Labour market responses of survival pensioners: Estimating a labour supply model and predicting the effect of the reform*

André Decoster, CES KU Leuven
Kristian Orsini, CES KU Leuven, IZA Bonn
Guy Van Camp, CES KU Leuven, FOD Sociale Zekerheid

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Abstract

In this paper we use a sample of administrative data coming from the 'Datawarehouse labour market and social protection' and the microsimulation model MIMOSIS to assess the labour supply effects of a reform of the rules for cumulating labour income with survival pension as proposed in the Generations Pact. In a first step we estimate a standard discrete choice labour supply model for several sub groups. Subsequently we model the proposed reform in the tax and benefit rules and we predict the change in desired labour supply of the targeted group. The reform has a significant positive effect on the labour supply of widows, but the effects are quite weak amongst the survivor pensioner with very low benefit, i.e. the group that was originally thought to benefit the most from the reform.

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1 Introduction

The Generations Pact ('Pacte de solidarité entre les générations' or 'Generatiepact'), formally approved by the Belgian federal parliament on the 23^{rd} of December 2005, contained a reform proposal for survival pensions. In this paper we exploit a well established methodology to assess ex-ante the potential labour supply effects and the budgetary cost (including potential feedback effects) of the proposed reform in the rules for cumulating labour income and survival pensions. The methodology consists of estimating households' preferences with respect to labour supply (i.e. leisure and consumption) under the current legislation. The estimated preference parameters may then be used to predict the behavioural adjustment to a change in the legislation. By aggregating behavioural change over the whole sample and weighting with the sampling weights, we can estimate the expected change in labour supply and expected earning back effects of the reform.

The structure of the paper is as follows: in section 2 we describe the current rules and the proposed reform for cumulating labour income and survival pensions; in section 3 we describe the data set, the selection procedure and provide some basic statistics; in section 4 we introduce the microsimulation model (MIMOSIS), in section 5 we describe the econometric structure of the labour supply model, while section 6 discusses the estimates. Finally, sections 7 and 8 present the estimated impact on employment as well as the budgetary cost of the reform. Section 9 concludes.

2 The current legislation and the proposed reform

Under current Belgian legislation, the amount of survival pension of eligible survivors depends on the level of gross labour income. Basically, the survival pension is means tested on individual gross labour income, which implies strong disincentives to supply labour amongst

survival pensioners (at least in the formal sector). According to the 2001 legislation - the reference year of the data and microsimulation model - there are two threshold levels: a bottom threshold of 14,552.13 EUR and a top threshold corresponding to 115% of the bottom threshold, i.e. 16,734.95 EUR [1] If gross labour income is below the first threshold the survivor is entitled to the full benefit. If gross labour income is above the first threshold, but does not exceed the second threshold, the full benefit is reduced with a taper rate corresponding to the ratio of the amount exceeding the first ratio, to the ratio itself. The taper thus increases linearly from 0 to 15% with increasing earnings. Finally, if gross labour income is above the second threshold, the survivor benefit is completely tapered away. The main elements of the proposed reform are (i) the joint assessment of labour income and survival pension in the eligibility test, (ii) application of single threshold on this joint income and (iii) a reduced taper rate of 50% on the benefit withdrawal in the range above this threshold. The levels proposed by the reform are 26.200,00 EUR for people without children and 29.910,80 EUR for people with children.[2]

To better understand the effects of the reform on the incentives to work, we outline budget sets before and after the reform. The budget sets in figures 1 to 3 show the effect of the reform on a single without dependent children with an hourly wage of 7, 13 and 20 euros.[3] All nominal variables are expressed in price levels of 2001.[4] The values on the x axis

[1]The above rates apply to survival pensioners without dependent children; the rates are 18,189.93 EUR and 20,918.42 EUR respectively, for survival pensioners with dependent children.

[2]Since data and reference year of the microsimulation model refer to 2001, we expressed the 2006 pre and post reform thresholds in 2001 prices. This gives a threshold of 23.231,07 and 26.521,37 EUR for survivor without and with dependent children respectively. For the conversion we used the consumer price index computed by Belgostat (which was 90,27 in January 2001 and 101,81 in March 2006, yielding an index of 1,1278).

[3]The hourly wage of 7 EUR is just slightly above the minimum hourly wage (6.92 EUR/hour in 2001), the hourly wage of 13 EUR corresponds to the sample mean, while the 20 EUR/hour wage rate corresponds to the 9^{th} decile cut point.

[4]Moreover, for figures 1 to 3 the following assumptions were made:

1. the initial survival pension is assumed to be 10.000 EUR (a value which is close to the average survival pension for widows in the wage earner regime, see table 1 below), gross labour income per year is computed as the number of hours worked per week times the gross wage times 52 (i.e. no additional holiday earnings taken into account);

correspond to the amount of hours worked per week, whereas on the y axis we have yearly disposable income.

The pictures clearly show the extent of the pre reform inactivity trap. For the low wage worker, this trap was not very significant since the benefit withdrawal only occurs when working overtime. The reform leaves the budget constraint almost unchanged, except for the segment beyond 45 hours per week. Of course, the extent of the inactivity trap also varies with the level of the survival pension, and for lower pension levels it might be a relevant disincentive to work even for the low skilled. It is however for the medium and high wage workers that the disincentive to work (or at least to work full time) is strongest. In particular, for a medium skilled worker receiving a survival pension of 10,000 EUR the disposable income is the same when working part time or when working full time (whereas supplying a number of hours in between part time and full time would actually cause a fall in disposable income). For a highly skilled worker, the extent of the trap is smaller, and mostly concentrated between a part time and a 3/4 of full time.

The reform reduces the extent of the inactivity trap. The sudden drop in the budget line disappears for all levels of income. It is therefore likely that the hours worked and to a lesser extent participation will increase for those households who where out of employment or working part time. However, the new budget constraint introduces an almost flat region in the range where income was previously decreasing. This implies that some households

2. standard social security contribution rates are applied both to labour income and to pension benefits (i.e. 13,07% and 3,55% respectively);

3. personal income taxes are computed by applying a rate scheme on the sum of the net taxable labour income and the net taxable survival pension, net of the personal tax credit and the tax credit on replacement incomes; professional costs computed by a lump sum scheme;

4. taxes (without additional crisis surcharges) are set to zero if the credits are larger than the taxes to be paid before application of the credits.

In the simulations of the baseline and of the reform on the real data, however, we do take into account holiday earnings, while employee contributions are computed in a more refined way (i.e. we take into consideration the rebates on low wage social security contributions).

who where supplying labour at full time might be induced to reduce their labour supply, since a drop in labour supply would now cause a small drop in disposable income. .

There are, however, also households who might lose from the reform. Picture 4 to 6 show the case of a survival pensioner with respectively 8,000 EUR, 15,000 EUR and 20,000 EUR of survivor benefits. The higher the pension income, the wider the range where the survival pensioner will be negatively affected. With a survival pension of 20,000 EUR per year (figure 6), for example, a medium wage survival pensioner will be negatively affected by the reform if he or she works between 5 and 30 hours. Clearly the disincentives to working longer hours disappear now, but at the same time the relative difference in income level between working part time or not working at all, is smaller than before the reform.

The effect (whether positive or negative) and the magnitude of the reform on the labour supply is therefore difficult to predict ex-ante, due to the interaction of substitution and income effects. We therefore need a model that identifies, for the relevant households, the fundamental preferences, the magnitude of substitution and income effects caused by the reform and, finally, the individuals' labour supply elasticity. The following sections explain how this model was constructed: the data used (section 3), the microsimulation model (section 4) and the econometric specification (section 5).

3 The data: sample selection and descriptive statistics

The sample on which the microsimulation model runs (MIMOSIS) was constructed by a two step sampling procedure. First a random sample of 100,000 individuals was sampled from the set of all individuals who, according to the National Register, were alive on January 1st 2002 and known to have their main place of residence in Belgium. Individuals in this random sample could be either living in private or collective households. In a second step,

the sample was extended with all household members of those individuals sampled in the first step and living in a private household. The final sample comprises a set of 305,019 individuals. Sample weights have been constructed to inflate the sample to the population level. For this sample, a data set with micro data from various administrative sources was constructed. Apart from some household characteristics taken from the National Register (age, sex, relationship between household members, region and population density in the residence area), the data set consists of variables taken from the 'Datawarehouse labour market and social protection'. At the time of writing, the data set we dispose of contains a) labour market income and a number of labour market characteristics for wage earners in either the private or public sector, b) some labour market characteristics of self employed but no gross earnings of these self employed and c) information on various social benefits such as unemployment benefits, sickness and disability benefits and pensions. All variables in our data set contain registrations for the tax benefit year 2001.

The variables with information on pensioners are provided by the Pensioenkadaster to the Datawarehouse. This allowed to identify individuals entitled to a survival pension in 2001. [5]

Survival pensions may be claimed by single widows and widowers who have not remarried, provided that the deceased spouse had fulfilled minimum employment and contribution requirements. The rights to a survival pension can be obtained in three different employment regimes: a) as wage earner in the private and public sector, b) as self employed and c) as civil servant. For most observed survival pensions, the regime in which the right was generated can be identified with the available data. It is possible to cumulate one's own

[5]We consider as survivor pensioners only the widows and widowers who are entitled to a legal survival pension according to Belgian laws. Neither the current legislation, nor the reform would in fact affect survival pensions obtained from extralegal provisions (the second or third pillar system) and survival pensions for which the rights were obtained according to foreign laws or according to the laws of supranational organizations.

retirement pension with a survivor benefit. In this case we classify the person as retired. Those who receive a survival pension can complement it with a retirement pension, at the age of retirement, if they are entitled to a retirement benefit. The total amount of the survival pension and the retirement pension together is limited to 110% of the survival pension that would be obtained in case of a full time career of the deceased spouse (see FOD Sociale Zekerheid, 2001, p. 263)

Table 1 shows that by means of our sample we estimate the number of widowers and widows in 2001 at 133,532 and 596,532 respectively. However the number of widowers and widows available for work is quite small: 18,418 and 84,618 respectively when we consider as available for work individuals who are not disabled, retired or pre-retired. The group of widowers and widows available for work and claiming a survivor benefit is further disaggregated on the basis of the scheme under which they are entitled to a survival pension. There are of course also widows and widowers who are not receiving any survivor benefit.

Since we only observe actual payments, it is however difficult to infer whether the absence of a survivor pension for widows and widowers is due to lack of entitlement, problems in take-up or simply too high gross earnings.

We assumed that widows and widowers currently not working and not receiving a survivor benefit are not entitled to a survivor benefit. This group will therefore not be affected by the reform. We assumed that widows and widowers currently working and not claiming a benefit were all entitled to a benefit. We imputed as entitlement the average benefit, computed separately for males and for females.

This point should not be underestimated: the potential negative responses to the reform would be concentrated amongst survival pensioners currently working and not claiming a benefit due to their labour income. The latter could indeed be induced by the reform to

reduce their labour supply. A reduction in labour supply would come at the cost of a smaller drop in disposable income compared to the pre-reform scenario. In order not to underestimate this effect we preferred being on the safe side by imputing the entitlement to the benefit to widows and widowers who are currently in work and not claiming their benefit due to their high labour income. In these cases we imputed the average claimed benefit, computed separately for males and females. As shown in table 1 the imputation concerns 11 % of females (8,190 out of 75,572) but almost 89% of males (10,306 out of 11,356).

The above hypothesis is very conservative with respect to the possible cost of the reform, and expected effect on labour supply, since it is likely that there is some endogenous selection mechanism into the group of workers and the group of non workers, and that as a consequence in the group of non workers there will be a higher percentage of widows and widowers who are either not entitled at all, or that are entitled to lower survivor pensions.

The reform concerns a small number of individuals: widows and widowers available for the labour market either claiming or entitled to a survivor pension. Following the imputation we only have 11,365 males and 75,572 females. These correspond respectively to 235 and 1,516 cases in our sample.

Since additional selection criteria, needed for the purpose of estimating a labour supply model, will further reduce the group targeted by the reform that can be modeled, we estimated the labour supply model on the whole population. The main assumption in this case, is that the preferences of males and females do not depend on their civil status (i.e. on whether married, single, separated or divorced).[6]

Although civil status is assumed not to affect behaviour, the 'de facto' composition of the households is assumed to affect the behaviour of the individual that compose it. Widows

[6]A priori we were not able to identify any reason why the preference structure of widows and widowers should be different from those of other individuals, once we control for other observable differences. The assumption is nevertheless difficult to test econometrically. See section 5 for a further discussion.

and widowers, just like other persons may live as single individuals or as couples (or in different - less common - household types). In case they live in couples (either married or de facto couples) the labour supply of both partners must be modeled as a joint decision.[7] The labour supply models were therefore estimated for three groups separately: single males, single females and couples. The term single should not be misunderstood: this typology includes also single mothers and single fathers, as well as individuals living with their old parents, who have retired from the labour market. The principal characteristics of single households is that they are composed of only one individual available for the labour market and does not have a partner.

Figure 7 gives a visual explanation of the selection procedure and of the modeling strategy. In order to be part of the estimation sub-sample, an individual must be in working age (18-65) and be available for the labour market, i.e. he or she may not be (pre)retired nor sick or disabled. Youngsters under the age of 25 who are not employees, self employed or registered as unemployed are assumed to be in full time education and not available for the labour market. Children over 25 with undefined professional status are just assumed to be inactive and thus potentially available for the labour market. This assumption allows us to neglect simultaneity issues of educational investment and labour supply. In modeling labour supply we also exclude the self employed, since we have no information on the hours worked. Self employed are thus treated as having a fixed labour supply. Employees, unemployed and inactives are treated as having a flexible labour supply. For couples we of course also have the possibility of mixed cases. For example a household may consist of a self employed

[7]The unitary setting is increasingly being questioned by economic theory. It is argued that unitary models are not compatible with the individualism that is at the heart of microeconomic theory. Beninger and Laisney (2004) have recently extended the above labour supply model to joint labour supply decisions and intra household welfare allocation, within a collective setting. For an application with Belgian data, see Vermeulen (2006).

husband and of an employed wife, or vice versa. These groups are currently not modeled.[8]

Besides the 'standard' cases of singles and couples there is a residual group of households which includes different types of families and forms of cohabitation: this include homosexual couples or cohabiting flatmates, brothers and sisters or other relatives sharing a same housing arrangement, and mainly couples with grown up children also available for the labour market. From the labour supply perspective, this group tends to be rather heterogenous, and the degree of 'unity' of the household (i.e. the extent to which the income of one member influences the decisions of the other members) is unknown and/or difficult to deduce. In other words, it is not possible to determine whether labour supply should be modeled as an individual or joint decision. We therefore follow the bulk of the literature on ex-ante evaluations and decide not to model these households.

Table 2 summarizes the selection process for the whole population, while table 3 provides similar information for the target group. The target group is defined as the set of widows and widowers either entitled or claiming a survivor benefit, who are available for the labour market and whose labour supply is being modeled. As shown in table 2, our modeling strategy will allow us to model the labour supply of almost 70% of the whole population. For the moment, however, we are able to model around 63% of males and 57% of females of working age - but over 75% and 65% of widowers and widows of working age. As revealed by table 3 there are only few widowers and even less widows in the subgroups 'men in couples' and 'women in couple'. These two groups include widows and widowers living with a retired, sick or self employed partner, i.e. a partner having a fixed labour supply. It is therefore acceptable to predict the effect of the reform using the models for couples, single males and single females alone. The main problem is the relatively high number of widows living

[8]Following the integration of the incomes of self-employed it will be possible to estimate a labour supply model for these two additional groups as well. These will be treated like singles, but taking joint household income as an explanatory variable.

in the residual ('other') household typology (658 out of 1,447). This is mainly composed of widows living with grown up children and their labour supply is not modeled for the moment. These cases are not discarded, but their labour supply is assumed not to respond to changes in the budget constraint.

The descriptive statistics of the the sub samples that will be used for the estimation of the labour supply model are presented in table 4. Table 5, on the other hand, produces the same statistics for the sub sample of modeled widows and widowers. In particular, table 4 shows us three sets of information: the demographic characteristics of the households, the professional status of the head of the household and eventually of the spouse and finally the amount of hours worked. For reasons that will become clear in the following sections, the hours worked have been discretized in intervals of ten hours. Table 5 also shows the share of households in which a survivor benefit is claimed or not, and disaggregates the hours supplied for the two sub groups. Indeed the difference in labour supply of benefit claimants and non claimants is striking, both for males and females.

4 MIMOSIS

MIMOSIS is a microsimulation model for the Belgian social security and personal income tax system, running on the administrative dataset described in section 3. Since the data go back to the tax benefit year 2001, the legislation that is currently modeled as baseline legislation, is that of 2001. The current version of the model aims to cover 6 policy domains: a) social security contributions, b) unemployment benefits, c) sickness and disability benefits, d) family benefits, e) existence minima and f) personal income taxes.[9]

[9]The version of the model used in this paper is a preliminary one. We mention the most important lacunas. First, information on self employment income is still missing. Second, in some modules observed benefits instead of simulated benefits are used. Thirdly, existence minima are attributed to individuals too generously because the take up behaviour of these benefits is not modeled. Yet, these deficiencies should

The use of a microsimulation model in this kind of analysis is indispensable for two reasons. First, it allows to translate a complex real world tax benefit system into the budget constraints as presented in Figures 1 to 6 in section 3. The - often hidden - interactions between different income components and eligibility rules need a level of detail in the program only available in a genuine microsimulation model. Secondly, the underlying database with micro information on a representative sample of households or individuals allows to complement the standard aggregate results (e.g. for the budget) with a rich and detailed distributional analysis.

A key variable in the labour supply model of sections 5 and 6 and in its application in section 7 to the survivor pensioners, is the gross wage. For the individuals active in the labour market we determined the gross wage by dividing gross labour income by the number of contractual hours, two variables which are both registered by the Datawarehouse. For the unemployed and inactives, we first tried to reconstruct their gross hourly wage by retrieving the last recorded hourly wage for those who had been active on the labour market before as wage earner. If both current and past labour market information was lacking, we assumed the individual could at least obtain the minimum hourly wage (6.92 EUR in 2001). We had to make this assumption for 22% of the sample on which the labour supply model was estimated. However, and not surprisingly, for the sample of widows and widowers in working age and receiving a survival pension (and not self employed), the imputation was necessary for 62% of the individuals.[10] Overall the average gross hourly wage (either registered or reconstructed) amounts to 13,00 EUR (in 2001 prices).

not have a major impact on the results of this simulation, since it is mainly concerned with survival benefits and gross labour income.

[10]We are aware that the standard procedure to impute missing wages, is to estimate a wage equation (either a linear regression or a Heckman two stage wage equation). However, since one of the crucial explanatory variables of the wage equation, level of education, is missing we could not fall back on this technique.

Assuming that the hourly gross wage stays constant across different working time options, we computed gross labour income for discrete intervals of weekly labour supply. The intervals ranged from 0 to 50 hours, in steps of 10 hours.[11] If gross labour income of survival pensioners is in between the lower and the upper threshold, we recompute the theoretical maximum entitlement by adding the fraction of benefit that was tapered away. To distinguish survival pensioners with and without dependent children (see section 2) we used the number of dependent children according to the personal income tax legislation. If disposable income of the household is below the existence minimum, it is complemented such that the existence minimum is reached. The existence minimum itself varies with the household situation.

5 Labour Supply Models

Discrete choice models of labour supply are based on the assumption that individuals in a household i can choose among $J+1$ working hours (non-participation denoted by $j = 0$ and J positive hours denoted by $j = 1, ...J$). For each discrete choice j, the net income of household i, denoted C_{ij} (equivalent to aggregate household consumption in a static framework) is computed by tax-benefit microsimulation techniques so that leisure-consumption preferences can be estimated. The approach has become standard practice as it provides a straightforward way to account for the nonlinear and nonconvex budget sets of complex tax and benefit systems when modeling individual and joint labour supplies of couples. In the latter case, the choice of working hours is given by the $J+1^2$ combinations of each partner's labour supply; see van Soest (1995). Precisely, the utility V_{ij} derived by household i from

[11] The introduction of possible labour supply above the legal maximum of 38 hours a week for a single full time job reflects the possibility of a combination of multiple parttime jobs. That people in practice do combine multiple jobs in the Belgian labour market is illustrated in Vermandere and Stevens (2002).

making choice j is assumed to depend on a function U of partners' leisures Lf_{ij}, Lm_{ij}, disposable income C_{ij} and household characteristics Z_i, and on a random term ϵ_{ij}:

$$V_{ij} = U(Lf_{ij}, Lm_{ij}, C_{ij}, Z_i) + \epsilon_{ij}.$$

If the error term ϵ_{ij} is assumed to be identically and independently distributed across alternatives and households according to an EV-I distribution, the probability that alternative k is chosen by household i is given by (McFadden, 1974):

$$P_{ik} = \Pr(V_{ik} \geq V_{ij}, \forall j = 0, ..., J) = \frac{\exp U(Lf_{ik}, Lf_{ik}, C_{ik}, Z_i)}{\sum_{j=0}^{J} \exp U(Lf_{ij}, Lf_{ij}, C_{ij}, Z_i)}.$$

The likelihood for a sample of observed choices can be derived from that expression and maximized to estimate the parameters of the function U. When actual working hours are used to define the individual leisure terms, the econometrician assumes that individuals freely choose their working hours and face no demand-side constraints. The approach is that of a pure - *unconstrained* - labour supply model.

In the following, we assume a quadratic specification of the utility function as in Blundell, Duncan, McCrae, and Meghir (2000). Hence, the utility function of a couple has the following form:

$$\begin{aligned} U_{ij} = \alpha_c C_{ij} + \alpha_{cc} C_{ij}^2 + \alpha_{lf} Lf_{ij} + \alpha_{lm} Lm_{ij} + \alpha_{llf} Lf_{ij}^2 + \alpha_{llm} Lm_{ij}^2 \\ + \alpha_{clf} C_{ij} Lf_{ij} + \alpha_{clm} C_{ij} Lm_{ij} + \alpha_{lmf} Lf_{ij} Lm_{ij} - \beta_{mj} - \beta_{fj}. \end{aligned} \tag{1}$$

We assume that preferences vary across households through taste-shifters on income and gender specific leisure coefficients:

$$\alpha_c = \alpha_{c0} + \alpha_{c1} X_1 \tag{2}$$

$$\alpha_{lf} = \alpha_{lf0} + \alpha_{lf1} X_2$$

$$\alpha_{lm} = \alpha_{lm0} + \alpha_{lm1} X_3.$$

where X_1, X_2, and X_3 are vectors including age, number of children and elderly in different age class, region and size of city of residence.

The utility function and the choice probability of a single individual are derived in the same way as above. The only difference is that the structural utility term contains only two variables: consumption and individual leisure:

$$U_{ij} = \alpha_c C_{ij} + \alpha_{cc} C_{ij}^2 + \alpha_l L_{ij} + \alpha_{ll} L_{ij}^2 + \alpha_{cl} C_{ij} L_{ij} - \beta_j. \tag{3}$$

with the same taste-shifters on income and leisure coefficients.

In the case of singles we restricted the option set to 6 discrete choices: 0, 10, 20, 30, 40, 50. In the case of couples, the option set included 36 alternatives.

We follow van Soest (1995) and introduce dummy variables (β_j). These are supposed to capture non monetary characteristics of the jobs: flexibility, working environment, working conditions and relative availability (i.e. the associated search costs). In particular we included one dummy for regular part-time (20 hours per week), one dummy for full-time position (40 hours per week) and one dummy for the irregular working time (i.e. 10, 30 or 50 hours per week). In the estimation we do not consider potential effects of unobserved heterogeneity which implies that the independence of irrelevant alternatives (IIA) property holds. However, Haan (2006) has shown that labour supply elasticities do not differ significantly when unobserved heterogeneity is introduced.

Other than perfect information and rational (optimizing) behavior, the model is based on a set of additional simplifying hypotheses:

1. lack of adjustment costs (economic agents may freely adjust their labour supply strategy without incurring additional costs);
2. lack of adjustment dynamics (economic agents may immediately adjust their labour supply strategy: there is no short term or long term path dependency);
3. lack of demand side constraints (each agent supplying zero hours of work does so because this is his/her optimal labour supply decision;
4. labour supply is a static decision (economic agents are not affected by long run considerations).

The above hypotheses are not innocuous and many would argue that they are not very realistic, especially in the framework of the Belgian labour market. On the other hand, it may be argued that the above hypotheses are 'optimistic' hypotheses. In this sense our estimate might be interpreted as an upper bound to the potential labour supply and earning back effect of the reform. Finally, let us recall that given the small sample size of widows and widowers, we introduced the additional hypothesis that survival pensioners living alone have the same preferences as singles, while survival pensioners living as a couple have the same preferences as legally married or 'de facto' couples.

6 Preference structure and labour supply elasticities

The coefficients of a discrete choice model have a less intuitive interpretation than in linear models and little can be said about the magnitude of the coefficients, however some elements

may be captured from the sign of the coefficients. Table 6 shows the regression coefficients for single males, table 7 for single females and table 8 for couples.

The marginal utility of consumption is positive over the whole range of incomes in the data set. In particular a negative sign on the squared leisure and income terms implies decreasing marginal utility of leisure and consumption. The most important element for the consistency of the model and for its ability to predict changes is that the utility function is globally concave in consumption (or disposable income - in a static model). Concavity was respected by over 99% of the sample. As stressed by van Soest (1995) several factors could explain that the choice function is not globally concave in leisure. Amongst other things, the fact that some value may be attached to working some amount of hours due to dominant social values. In particular between 20 to 30% of the sample did not respect concavity in leisure. Note also the positive sign of the cross leisure terms in the utility function of couples: the non market time of partners is complementary and not a substitute.

Other elements may also be captured from the regression coefficients. The taste shifters for both the consumption and (to a lesser extent) leisure coefficients increases with age, but starts decreasing after the age of 50: the inverse U relation applies both to couples and single males. This relationship is consistent with the traditional life cycle hypothesis, but is probably also affected by the correlation between productivity and age. For single females the effect of age on the preference for income and leisure is reversed. It increases over the whole range. Since we control for the 'dual burden' effect (number and age of children and number and age of elderly people), it is likely that this relationship captures some differences in the labour market institutions, including the costs of reentering the labour market after childbirth.

The preference for leisure appears to be different for males and females. This difference

is not only evident in the value of the constant in the leisure term of couples (negative for males and positive for females), but to a lesser extent it also applies to single males and single females. The latter seem to have a higher preference for leisure than the former, which might to some extent respect difference in social stigma associated to inactivity of males and females. The preference for leisure also increases with the presence of small children (for single females) and elderly people in the households (for both single females and single males), which is consistent with the additional caring responsibilities that single adults may encounter.[12] In the case of couples the number of small children tends to increase the taste for work for fathers, whereas it increases the taste for leisure of mothers (for mothers in couples it is not only the case for small children, but for grown up children as well). Also, the number of older individuals in the household seems only to affect the labour supply of females (with the impact of the over 75 being stronger than the impact of the elderly in the 65-75 range). These results seem consistent with the evidence that gender specialization in market and non market time tend to resist within couples. Differences between single males and single females, on the contrary, appear to be much less pronounced.

Living in Flanders increases the preference for working, as is the case when living in small centers (the reference category in the regression). This is also consistent with lower activity rates for Wallonia, Brussels and in bigger cities in general. Tentative explanations might point in the direction of smaller social stigma associated with unemployment and non activity in medium to big cities in general and in Brussels in particular. Besides that, the regional dummies might also capture some demand side constraint: the unemployment rate in Brussels is indeed higher than in Wallonia and in Flanders.

We also specified a model with the dummy variable 'widow or widower'. The latter

[12]Note that although we speak of leisure time, the preference for leisure should be interpreted as preference for non market activities, as we are not able to distinguish between caring and home production and actual leisure.

was introduced as a taste shifter in the linear coefficient for consumption and leisure. The estimate was not significantly different from zero for single adult males or for males living with a partner. Also widows living with a partner did not show significantly different preferences than other married or unmarried women living with their partner. For single females, however, the dummy variable widow turned out to be significative. Note that this does not necessarily imply that the preferences of widows are different. As in the case of the regional variables, being a widow could capture some other factors (e.g. depression, prolonged weak labour market attachment). Since we could not control for these factors in an appropriate way, we decided to exclude variables whose influence on preferences could not be explained or justified. For a detailed discussion on the risk of misspecification in structural models of labour supply, see Bargain, Caliendo, Haan, and Orsini (2006)

The goodness of fit of a discrete choice model may not be judged by the pseudo-R^2. At most such figure may be used to judge the goodness of fit between a group of models: in other terms it is a relative figure, and not an absolute one. In order to judge the prediction power of the model, one often compares the observed and the predicted frequencies. Figure 8 and figure 9 show the observed and predicted frequencies for single males and single females respectively. Figures 10 and 11 show the observed and predicted frequencies for males and females living in a couple where both partners have a flexible labour supply.[13]

[13]Predicted frequencies results from aggregating individual probabilities over the whole sample, whereas observed frequencies simply represent the frequency of the observed choice over the whole sample. We also estimated the model on 5 hours intervals and a simple inactivity, part-time and full-time model. In all the cases results were surprisingly similar: the sign and magnitude of the coefficients remained the same for the different specifications, although the prediction power slightly decreased when using 5 hours intervals. The 10 hours intervals, nevertheless produced an extremely good fit and at the same time where sufficient to capture the effect of the reform on the budget constraints.

6.1 Predicted Elasticities

Another way to interpret the estimated parameters is to look at labour supply elasticities. Elasticities may not be derived analytically, since we do not have a reduced functional form for the labour supply function. However, it is possible to compute labour supply elasticities numerically. In particular we simulated a 1% hourly wage increase and recomputed the expected labour supply following such a wage shock. Participation and total hour elasticities are presented in table 9.[14] The average figures are substantially higher than recently estimated labour supply elasticities, both for Belgium and for other EU countries, see Orsini (2006). In the survey of estimations of couples' labour supply based on structural modeling, the author finds that labour supply elasticities of females in couple vary between .3 and .7, whereas the labour supply of males in couple varies between .08 and .2. The larger labour supply elasticity of females in couples has been largely documented in the recent literature (Blundell and MaCurdy, 1999). Moreover it is usually the case that labour supply elasticities of singles (both males and females) approach those of males in couples, since they all are primary earners, see Bargain, Caliendo, Haan, and Orsini (2006). The high predicted labour supply elasticities of single males and females come therefore as a surprise. One of the explanations might be that our sample is based on administrative information. Some of those registered as inactive, could indeed be employed in the informal economy, while others may be currently enrolled in educational programmes, but may appear as inactive. Moreover, for the moment, we decided to exclude households with economically active grown up children. It is likely that in some of these cases the grown up children are de facto living

[14] With total hour elasticity we mean the percentage increase in hours supplied following a 1% increase in the gross wage, whereas with participation elasticity we mean the increase in the employment rate following the same increase in the gross wage. For example a total hour elasticity of .7 and a participation elasticity of .2 mean that if gross wages were to increase by 1%, the total amount of supplied hours would increase by .7% whereas the total number of participants in the labour market would increase by .2%: that implies that an employment rate of 50% would increase to 50.1%.

alone but are still registered in the parental home, or they are still living at home, but are independent from their parents with respect to labour market behaviour. This might explain the relatively high share of inactives amongst the population of singles. The inactivity rate reported in table 4 (16.99% of single males and 36.43% of single females), seems indeed quite high with respect to other statistical sources not based on administrative data. Such a high inactivity rate might be the cause for a biased estimation of the participation elasticity and hence total labour supply elasticity. This, however, should not have a large negative effect on the estimated labour supply elasticity of a particular target group, see Bargain, Caliendo, Haan, and Orsini (2006).

The distribution of labour supply elasticities by decile of household disposable income is broadly consistent with the evidence of larger labour supply elasticities amongst the less skilled households; see Aaberge, Colombino, and Strøm (2004).

Table 10 also presents the labour supply elasticities for the sub sample targeted by the reform. The target group includes widows and widowers available for the labour market (but not self employed) either claiming or entitled to a survivor benefit.

The labour supply elasticities of the target group are smaller than those of the whole population for males and for females in couples. Single females and single males in the target group, on the other hand, show higher labour supply elasticities than the corresponding group in the whole population.

The high labour supply elasticity are a consequence of the individual characteristics and of the specific budget constraint faced. In particular the presence of out of labour income tend to induce to higher labour supply elasticities.

Note that average elasticities might nevertheless be misleading, especially in when dealing with reforms that affect differently the low skilled and the high skilled. The reform might

induce a stronger increase in labour supply on the low-medium skilled population (i.e. the sub group that tends to have relatively higher elasticities), while the negative change in labour supply should a priori be concentrated amongst the skilled population, characterized by lower labour supply elasticities.

In the following section we will see how employment and the amount of hours worked will change after the reform, when the institutional disincentives to work are partially removed.

7 Employment Effects of the Reform

Table 11 shows the overall employment level and the number of hours worked (in FTE - Full Time Equivalent positions) before and after the reform. The reform can be expected to increase the labour supply by 830 FTE positions. The increase in participation plays an important role in explaining this increase, as 657 survival pensioners are predicted to enter the labour market. This shows that in the pre reform scenario, many survival pensioners preferred not to enter the labour market, rather than working short hours. This is probably associated with the fixed costs of labour supply, which make part time and marginal part time relatively less attractive than full time positions (see the β coefficients in the regression tables).

The additional employment is almost entirely coming from widows living in single households (782 FTE positions) and to a lesser extent from widows with a survival pension living with a partner (64 FTE positions). The reform can thus broadly be described as a reform targeting the female population in general and the female population living in single households in particular. The increase in labour supply of males in couples corresponds to just about 17 units, a figure that could be expected not to be significantly different from zero, while single males - the group that had the highest pre reform employment rate (amongst

benefit claimants) - decrease their labour supply by about 26 FTE position. At the same time however participation increases. Clearly the reform induces two movements: a movement towards an increase in labour supply (or even participation for the formerly inactive) and a movement towards a decrease in labour supply amongst the full time working population. The analysis of inflows and outflows of labour supply and of the characterisitics of the individuals increasing or decreasing their labour supply will be the core of the following section.

7.1 Distributional impact

In this section we further disaggregate the net effects in increases and decreases of labour supply. Table 12, table 13 and table 14 show the relative contribution to the net effects by age group, by hourly wage and by survivor pension level. Finally table 15 disaggregates inflows and outflows by quintile of household disposable income (the latter was equivalised by dividing with the squared root of household size). In the tables the 'target' group refers to all households with one widow or widower entitled to a survivor pensioner (although not always currently claiming it), whose labour supply has been modeled.

The size of the male labour supply effect is far too small to singleout any particular trend. In the following discussion we will therefore only focus on the female labour supply. The movement into the labour market is concentrated amongst the females aged between 45 to 55, and to a lesser extent amongst women aged 55 to 65. The strongest movement out of the labour market comes mainly from the widows aged 45 to 55, but the net effect for the latter age group is positive: more than half of the total increase in labour supply is to be expected amongst widows in this age group.

With respect to hourly wage, the biggest positive contribution comes from the medium-

low-skilled i.e. from the widows with imputed or current minimum wage in ranging from above the minimum wage to 12 EUR/hour. In particular more than half the total net increase in labour supply (485 FTE) comes from widows with wages between the minimum wage and 10 EUR/hour. Much of the reduction in labour supply, on the other hand, comes from widows with an hourly wage in the range from 16 to 18 or higher. As seen from figures 4 to 6, this group may be negatively affected by the reform, if the level of the pension is sufficiently high. Otherwise, in case of full time participation, the reform does provide an incentive to reduce labour supply for high skilled widows, as this will now cause only a small reduction in disposable income. As expected, for very high wage levels the incentive to withdraw from the labour market is smaller than for medium-high wages.

It is also interesting to see how the system of incentives provided by the reform varies as a function of survivor benefit. The largest increase in labour supply, in this case, comes from widows with survivor benefits ranging from 6,000 to 14,000 EUR per year. Almost 228 FTE positions, however, come from the group of widows with a survivor pension in the range of 10,000 to 12,000 EUR. Negative responses, i.e. reductions in labour supply, are mainly coming from widows with survivor pensions greater than 14,000 EUR per year.

Finally, when looking at the distribution of the impact by income quintile we see that very little happens in the first quintile. The largest increase in labour supply comes partially from the 4^{th} quintile (+442.6 FTE) and to a lower extent from the 3^{rd} quintile (+249.1). The majority of the outflow, on the other hand, comes from the 5^{th} quintile (-124.8 FTE).

We may therefore broadly identify the characteristics of the survivor pensioner which is most likely to respond positively to the reform: it's a widow, not living with a partner, aged between 45 and 55, with a medium to low hourly wage, but a rather high survivor benefit which places her in the higher end of the income distribution.

The strongest negative effects, on the other hand, are likely to come from elderly medium to highly skilled women (wage ranging from 16 to 18 EUR/hour and above), with high survivor benefit (over 14,000 EUR/year) and household disposable income in the top decile of the distribution.

Finally, table 16 shows how disposable income is modified after the reform and after behavioural adjustments. The column target in the first two panels reports the sum of the households which are affected by the reform in a static framework. In other words it reports the sum of the households which will experience a change in disposable income at their given labour supply. The change in disposable income is then subdivided in 6 brackets $(0, 5]$, $(5, 10]$, $(10, 15]$, $(15, 20]$, $(20, 25]$ and $(25, \infty]$ according to the size of the percentage change in disposable income. Clearly the losers from the reform are concentrated in the upper quintile, and the size of the loss is always less than 10%. The significant benefits (more than 15% increase in disposable income) are spread between the second and the fourth quintile, with the highest concentration being in the third quintile. The very lowest decile is not affected by the reform, according to our data.

The column target in the last two panels has a different meaning than in the two previous panels: it sums up all households which are affected by the reform in some segment of their budget constraint, irrespective of their current labour supply. In other words it is the sum of households for which the system of incentives is modified by the reform. The change in disposable income now includes changes coming from the reform and from behaviour. The structure of the financial gains has a less clear pattern. Mostly, however, the reform affects widows (and widowers) in the second and third quintile positively. Interestingly, when considering behavioural reactions, the first quintile also shows significant increases in disposable income. The strongest reduction in disposable income, on the other hand, are

concentrated in the two top quintiles.

Note that we do not use the behavioural model for a welfare evaluation of the reform. It should be stressed that a priori a decrease in disposable income may be associated with both decreases and increases in the level of welfare, and vice versa. The distribution of financial gains and losses should therefore be interpreted with caution, as a reduction in disposable income does not mean a reduction in welfare, and vice versa.

8 Budgetary Costs

We finally turn to the budgetary costs of the reform. In table 17 we show some budgetary aggregates (employee's and employers' social security contributions, gross social benefits and personal income tax) before and after the reform, as well as after the behavioural reactions.

The cost of the reform is in the order of 22.5 million Euros, if we do not take into account behavioral reactions

The cost of the reform is mainly driven by a net increase in spending on social benefits. Although some households actually lose from the reform, a larger number of households benefit from the redefinition of the thresholds and are now entitled to larger survival benefits. However, income taxation and to a lesser extent social security contributions levied on gross survivor benefits partially reduce the cost of the reform.

However, if we allow workers to flexibly adjust their labour supply to respond to the new system of incentives, the budgetary cost is almost halved: the increase in hours worked generates an increase in gross labour income of about 15 millions Euros, i.e. almost 1,600 EUR/month per FTE. Note that this figure corresponds to an hourly wage of about 9.98 EUR (i.e. the hourly wage of a medium/low skilled worker).

The increase in employment generates an increase in SSCs both of employees and em-

ployers (1.8 and 6.4 million Euros respectively) and a further increase in personal income tax. Moreover, expenditures on gross social benefits will go down once we allow for behavioural reactions: given the less stringent rules for cumulating labour and pension income, in fact, survival pensioners are now ready to lose part of the full entitlement and combine it with income from work. The net effect is a budgetary cost of about 11 million EUR.

Let us recall that these figures are punctual estimates, and we do not provide a confidence interval. These could be generated by bootstrapping from the estimated distribution of the parameters. However, given the size of the movements out of the labour market, it could be reasonably expected that both the employment effect and the budgetary effect are significantly positive. The pool of individuals which could contribute negatively (i.e. reduce their labour supply) is in fact very small and already largely overestimated by our 'conservative' imputation procedure. Assuming somewhat lower reactions amongst non claiming employed widows and widowers and a more or less equal response amongst the survivor pensioners currently not modeled, it is likely that the cost of the reform would be further reduced.

9 Conclusions

The proposed reform eliminates a disincentive to work faced by widows and widowers entitled to a survival pension. Under the current system, a worker has no incentive to supply an amount of hours that would bring his/her labour income over the upper threshold, since this would result in an income loss.

The proposed reform eliminates the income loss, by lowering the withdrawal rate and conditioning the means test on the sum of gross labour income and survivor benefit. Moreover, the upper threshold disappears, thus avoiding a sudden drop of the survivor benefit.

The new budget constraints present a moderate slope in the previous 'trap-range'. Ex ante it is difficult to predict the effects of the reform: it depends on the relative weight of substitution and income effect, as well as on the distribution of the target population over the budget constraint. Survival pensioners supplying labour at full time or over time may indeed decide to reduce their labour supply, without having to suffer an all too large income drop. On the other hand, inactive survival pensioners and survival pensioners which were supplying work at part-time or marginal part-time levels in order not to lose the benefit entitlement, could now decide to increase their labour supply without suffering major income losses.

According to our estimates, the targeted population responds well to the change of incentives. Total hours worked could increase by over 800 units in FTE. This figure is not that impressive in absolute terms, but it should be brought to mind that the targeted population is indeed quite small. Moreover, the budgetary cost of this activation policy is modest (and yet overestimated). Clearly, the reform of survivor benefit can be broadly described as a 'making work pay' policy, in as far as it aims to make work financially more attractive. The cost of these activation policies tends to be very high. Orsini (2006) reviews different activation policies in EU countries. The cost per job created is often in the range of 100,000 to 200,000 EUR/year. In the case of the survivor pension, the cost is just about 13,000 EUR/year. The reform has a positive effect given that the pool of workers which is likely to respond negatively is small: only about 20% of the sample of widows is working more than part-time. In the case of widowers the percentage is much higher, about 66%, but very few will reduce labour supply following the reform. The proposed reform is therefore a good example of how labour supply may be increased with a minor budgetary cost by simply removing disincentives to work built in the tax benefit system.

Recently, the minister decided to postpone the implementation of the reform. On the one hand, in fact, the policy was originally meant to primarily activate survivor pensioners with a low survivor benefit and low disposable income. However, the biggest net effect in terms of labour supply, is clearly not coming from this group. On the other hand, the reform also implies a loss in disposable income for some survivor pensioners. Such a 'political cost' must then be weighted with the potential benefits of the reform in terms of labour supply. Finally, as argued by the minister, survivor benefits need to be profoundly rethought as an instrument of social protection in a society where increasing female employment and family instability are rapidly outdating the single male breadwinner model. The final decision was therefore to propose in the legislation to come, a more ambitious reform of the survivor benefits, to be implemented in the general framework of the individualization of social security rights.

Table 1: Widows and widowers

	Widowers				
	Not weighted		Weighted		
	Number of cases	Frequencies	Number of cases	Frequencies	Average pension[4]
All	1,903	100.00	133,532	100.00	-
Available for work and affected by the reform[1]	235	65.65	11,356	61.66	-
Claiming a survivor benefit					
- Survivor pension (wage earner)	20	5.59	817	4.44	8,087
- Survivor pension (self employed)	1	0.28	34	0.18	6,460
- Survivor pension (civil servant)	5	1.40	199	1.08	10,799
- Survivor pension (not classified)	-	-	-	-	-
Entitled to a survivor benefit[2]	209	58.38	10,306	55.96	
Available for work but not affected by the reform[3]	123	34.36	7,062	38.34	-

	Widowers				
	Not weighted		Weighted		
	Number of cases	Frequencies	Number of cases	Frequencies	Average pension[4]
All	8,548	100.00	596,921	100.00	-
Available for work and affected by the reform[1]	1,516	88.65	75,572	89.31	-
Claiming a survivor benefit					
- Survivor pension (wage earner)	1,006	58.83	49,243	58.19	10,548
- Survivor pension (self employed)	136	7.95	7,547	8.92	6,416
- Survivor pension (civil servant)	184	10.76	8,987	10.62	13,088
- Survivor pension (not classified)	34	1.99	1,605	1.90	10,218
Entitled to a survivor benefit[2]	156	9.12	8,190	9.68	
Available for work but not affected by the reform[3]	194	11.35	9,046	10.69	-

Widows and widowers receiving two or more pensions from different schemes are classified on the basis of the greatest pension.
[1] Individuals affected by the reform are widows and widowers claiming or entitled to a survivor benefit.
[2] Entitlement to a survivor benefit has been imputed to all widows and widowers having a labour income.
[3] Individuals not affected by the reform are widows and widowers not entitled to a survivor benefit.
[4] Average (survivor) pensions are expressed in EUR/year.

Table 2: Sample selection for labor supply model (whole population)

	Males				Females			
	Unweighted		Weighted		Unweighted		Weighted	
	Number of cases	Frequencies	Number of cases	Frequencies	Number of cases	Frequencies	Number of cases	Frequencies
Population	151,806	100.0	4,897,974	100.0	153,213	100.0	5,137,005	100.0
Adults	106,902	70.4	3,845,866	78.5	110,215	71.9	4,131,619	80.4
In working age (18-65)	92,818	61.1	3,132,904	64.0	93,007	60.7	3,098,345	60.3
With flexible labour supply	64,579	42.5	2,197,966	44.9	73,872	48.2	2,464,762	48.0
- Couples[1]	28,555	44.2	914,115	41.6	28,555	38.7	914,115	37.1
- Single males	6,292	9.7	483,044	22.0	-	-	-	-
- Single females	-	-	-	-	8,788	11.9	506,791	20.6
- Males in couple[2]	3,414	5.3	120,467	5.5	-	-	-	-
- Females in couple[3]	-	-	-	-	9,254	12.5	339,586	13.8
- Other	26,318	40.8	680,340	31.0	27,275	36.9	704,270	28.6

[1] Both partners with a flexible labor supply.
[2] Male with a flexible labor supply living with a female partner with a fixed labor supply.
[3] Female with a flexible labor supply living with a male partner with a fixed labor supply.

Table 3: Sample selection for labor supply model (target group)

	Males				Females			
	Unweighted		Weighted		Unweighted		Weighted	
	Number of cases	Frequencies	Number of cases	Frequencies	Number of cases	Frequencies	Number of cases	Frequencies
Target population	226	100.0	11,027	100	1,447	100	72,208	100
Claiming a survivor benefit	17	7.5	721	6.5	1,291	89.2	64,018	88.7
- Couples[1]	1	0.4	51	0.5	99	6.8	3,790	5.2
- Single males	10	4.4	498	4.5	-	-	-	-
- Single females	-	-	-	-	529	36.6	36,438	50.5
- Males in couple[2]	1	0.4	34	0.3	-	-	-	-
- Females in couple[3]	-	-	-	-	57	3.9	2,657	3.7
- Other	5	2.2	138	1.3	606	41.9	21,133	29.3
Not claiming a survivor benefit	209	92.5	10,306	93.5	156	10.8	8,190	11.3
- Couples[1]	32	14.2	1,294	11.7	15	1.0	666	0.9
- Single males	96	42.5	6,216	56.4	-	-	-	-
- Single females	-	-	-	-	85	5.9	5,448	7.5
- Males in couple[2]	17	7.5	691	6.3	-	-	-	-
- Females in couple[3]	-	-	-	-	4	0.3	187	0.3
- Other	64	28.3	2,105	19.1	52	3.6	1,889	2.6

[1] Both partners with a flexible labor supply.
[2] Male with a flexible labor supply living with a female partner with a fixed labor supply.
[3] Female with a flexible labor supply living with a male partner with a fixed labor supply.

Table 4: Descriptive statistics (whole population)

	Singles		Couples	
	Males	Females	Males	Females
Demographics				
Household size	1.34	1.77	3.15	
Children under 3	0.01	0.06	0.21	
Children from 3 to 6	0.01	0.08	0.22	
Children from 6 to 12	0.02	0.18	0.41	
Children from 12 to 23	0.06	0.30	0.29	
Elderly people (65-75)	0.12	0.06	0.01	
Elderly people (over 75)	0.06	0.04	0.01	
Age of male (head)	40.57	-	39.74	
Age of female (head/spouse)	-	41.30	37.44	
Living in Wallonia	35.10	36.17	30.79	
Living in Flanders	47.82	45.08	61.54	
Living in medium cities	47.92	50.25	59.32	
Living in big cities	41.06	40.04	25.24	
Professional Status				
Employee	52.64	43.59	69.48	51.97
Civil servant	11.97	9.01	14.94	8.95
Unemployed	18.40	21.86	7.21	15.04
Inactive	16.99	25.54	8.37	24.04
Self employed	-	-	-	-
Retired	-	-	-	-
Sick or disabled	-	-	-	-
Student	-	-	-	-
Labour supply				
from 0 to 5 hours	36.01	47.22	15.51	36.43
from 5 to 15 hours	3.02	3.30	2.13	3.90
from 15 to 25 hours	5.26	9.16	4.94	14.62
from 25 to 35 hours	12.64	7.92	15.88	15.06
from 35 to 45 hours	41.84	31.80	59.89	29.65
more than 45 hours	1.23	0.60	1.66	0.34

Table 5: Descriptive statistics (target group)

	Singles		Couples	
	Males	Females	Males	Females
Demographics				
Household size	1.61	1.50	2.59	
Children under 3	0.01	0.01	0.07	
Children from 3 to 6	0.05	0.02	0.08	
Children from 6 to 12	0.14	0.10	0.18	
Children from 12 to 23	0.37	0.32	0.23	
Elderly people (65-75)	0.02	0.02	0.00	
Elderly people (over 75)	0.02	0.02	0.02	
Age of male (head)	49.83	-	48.47	
Age of female (head/spouse)	-	53.37	44.77	
Living in Wallonia	27.51	40.27	32.79	
Living in Flanders	66.09	52.07	63.90	
Living in medium cities	52.86	61.08	56.18	
Living in big cities	28.17	26.38	27.35	
Professional Status				
Employee	58.49	22.97	58.89	31.98
Civil servant	33.54	8.19	20.77	7.65
Unemployed	1.36	1.17	10.22	0.96
Inactive	6.61	67.67	10.13	59.42
Self employed	-	-	-	-
Retired	-	-	-	-
Sick or disabled	-	-	-	-
Student	-	-	-	-
Survivor benefit				
Claiming a survivor benefit	7.42	87.12	0.90	67.10
Not claiming a survivor benefit	92.58	12.88	99.10	32.90
Claiming a survivor benefit				
from 0 to 5 hours	89.16	80.68	0.00	88.31
from 5 to 15 hours	0.00	2.95	100.00	0.00
from 15 to 25 hours	0.00	14.10	0.00	11.16
from 25 to 35 hours	6.83	1.44	0.00	0.53
from 35 to 45 hours	4.02	0.82	0.00	0.00
more than 45 hours	0.00	0.00	0.00	0.00
Not claiming (or not entitled to) a survivor benefit				
from 0 to 5 hours	0.82	1.09	18.71	8.40
from 5 to 15 hours	3.02	21.31	3.79	5.49
from 15 to 25 hours	9.36	13.97	3.34	12.76
from 25 to 35 hours	19.37	58.87	20.19	22.12
from 35 to 45 hours	64.11	4.76	53.98	49.89
more than 45 hours	3.31	0.00	0.00	1.35

For single males and single females the labour supply of those not entitled to benefits is zero by construction, since entitlement was imputed in all cases where labour supply income was observed. In the case of couples the labour supply figures include the labour supply of the partners of widows and widowers.

Table 6: Conditional logit estimation : single males

	Log-likelihood				-7218.59
	Number of observations				6292
	Wald ch2				172.36
	Prob>chi2				0.0000
		Coefficient	Std. Error		p-value
α_c	Age of head	-0.0540	0.1896		0.7760
	Age of head squared	0.1081	0.0890		0.2240
	Children under 3	-0.0061	0.0581		0.9160
	Children from 3 to 6	-0.0284	0.0302		0.3470
	Children from 6 to 12	0.0185	0.0242		0.4450
	Elderly children	-0.0227	0.0112	**	0.0420
	Elderly people (65-75)	0.1815	0.0208	***	0.0000
	Elderly people (over 75)	0.2164	0.0299	***	0.0000
	Living in medium city	0.0297	0.0233		0.2020
	Living in large city	0.0587	0.0245	**	0.0170
	Living in Wallonia	0.0371	0.0205	*	0.0700
	Living in Flanders	-0.0024	0.0188		0.9000
	Constant	0.3588	0.1094	***	0.0010
α_{cc}		-0.0042	0.0005	***	0.0000
α_l	Age of head	-0.0679	0.0615		0.2690
	Age of head squared	0.0695	0.0292	**	0.0170
	Children under 3	0.0016	0.0164		0.9230
	Children from 3 to 6	0.0011	0.0101		0.9150
	Children from 6 to 12	-0.0012	0.0073		0.8720
	Elderly children	-0.0149	0.0042	***	0.0000
	Elderly people (65-75)	0.0738	0.0082	***	0.0000
	Elderly people (over 75)	0.0890	0.0117	***	0.0000
	Living in medium city	0.0133	0.0080	*	0.0940
	Living in large city	0.0290	0.0083	***	0.0000
	Living in Wallonia	0.0045	0.0065		0.4900
	Living in Flanders	-0.0199	0.0061	***	0.0010
	Constant	-0.4716	0.0409	***	0.0000
α_{ll}		0.0046	0.0002	***	0.0000
α_{cl}		-0.0018	0.0004	***	0.0000
β	Part-time	0.7975	0.0000	***	0.0000
	Full-time	-0.3305	0.0000	***	0.0000
	Irregular working time	6.0881	0.0000	***	0.0000

*** Coefficient significant at 0.001 level;
** coefficient significant at 0.005 level;
* coefficient significant at 0.01 level.

Table 7: Conditional logit estimation: single females

	Log-likelihood				-9935.43
	Number of observations				8788
	Wald ch2				181.25
	Prob>chi2				0.0000
		Coefficient	Std. Error		p-value
α_c	Age of head	0.5526	0.2166	**	0.0110
	Age of head squared	-0.1400	0.1020		0.1700
	Children under 3	-0.0321	0.0254		0.2060
	Children from 3 to 6	-0.0169	0.0187		0.3650
	Children from 6 to 12	-0.0276	0.0106	***	0.0090
	Elderly children	-0.0100	0.0077		0.1940
	Elderly people (65-75)	0.2026	0.0278	***	0.0000
	Elderly people (over 75)	0.0909	0.0293	***	0.0020
	Living in medium city	0.0083	0.0221		0.7090
	Living in large city	0.0196	0.0231		0.3960
	Living in Wallonia	0.0284	0.0183		0.1200
	Living in Flanders	-0.0125	0.0172		0.4670
	Constant	0.0406	0.1208		0.7370
α_{cc}		-0.0035	0.0006	***	0.0000
α_l	Age of head	-0.0784	0.0602		0.1930
	Age of head squared	0.0927	0.0289	***	0.0010
	Children under 3	0.0272	0.0065	***	0.0000
	Children from 3 to 6	0.0120	0.0049	**	0.0140
	Children from 6 to 12	0.0078	0.0030	***	0.0090
	Elderly children	0.0035	0.0023		0.1300
	Elderly people (65-75)	0.0876	0.0102	***	0.0000
	Elderly people (over 75)	0.0501	0.0111	***	0.0000
	Living in medium city	0.0053	0.0061		0.3890
	Living in large city	0.0106	0.0064	*	0.0950
	Living in Wallonia	0.0123	0.0051	**	0.0160
	Living in Flanders	-0.0142	0.0048	***	0.0030
	Constant	-0.2312	0.0361	***	0.0000
α_{ll}		0.0025	0.0001	***	0.0000
α_{cl}		-0.0020	0.0004	***	0.0000
β	Part-time	1.3170	0.0000	***	0.0000
	Full-time	0.4052	0.0000	***	0.0000
	Irregular working time	5.4908	0.0000	***	0.0000

*** Coefficient significant at 0.001 level;
** coefficient significant at 0.005 level;
* coefficient significant at 0.01 level.

Table 8: Labor Supply Model (couples)

	Log-likelihood				-65077.39
	Number of observations				28555
	Wald ch2				340.2200
	Prob>chi2				0.0000
		Coefficient	Std. Error		p-value
α_c	Age of head	0.2151	0.0675	***	0.0010
	Age of head squared	-0.1347	0.0324	***	0.0000
	Age of spouse	0.6357	0.0645	***	0.0000
	Age of spouse squared	-0.2742	0.0323	***	0.0000
	Children under 3	-0.0324	0.0059	***	0.0000
	Children from 3 to 6	-0.0027	0.0056		0.6330
	Children from 6 to 12	0.0091	0.0039		0.0180
	Elderly children	0.0077	0.0043		0.0710
	Elderly people (65-75)	0.0777	0.0203	***	0.0000
	Elderly people (over 75)	0.0703	0.0257	*	0.0060
	Living in medium city	-0.0079	0.0086		0.3570
	Living in large city	-0.0029	0.0097		0.7680
	Living in Wallonia	0.0382	0.0104		0.0000
	Living in Flanders	0.0170	0.0097		0.0780
	Constant	0.4525	0.0504	***	0.0000
α_{cc}		-0.0043	0.0002	***	0.0000
α_{lm}	Age of head	-0.0222	0.0320		0.4880
	Age of head squared	0.0306	0.0153		0.0460
	Children under 3	-0.0096	0.0022	***	0.0000
	Children from 3 to 6	0.0039	0.0021		0.0620
	Children from 6 to 12	0.0097	0.0015	***	0.0000
	Elderly children	0.0065	0.0017	***	0.0000
	Elderly people (65-75)	0.0502	0.0083	***	0.0000
	Elderly people (over 75)	0.0377	0.0104	***	0.0000
	Living in medium city	-0.0018	0.0032		0.5700
	Living in large city	0.0030	0.0036		0.4040
	Living in Wallonia	0.0031	0.0037		0.3960
	Living in Flanders	-0.0109	0.0035	**	0.0020
	Constant	-0.1461	0.0236	***	0.0000
α_{llm}		0.0027	0.0001	***	0.0000
				***	
α_{lf}	Age of spouse	-0.0456	0.0297		0.1250
	Age of spouse squared	0.0695	0.0150	***	0.0000
	Children under 3	0.0192	0.0021	***	0.0000
	Children from 3 to 6	0.0153	0.0020	***	0.0000
	Children from 6 to 12	0.0181	0.0014	***	0.0000
	Elderly children	0.0141	0.0016	***	0.0000
	Elderly people (65-75)	0.0362	0.0076	***	0.0000
	Elderly people (over 75)	0.0271	0.0098	**	0.0050
	Living in medium city	-0.0012	0.0030		0.6930
	Living in large city	0.0032	0.0034		0.3510
	Living in Wallonia	0.0130	0.0037	***	0.0000
	Living in Flanders	0.0009	0.0035		0.8040
	Constant	0.0239	0.0192		0.2110
α_{llf}		0.0011	0.0001	***	0.0000
α_{clm}		-0.0036	0.0002	***	0.0000
α_{clf}		-0.0023	0.0002	***	0.0000
α_{lmlf}		-0.0005	0.0001	***	0.0000
β_m	Part-time	0.6039	0.0464	***	0.0000
	Full-time	-0.2957	0.0255	***	0.0000
	Irregular working time	5.8808	0.0586	***	0.0000
β_f	Part-time	1.4774	0.0322	***	0.0000
	Full-time	0.1508	0.0193	***	0.0000
	Irregular working time	5.0773	0.1060	***	0.0000

*** Coefficient significant at 0.001 level;
** coefficient significant at 0.005 level;
* coefficient significant at 0.01 level.

Table 12: Change in hours supplied by age bracket

	Males				Females			
Age	Target	Increase	Decrease	Net	Target	Increase	Decrease	Net
age $\leq$ 35	862.0	0.8	6.3	-5.5	2423.0	21.0	17.2	3.8
35 $<$ age $\leq$ 45	2948.0	26.3	14.1	12.1	7467.0	207.6	33.4	174.2
45 $<$ age $\leq$ 55	5252.0	40.5	50.2	-9.7	17388.0	577.4	72.6	504.8
55 $<$ age $\leq$ 64	3300.0	26.6	27.2	-0.7	20256.0	262.2	62.7	199.5

Change in hours supplied is expressed in FTEs.

Table 9: Labor supply elasticity by decile of household disposable income

	Singles				Couples			
Decile	Males		Females		Males		Females	
	Hours	Participation	Hours	Participation	Hours	Participation	Hours	Participation
1	1.288	1.217	0.962	0.8	1.174	0.988	1.326	1.124
2	1.017	0.923	1.232	1.108	0.929	0.755	1.188	0.991
3	0.957	0.833	0.927	0.81	0.76	0.61	1.126	0.929
4	0.955	0.834	0.876	0.726	0.683	0.538	1.088	0.886
5	0.974	0.856	0.921	0.765	0.598	0.462	1.005	0.809
6	0.985	0.859	1.009	0.845	0.501	0.379	0.944	0.737
7	0.928	0.81	1.062	0.898	0.416	0.303	0.848	0.65
8	0.783	0.681	0.967	0.836	0.35	0.248	0.741	0.553
9	0.585	0.504	0.872	0.729	0.275	0.184	0.599	0.443
10	0.264	0.225	0.518	0.422	0.152	0.093	0.395	0.307
Average	0.814	0.724	0.868	0.742	0.509	0.398	0.829	0.667

Participation and hours elasticities were computed numerically, by comparing the expected labor supply after a 1% wage increase and expected labor supply at current wages.

Table 10: Average labor supply elasticity of population targeted by the reform

Singles				Couples			
Males		Females		Males		Females	
Hours	Participation	Hours	Participation	Hours	Participation	Hours	Participation
0.800	0.641	0.906	0.770	0.442	0.306	0.455	0.394

Participation and hours elasticities were computed numerically, by comparing the expected labor supply after a 1% wage increase and expected labor supply at current wages.

Table 11: Predicted change in hours worked and employment rate after the reform

	Singles				Couples				Total all	
	Males		Females		Males		Females			
	Hours	Participation	Hours	Participation	Hours	Participation	Hours	Participation	Hours	Participation
Before the reform										
Total	5,882	6,287	8,729	12,603	4,487	4,847	1,920	2,446	21,379	23,255
Average	22.405	0.630	7.835	0.298	26.227	0.746	11.223	0.376	-	-
After the reform										
Total	5857	6,293	9,512	13,132	4,504	4,857	1,984	2,503	22,209	23,912
Average	22.306	0.631	8.537	0.310	26.324	0.747	11.596	0.385	-	-
Net effect										
Total	-26	7	782	529	17	10	64	57	830	657
Average	-0.099	0.001	0.702	0.012	0.097	0.001	0.373	0.009	-	-

Total hours supplied are expressed in Full Time Equivalent (FTE), i.e. total number of hours divided by 38, the standard number of hours worked in a week in a full time position.
Total participation is expressed in units, i.e. number of individuals in employment.
Average hours represents the average weekly duration of work in the subsample. Average participation represent the share of the subsample in employment.

Table 13: Change in hours supplied by hourly wage bracket

	Males				Females			
	Target	Increase	Decrease	Net	Target	Increase	Decrease	Net
$\bar{w}$	1064.0	13.3	0.0	13.3	23226.0	39.7	0.5	39.2
$\bar{w} <$ w ≤ 10	1784.0	26.5	6.1	20.4	10118.0	508.6	22.8	485.8
$10 <$ w ≤ 12	1848.0	20.5	5.0	15.5	4953.0	331.2	4.7	326.5
$12 <$ w ≤ 14	2621.0	29.4	16.0	13.4	2779.0	93.0	51.6	41.4
$14 <$ w ≤ 16	1141.0	0.5	26.5	-26.1	2072.0	47.4	21.0	26.5
$16 <$ w ≤ 18	857.0	1.5	14.3	-12.8	1939.0	22.4	40.6	-18.2
$18 <$ w	3047.0	2.5	29.9	-27.4	2447.0	25.8	44.7	-18.8

$\overline{w}$ is 2001 legal minimum wage, i.e. 6.92 EUR/hour.
Change in hours supplied is expressed in FTEs.

Table 14: Change in hours supplied by survivor pension benefit

	Males				Females			
	Target	Increase	Decrease	Net	Target	Increase	Decrease	Net
$0 <$ sp ≤ 4000	222.0	2.5	0.0	2.5	2704.0	34.8	0.0	34.8
$4000 <$ sp ≤ 6000	178.0	0.3	0.0	0.3	2293.0	74.9	0.3	74.6
$6000 <$ sp ≤ 8000	7707.0	52.5	84.4	-32.0	7005.0	185.8	12.9	172.9
$8000 <$ sp ≤ 10000	1434.0	0.6	4.5	-3.9	6325.0	156.9	1.3	155.6
$10000 <$ sp ≤ 12000	1750.0	33.0	6.0	27.0	16545.0	352.2	123.7	228.5
$12000 <$ sp ≤ 14000	646.0	2.0	2.3	-0.3	6714.0	173.9	6.7	167.2
$14000 <$ sp	425.0	3.3	0.6	2.6	5948.0	89.7	40.9	48.7

Change in hours supplied is expressed in FTEs.

Table 15: Change in hours supplied by income quintile

		Males			Females		
Quintile	Target	Increase	Decrease	Net	Increase	Decrease	Net
1	2,145	0.0	0.0	0.0	44.1	0.0	44.1
2	6,614	16.1	0.0	16.1	114.8	0.0	114.8
3	14,869	41.7	5.4	36.4	257.9	8.7	249.1
4	19,055	11.3	29.9	-18.6	494.9	52.4	442.6
5	11,565	25.0	62.6	-37.6	156.5	124.8	31.7

Change in hours supplied is expressed in FTEs.
Households with self employed have been excluded.
Equivalence scale is squared root of household size.

Table 16: Change in disposable income after the reform and after behavioural adjustments by equivalent income quintile

		Gainers (before behavioural reaction)					
Quintile	Target	(0,5]	(5,10]	(10,15]	(15,20]	(20,25]	(25,∞]
1	0	0	0	0	0	0	0
2	76	0	50	25	119	51	34
3	834	772	543	354	485	239	412
4	1813	1222	1304	1066	309	309	0
5	2328	2225	945	307	0	51	51

		Losers (before behavioural reactions)					
Quintile	Target	(0,5]	(5,10]	(10,15]	(15,20]	(20,25]	(25,∞]
1	0	0	0	0	0	0	0
2	76	17	0	0	0	0	0
3	834	455	85	0	0	0	0
4	1813	1665	170	76	0	0	0
5	2328	1329	394	206	0	0	0

		Gainers (after behavioural reaction)					
Quintile	Target	(0,5]	(5,10]	(10,15]	(15,20]	(20,25]	(25,∞]
1	9,309	608	206	0	0	0	103
2	10,652	1,287	596	265	51	85	34
3	13,595	4,592	1,991	740	298	393	309
4	18,746	5,466	3,540	569	600	309	103
5	11,514	6,480	1,277	308	153	0	0

		Losers (after behavioural reactions)					
Quintile	Target	(0,5]	(5,10]	(10,15]	(15,20]	(20,25]	(25,∞]
1	2,145	0	0	0	0	0	0
2	6,614	161	34	51	34	0	25
3	14,869	1,628	290	51	0	0	0
4	19,055	2,657	170	308	103	0	0
5	11,565	1,197	452	0	103	206	0

The number of affected households in the first two quadrant refers to the static situation (i.e. the number of households experiencing a change in disposable income at the given labour supply). When allowing for behavioural reactions we consider all households, whose budget constraint is modified, irrespective of their current labour supply.
Equivalence scale is squared root of household size.
Households with self employed have been excluded.

Table 17: Change in budgetary aggregates and in gross labour income after the reform and after behavioural adjustments

	Before the reform	**After the reform**	**After adjustment**
Single Males			
Gross labour income	216,096	216,096	214,529
Employees' SSC	28,337	28,642	28,461
Employers' SSC	49,697	49,697	49,559
Social benefits	52,714	62,783	63,267
Personal Income Tax	61,703	65,447	65,016
Single Females			
Gross labour income	252,187	252,187	268,605
Employees' SSC	76,516	76,807	78,706
Employers' SSC	58,092	58,092	64,007
Social benefits	818,199	828,356	824,833
Personal Income Tax	195,868	195,868	195,868
Couples			
Gross labour income	189,309	189,309	190,815
Employees' SSC	27,787	27,886	28,059
Employers' SSC	50,517	50,517	51,143
Social benefits	96,261	100,009	99,616
Personal Income Tax	56,670	58,136	58,612
Others			
Gross labour income	774,605	774,605	774,605
Employees' SSC	132,009	132,164	132,164
Employers' SSC	216,547	216,547	216,547
Social benefits	625,925	633,359	633,359
Personal Income Tax	252,801	255,591	255,591
Total			
Gross labour income	1,432,197	1,432,197	1,448,553
Employees' SSC	264,649	265,499	267,390
Employers' SSC	374,853	374,853	381,255
Social benefits	1,593,099	1,624,508	1,621,075
Personal Income Tax	567,042	575,043	575,088
Cost of the reform		**-22,557**	**-10,786**

Figure 1: Low wage widow(er)

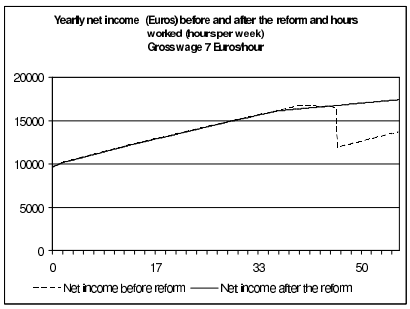


Figure 2: Medium wage widow(er)

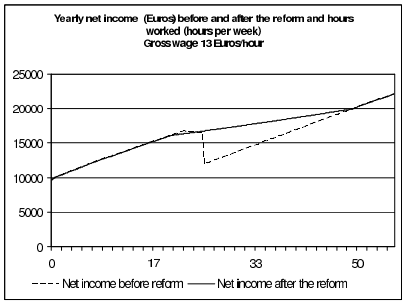
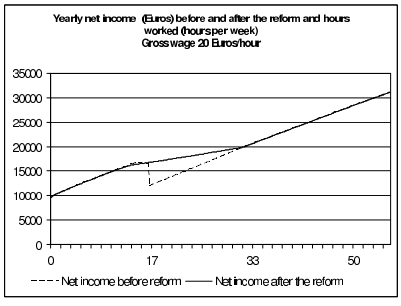


Figure 3: High wage widow(er)



Survivor pension: 10,000 EUR/year, no dependent children. children

Figure 4: Widow(er) with low survivor pension

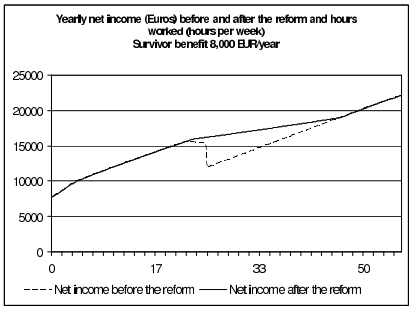


Figure 5: Widow(er) with medium survivor pension

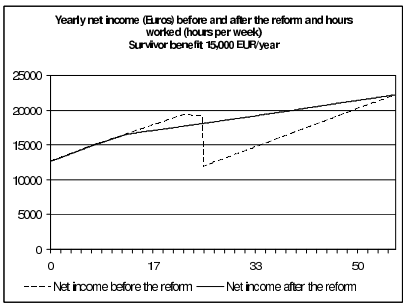
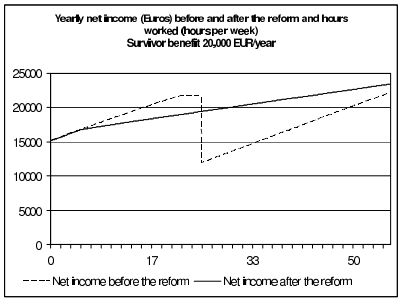
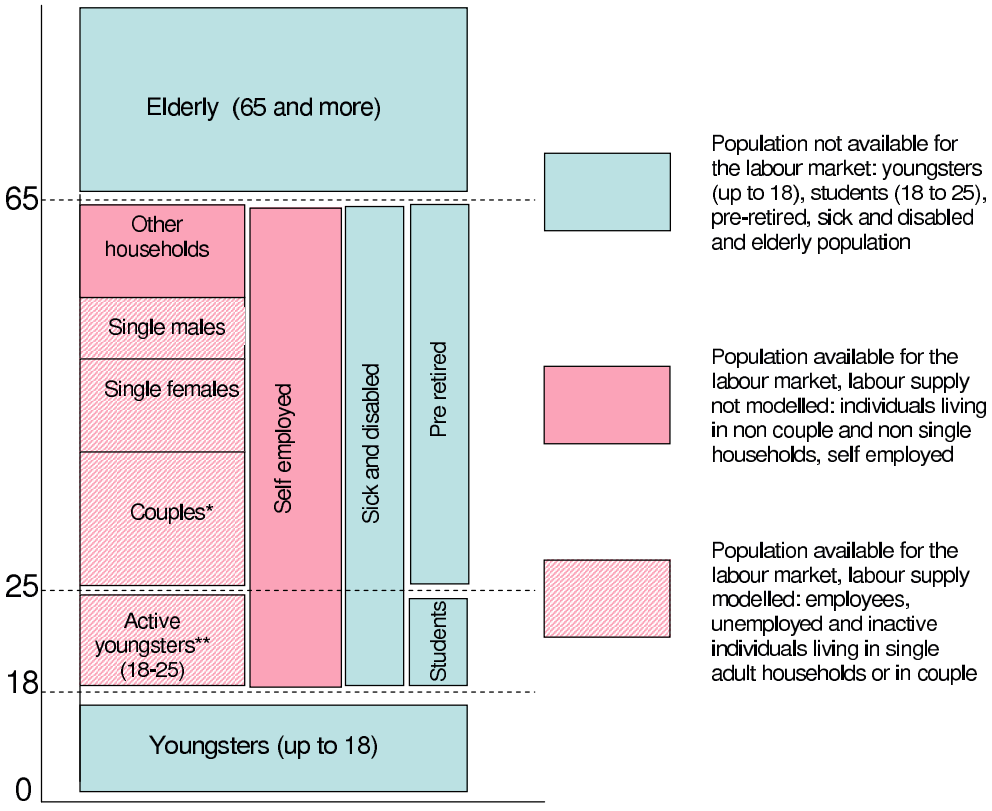


Figure 6: Widow(er) with high survivor pension



Wage rate: 13,000 EUR/year, no dependent children children

Figure 7: Sample selection and modelling strategy



*at least one partner available for the labour market
**only youngsters living as singles or in couple.

Figure 8: Observed and predicted frequencies (Single males)

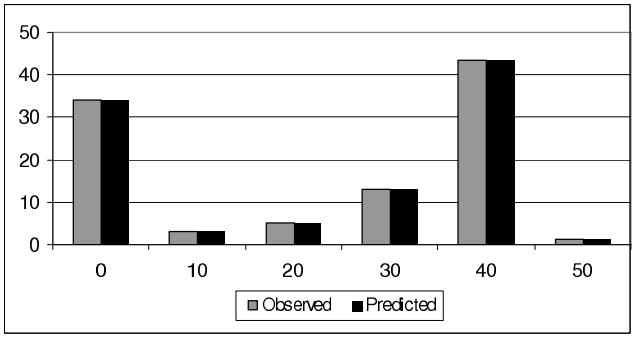


Figure 9: Observed and predicted frequencies (Single females)

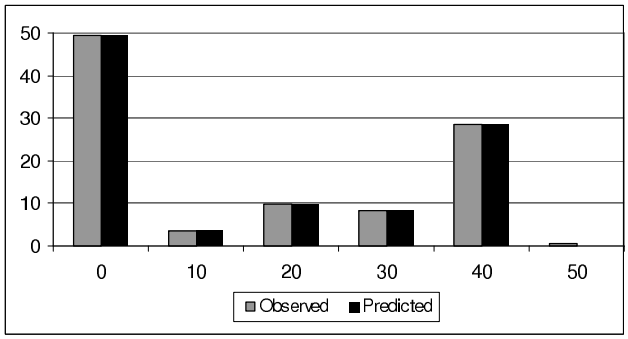


Figure 10: Observed and predicted frequencies (Males in couples - both flexible)

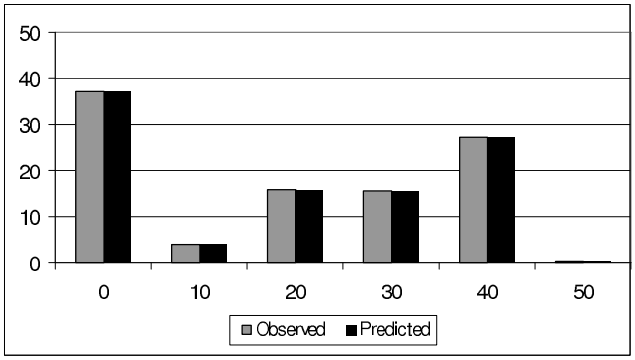
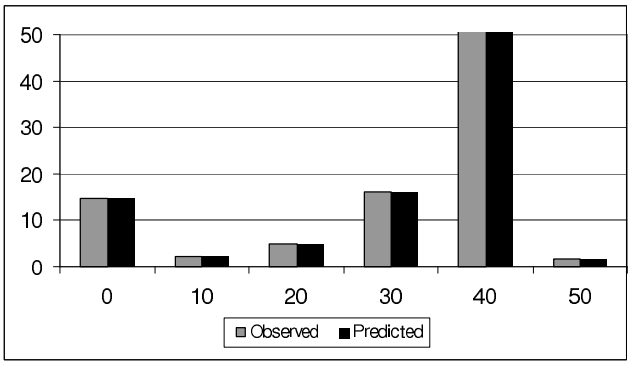


Figure 11: Observed and predicted frequencies (Females in couples - both flexible)



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