30-45)	319	1978	2517	0	18	4832
Overtime (>45)	75	352	437	206	0	1070
Total female couple	830	2696	5034	10635	724	19919
Male in a couple:	***Inactivity***	***Marginal part-time***	***Part-time***	***Full-time***	***Overtime***	***Total***
Inactivity(0-5)	0	40	90	1858	264	2251
Marginal part-time (5-20)	9	0	10	220	38	277
Part-time (20-30)	83	0	0	15	0	98
Full-time (30-45)	568	502	806	0	742	2618
Overtime (>45)	72	156	305	1536	0	2069
Total male couple	732	698	1211	3629	1044	7313

***Source* :** own calculations.