Labor Supply and Inequality Effects of In-Work Benefits: Emiprical Evidence from Serbia

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Abstract

The labour force participation rate of the working age population in Serbia in 2012 stood at 64%, while the inactivity rate was considerably above the EU average. There are several studies arguing that high inactivity rates are mostly due to the design of the tax and the benefit system. Our paper provides ex-ante evaluation of the impact of in-work benefit schemes in Serbia on labour supply and income distribution. In-work benefits are means-tested transfers given to individuals conditional on their employment status. For the purpose of this analysis we combine the tax and benefit micro-simulation model for Serbia with a structural discrete choice labour supply model. We simulate two in-work benefit schemes: the first one is a means-tested one on family income while the second one is a purely individualized policy. Our results show that the IWB assessed at the household level encourage the participation of single individuals, while benefit that is conditioned on individual earnings have greater incentive effects than the family-based alternatives since they do not discourage the participation of second-earners in a couple. Most of the behavioural changes take place among the poorest individuals with important redistributive effects.

Key words: in-work benefits, labour supply, discrete choice, inequality, tax-benefit, microsimulation

JEL Classification codes: J21, J22, J64, H24, H31

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1. Introduction

A high labour force participation rate is important for competitiveness, especially with an aging population. Moreover, it is important for political and social stability. This is the reason why the European Union (EU) Lisbon strategy – now replaced by the EU 2020 strategy – sets a target of 75% labour force participation of the population aged 20 to 64. The labour force participation rate of this age group in Serbia in 2012 is at 64%. At the same time, the inactivity rate for the working age population is among the highest in Europe – in the last quarter of 2012 it amounted to almost 40%. The country also faces a high informal employment rate of 22%. Finally, the size of the active population will be under further pressure in the next decade, since its main reservoir, e.g. the working age population, is projected to drop cumulatively by around by 8 percentage points as the baby boomers exit the working age population. In this respect, measures aimed at increasing the labour force participation need to be addressed.

Studies by Arandarenko and Vukojević (2008) and the World Bank (2010) argue that high levels of informality and inactivity in Serbia are mostly due to the specific design of the tax and benefit system. Arandarenko and Vukojević (2008) show that progressivity of the tax wedge is very mild or completely absent between the levels of 50% and 100% of average wage, which is empirically the most dense section of the wage distribution. Specifically, they point out that by enforcing high entry costs (in terms of high minimum mandatory bases for social security contributions payments and modest or entirely missing zero tax brackets for personal income tax), the taxes discourage the formalization of jobs for low-wage labour.

Using the OECD tax-benefit model for Serbia, a recent World Bank (2010) study calculates the so called Implicit Costs of Formalization (ICF) showing disincentives stemming not only from labour taxation, but also from benefit withdrawal due to formalization. ICF measures the difference between the informal income (informal wage and social benefits at the level of no formal wage) and formal net income (formal net wage and social benefits with formal wages) as a share of the informal income. It is therefore the share of informal income that an informal worker has to give up to formalize. A World Bank (2010) study shows that a single person with no children who earns less than the minimum wage in the informal sector has to give up between 40 and 75 percent of income to formalize. A one-earner couple with two children has to give up between 20 and 40 percent of informal income at very low wage levels, and between 40 and 55 percent of informal income at wage levels between 10 and 100 percent of average wage.

Our research combines the tax and benefit micro-simulation model for Serbia (SRMOD) with a structural labour supply model in order to simulate the introduction of in-work benefits and to evaluate their effects on labour supply incentives and income distribution. In-work benefits (IWB) or making work pay (MWP) policies are means-tested transfers given to individuals conditional on their employment status. They have become popular in many European countries trying to promote employment, particularly among low-paid workers. Inspired mainly by pioneering measures introduced in the U.S. and the U.K. with the Earned Income Tax Credit (EITC) and the Working Family Tax Credit (WFTC), the objective of an in-work benefit is to redistribute income to low-income groups while also creating additional work incentives. Another advantage of these policies is that they encourage formality, not only by a reduction in the tax wedge, but also by encouraging wage earners to report their taxes. Following Figari (2010), as an example, we simulate family-based policy in Serbia using the British WFTC.

Building on the existing knowledge on the design of IWB policies, the contribution of our research is twofold. First, we aim to provide empirical evidence about potential effects of in-work benefits from a perspective of a transition country, where the analysis thus far has been limited. For example, studies like Leppik (2006) and Leibfritz (2008) give an overview of the IWB policies implemented in the OECD countries and predict their impact on countries in transition based on the similarities between the former and the later group of economies. Most evaluations of employment and distributional effects of IWB have been done for Western European countries and the United States. Recently, following the policy debate on the effectiveness of in-work benefits for an increasing female labour participation rate in particular, a number of studies has emerged for Southern European countries, most of them being done for Italy (Figari 2010; 2011, De Lucca, Rossetti and Vuri, 2012.). Given that in-work benefits might be one of the instruments to enhance the economic position of working poor and to increase women's employment, but also to help protect the income of the families in a period of economic downturn, this paper tests the effects of IWB for Serbia.

Second, bearing in mind that the success of certain policies in some countries does not guarantee that the same would work in others, our design of in-work benefits would mirror the characteristics of the labour market and the tax and benefit system in Serbia. In other words, we intend to adapt the research in developed economies to the particular situation in Serbia. The advantage of our approach is that, by using a micro-simulation model, we are not only able to experiment with a particular policy design but also to take into account the interplay between the IWB policies and other tax and benefit schemes which determines, among other things, the success of these policies.

2. Tax and Benefit System in Serbia: Why Work at Low Wage Levels Does Not Pay?

Serbia is a country with a troubled labour market situation. The employment rate of 46.4% is far below the EU average, while the unemployment rate of 23.1% is among the highest in the region and is considerably higher than that recorded an average in the EU-27 (10.9 %). Lower employment and increasing unemployment rates point to high flows from activity to inactivity, especially for women, young people and workers at the fringe of the labour market.

Inactivity rates in Serbia are particularly high among low-educated individuals. A recent study by Arandarenko et al. (2012) showed that inactivity rates for those with primary education (50.9%) are significantly higher than for those with secondary (32.1%) and tertiary education (20.4%). At the same time, women with a lower educational attainment are in a particularly difficult labour market position. On average, they have 19 percentage points higher inactivity rate and a 2 percentage points higher unemployment rate than men. The highest differences among men and women are to be found for those with the lowest level of education (Table 1). The lack of working experience is an additional contributing factor to high unemployment and inactivity rates, and again especially for women. For example, 55% of women among those who are inactive and with primary education have no working experience.

Table 1: Inactivity and unemployment rates by level of education and gender (%)*

	Inactivity rate		Unemployment rate	
Level of education	Men	Women	Men	Women
Primary	32.4	64.4	21.5	25.1
Secondary	24.5	40.9	22.4	26.5
Tertiary	18.0	22.4	15.5	14.2

*for working age population (15-64 years)

Source: LFS, 2011

Low-education attainment coupled with a lack of work experience generates low earnings capacity in the labour market. When earnings or potential earnings are low, incentives to seek employment or stay in employment are usually limited. Incentives problems are aggravated by high tax burdens on labour income and by cuts in social benefits designed to provide at least some safety-nets for those with no, or very low income (Immervoll and Pearson, 2009).

This section provides a closer investigation of the Serbian tax and benefit system, which will suggest that those taking up low-paid employment often see that a large part of their gross earnings is consumed by income taxes, social contributions and/or reduced social benefits.

Compared to other Western Balkan countries, the tax wedge in Serbia, defined as the difference between labour costs and take-home (net) wage of workers, is average at higher wage levels, but high at lower wage levels (Table 1). A relatively high labour tax

burden for low-paid employees is due to several reasons. The most important one is the existence of mandatory minimum base for social security contribution (SSC).[1] The minimum base is set at 35% of the average wage and given that it is not adjusted for hours actually worked, it implies that low-paid part time workers are also subject to it.

Additionally, the labour tax reform which was introduced in 2001 brought the abolishment of fringe benefits. The two most important benefits of this kind were food allowances (paid monthly) and an annual leave (called 'regres'). Given that both fringe benefits were untaxed and paid in equal amounts to each worker, the abolishment of these benefits contributed to the regressive character of the labour tax system which was in effect until 2007 (Arandarenko and Vukojević, 2008). In 2005, the tax wedge was at 47.1% of the total labour costs and at 50% of the average wage, but 42.2% for a person earning an average wage. In 2006, the mandatory minimum SSC base was reduced from 40% to 35% of the average wage making tax wedges constant across wage levels, as can be seen in Table 2.

Table 2: Comparison of the Tax Wedge in Serbia, the Western Balkan Countries and the EU

% of the average wage		50%	67%	100%	167%
Country	**Year**				
Serbia	2006	42.3%	42.3%	42.3%	42.3%
	2007	37.6%	38.4%	39.2%	39.7%
Albania	2006	34.1%	27.9%	28.9%	29.8%
Montenegro	2007	36.3%	38.6%	40.9%	42.8%
BiH Federation	2006	30.6%	29.3%	32.3%	35.3%
R. of Srpska	2007	31.7%	31.6%	32.5%	33.2%
Macedonia	2007	41.2%	37.8%	38.6%	39.2%
EU-27	2008		37%	40.6%	45.1%
EU-15	2008		38.1%	42.4%	47.6%
NMS-12	2008		35.6%	38.5%	42%

Note: tax wedge for a single person as a percent of total labour costs
Source: Data for Macedonia, Serbia, Albania, Montenegro and Bosnia (Leibfritz, 2008). Other data from Mojsoska Blazevski (2011)

The latest changes to the labour tax system took place in 2007 when the personal income tax rate was reduced from 14% to 12% and a zero tax bracket (up to 5000 RSD, or 15% of the average wage) was introduced. However, the burden on labour did not change considerably given that the social security contributions dominate the tax wedge.[2] The comparison with other Western Balkan countries, given Table 1, shows that

[1] This is a peculiar feature of the social security contribution systems in the Western Balkan region. The most drastic example is Macedonia, where the mandatory base is set as high as 50% of average wage.
[2] In 2001 contributions were set at 32.6% of the gross wage, equally split between employers and workers. The first increase in mandated contributions occurred in 2003 with an increase of 1 percentage point. The next modification was done in 2004 and currently the overall social security tax rate amounts to 35.8% of gross

for a single worker, who earns only half of the average wage, the tax wedge in Serbia is at about 38%, with only Macedonia having a higher tax wedge at this wage level. The tax wedge increases by only 1.6 percentage points going from 50% to 100% of the average wage.

For a country with such a high tax wedge for low-wage earners we would expect a less progressive labour taxation. However, especially low progressivity of the labour tax system in Serbia stands out. In most countries labour taxes increase significantly with the wage level and for many countries by over 10 percentage points between 33% and 100% of the average wage level. In Serbia, however, labour taxes increase by only 2.6 percentage points in the same range of the average wage level (Koettl, 2010).

Looking at the evolution of informality in the Serbian labour market, Krstić and Sanfey (2011) found that between 2002 and 2007, informal employment rates rose despite strong economic growth and improved business climate in the country. The authors argue that one possible reason for this unexpected result is the regressive character of the labour tax system that was introduced in 2001 and that was applied until January 2007. The incentives to join the formal economy were diminished for both workers and employers.

Besides labour taxation, the social benefits design is another piece in the puzzle necessary to explain the high levels of inactivity and informality among the working age population in Serbia. Once a person has a formal income on his records, major income-tested benefits, social assistance and child allowance in particular, will be decreased for the total amount of earned income or completely withdrawn. In their study on inactivity in the Serbian labour market Arandarenko et al. (2012) show that a person receiving social benefits does not have an incentive to search for a job offering a salary below 20% of the average gross wage (this is equivalent to a part-time job offering at an hourly wage at the minimum wage level). Mainly due to the mandatory minimum social security contributions base, net income for this individual becomes equal to the amount of social assistance benefit. Therefore, the so-called mini-jobs and midi-jobs (mainly part-time jobs) are not economically attractive for low-wage earners.

3. In-work Benefits: Objectives, Features and Evaluation Results

A desire of policymakers to address the problems of economic exclusion, high unemployment and low pay of the low-skilled has renewed interest in the use of the tax and benefit systems. While the basic problems and policy objectives are broadly similar, countries have followed two different routes in their policy interventions, depending on

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wage: 22% for old age, disability and survivors pensions, 12.3% for health insurance, and 1.5% for unemployment insurance.

their initial situation. Those countries most concerned with a high unemployment of the low-skilled workers have focused on measures increasing their labour demand without lowering their wages. On the other hand, countries with a high incidence of low pay have concentrated on re-distribution of income in their favour. In both cases, people with a low earnings capacity will have greater incentives to participate in the labour market in the first place.

Measures directed at increasing the income of persons with a low earnings capacity have centred on the introduction of in-work benefits or "making work pay" policies. IWBs are designed to create a significant gap between the incomes of people in work compared with the incomes that they would have if they were out of work. These policies encourage the entry into the labour market, but also ensure a higher living standard of low-income individuals and help to reduce poverty. Additionally, IWB schemes contribute to higher formality by reducing the labour tax wedge and also by encouraging wage earners to report their taxes.

The introduction and expansion of IWB in European countries has been inspired by the Earned Income Tax Credit introduced for the first time in the United States and the Working Family Tax Credit in the United Kingdom. The main motivation for the introduction of these policies in Europe and North America during the early 1990s, were the low levels of employment, experienced by certain specific demographic groups of working age (Blundell, 2006). For example, one central stimulus for the WFTC in the U.K. was the stubbornly low levels of labour market attachment of single mothers and women with low educational attainment, at a time when for other women, labour force attachment was on an increasing path. Another distinguishing characteristic of the U.K. labour market over this period was a growth in workless couples with children.

At the moment, 16 out of 30 OECD countries have one form or another of employment-conditional benefit schemes and several other countries are actively considering their introduction, including Austria and OECD accession countries (Chile and Israel), (Immervoll and Pearson, 2009). Even though there are differences among countries in the design of the IWB, all employment-conditional measures use at least one of the following criteria to assess eligibility and determine the amount of benefit: having children, working minimum number of hours, and receiving income from work or entering/switching employment. Most of these benefits are proportional to gross income up to a maximum amount and are – after a threshold – gradually withdrawn. In other words, they are characterized by the gradual phase-in and phase-out brackets as a mean of targeting individuals with specific earnings levels or working hours.

A more important aspect in the design of in-work benefits is the choice of the unit used to assess income (Orsini, 2006; Orsini and Bargain, 2006). In some countries eligibility for benefits is assessed at the household level while in other countries it is focused on individuals. Family benefits, such as the EITC and the WFTC, depend on the household size and are mean-tested on the family income. Previous applications of these

measures show that they are introduced when distributional objectives are of particular importance. However, while the IWB assessed at the household level encourage the participation of single individuals, it often discourages the participation of second-earners in couples, most of them being women (Eissa and Hoynes, 1998). Yet, in certain cases, family benefits can have both redistributive and incentive effects. This is the case for lone parents that constitute a large group of poor households (Orsini and Bargain, 2006).

Measures that are conditioned on individual earnings only are usually of smaller amounts and targeted at a larger number of recipients. Research shows that these policies have greater incentive effects than the family-based alternatives since they do not discourage the participation of second-earners in a couple (Orsini and Bargain, 2006; Blundell et al., 2000)

Most evaluations of labour supply effects and distributional effects of the IWB policies in European countries are *ex ante* evaluations based on a behavioural micro-simulation framework. Blundell et al. (2000) estimated first labour supply preferences on data not affected by the policy reforms, which were then used to simulate the impact of the introduction of the WFTC. The authors predicted an increase in the labour market participation rates for lone mothers and a small decline in labour market participation amongst women in couples. No net effect on the labour market participation rates of men in couples was found.[3]

Bell (2005) attributed a decline in child poverty between the fiscal years of 2002 and 2003 and 2003 and 2004 to the introduction of the WTFC programme. Brewer (2006) also noted that the programme reduced the number of families in poverty. St Martin and Whiteford (2003) estimated that the WFTC programme produced about 100,000 new jobs, while the cost of this policy was about 1% of GDP.

Using the microsimulation tax and benefit model for the European Union (EUROMOD), Orsini and Bargain (2006) simulated the British Working Family Tax Credit scheme and the individualized wage subsidy scheme for Finland, France, and Germany, countries which experienced severe poverty traps. They found that participation of married women declined in all three countries, especially in France. This effect was only partially offset by a positive impact of the reform on single women's labour supply in Finland and in Germany. Individual wage subsidy encouraged married women to take up a job, especially in France and Germany. In these two countries, an individual transfer contributed positively to the objective of social inclusion, understood as the maximization of transitions into work. In Finland however, the effects were extremely low, which was mainly due to the relatively small labour supply elasticity in a country where female participation was already high. Both the family-based tax credit

[3]For the evaluation of the EITC see: Scholtz (1994, 1996), Eissa and Hoynes (1998), Eissa and Liebman (1996), and Meyer and Rosenbaum (2000).

and the individual wage subsidy achieved significant poverty reduction in France and, to a lesser extent, in Germany.

Saez (2002) showed that in-work benefits may be optimal income transfers when an individual's choice is whether or not to work, rather than varying the number of hours worked. Saez (2002) shows that in this case, in-work benefits were more efficient than guaranteed income support schemes.

Positive evidence of redistributive effects and social inclusion of low skilled workers in the Anglo-Saxon welfare systems encouraged other countries to study the feasibility of implementing of such policies. A number of studies have questioned whether these policies might be one of the pillars of redesigned welfare systems of the Southern European countries (Baldini et al., 2002; Owens, 2006).

Several papers emerged focusing on a country like Italy which is characterized by low labour market participation of less educated and unskilled women, high in work poverty, lack of employment support programs, high marginal tax rates on earned incomes, and a widespread cultural tradition of married couples with male breadwinner (Colonna and Marcassa (2011), Figari (2011), De Lucca, Rossetti and Vuri (2012)). All studies use the same modelling framework - behavioural micro-simulation models. Figari (2011) finds that family in-work benefits lead to an average increase of female labour supply of 3 percentage points. The individual in-work benefit has even stronger incentive effects for women in couples who see their labour supply rising by 5 percentage points. Most of the labour supply reactions induced by the in-work benefits take place among the poorest individuals with important redistributive effects. Similar results, especially for couples with children and at the bottom of the disposable household income distribution are found in De Lucca, Rossetti and Vuri (2012). Colonna and Marcassa (2011) show that the working tax credit boost the participation rate, with the effects being concentrated on unskilled and low educated women.

4. Methodology: Behavioural Microsimulation Model, Data and Policy Reform Design

4.1 Model and Data

In order to analyse the potential effects of policy measures on labour supply incentives and income redistribution, this paper combines the tax and benefit micro-simulation model for Serbia(SRMOD) with a structural discrete choice labour supply model[4]. The tax and benefit microsimulation model allows us to reproduce the budget constraint for each household, i.e., the latent set of working hours and household

[4]The main advantage of using discrete-choice instead of continuous labour supply models comes from the possibility of accounting for taxes and benefits, i.e., non-linear and non-convex budget sets (Van Soest, 1995), which is why these models have been used extensively for an ex ante evaluation of hypothetical tax and benefit reforms.

disposable income alternatives, while the labour supply model rationalizes observed behaviour.

SRMOD is based upon the EUROMOD platform (tax and benefit micro-simulation model for the European Union)[5]. Similar to other microsimulation models, SRMOD is a tax and benefit calculator based on micro-data on income, earnings, labour force participation as well as socio-demographic variables. It enables the computation of social contributions, direct taxes and transfers to individuals and households, and further calculation of household disposable income, replacement rates, and effective marginal tax rates. Database used in the model is the Living Standards Measurement Survey (LSMS), a nationally representative survey, conducted by the Statistical Office of the Republic of Serbia in cooperation with the World Bank. LSMS data are from 2007 and contain detailed socio-economic information for 17,375 individuals living in 5,575 households.

In this paper, we make two discrete choice labour supply models. The first model estimates preferences in the sample of singles and the second one in the sample of couples. When estimating preferences of couples, working hours of the second person in the household are set to zero. Discrete choice labour supply models are based on the assumption that a household can choose among a finite number J+1 of working hours (J positive hours and non-participation). Each hour j=0,...,J corresponds to a given level of disposable income, I_{ij} and each discrete bundle of working hours and income provides a different level of utility. In other words, the utility of a household *i* making the choice j, V_{ij}, is given by:

$$V_{ij} = U\left(Hf_{ij}, Hm_{ij}, I_{ij}, Z_i\right) + \varepsilon_{ij}$$

The deterministic part of the utility function - U_{ij}, depends on the spouses' working hours Hf_{ij}, Hm_{ij},, disposable income I_{ij} as well as on a vector of Z_i households characteristics (age, gender, education level of the household members and parenthood). For a couple, choices j= 0,...,J correspond to all combinations of the spouses' discrete working hours. We assume that each partner may work 0, 20, or 40 hours, corresponding to non-participation, part-time, and full-time employment. This set of working hours implies that a couple can choose among nine alternative working hours combinations. Each alternative is characterized by a triplet of disposable income and working hours of female and male partner.

Disposable income, I_{ij}, is the sum of female and male net labour income, other, non-labour income of the household (capital income, lottery winnings etc), pensions and social benefits; i.e.:

$$I_{ij} = wf_{ij} * Hf_{ij} + wm_{ij} * Hm_{ij} + y_i + P_i + B_{ij}$$

[5]More details on SRMOD are provided in Ranđelović and Žarković-Rakić (2013).

The first part of the above formula $wf_{ij} * Hf_{ij} + wm_{ij} * Hm_{ij}$, is net labour income (gross income minus taxes and contributions), which is dependent on the choice j of female and male working hours ($Hf_{ij}$and Hm_{ij}) and their respective hourly wage rates ($wf_{ij}$and wm_{ij}) and thus is different across households and choices. In the second part of the formula, non-labour income y_i (such as capital income), and pensions P_i are not dependent on the choice j of a working hours. Given that social benefits are means tested, they depend on the choices of j. The disposable income I_{ij} is the main output of the tax and benefit calculator, SRMOD.

When estimating a discrete labour supply model, for inactive and unemployed workers in the sample hourly wage is not observed. Predictions from Heckman selection model are used (Heckman, 1976; 1979) to impute hourly wages for males and females supplying zero hours. We then use SRMOD to calculate their labour income corresponding to a discrete set of working time alternatives (inactivity, part-time and full-time).

Once disposable income I_{ij} is obtained for all the choices (j) and all the individuals (i, both non-employed and employed), a maximum-likelihood estimation is applied on a conditional logit function in order to estimate preference parameters of the utility function. Labour supply effects are estimated by comparing the predicted probability of each choice under the pre-reform and post-reform conditions.

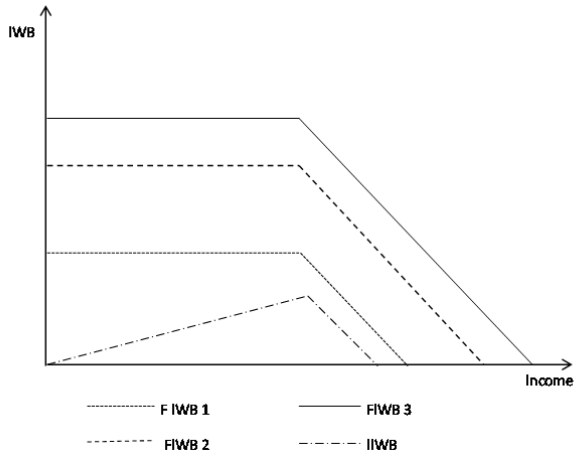
The sample for Heckman wage estimation and the labour supply model consists of 5,078 persons: 1,992 single persons and 3,086 individuals in couples . We drop those under 18 and over 64 years of age, students, pensioners, persons with disability and women on maternity leave from the sample since their labour supply is not flexible.. Finally, we drop those who are self-employed since it is reasonable to assume that for employed individuals in the sample, the employment decision and the number of hours worked per week are the channels through which they respond to tax reforms, while for self-employed hours of work and employment are not the important margin of response.

4.2. Policy Design

Although the most OECD countries apply some sort of IWB, the U.S. Earned Income Tax Credit and the British Working Family Tax Credit are the most commonly analyzed and discussed. The British scheme of in-work benefit is recently considered as a potential model to be imported in the Southern European countries in order to support labour market participation of women and poor households (Owens, 2006; Figari 2010)

Given the pioneer role of the British experience in these policies, we simulate the family based in-work benefit using the UK Working Family Tax Credit as an exemplar and borrowing its structure..

Figure 1: Structure of hypothetical in-work benefits in Serbia



Depending on the structure of the family, there are three types of family IWB (FIWB) (Figure 1). We also simulate individual IWB (IIWB), taking into account only the income of the individual

The first family based IWB scheme ("FIWB 1") refers to the case of a single person working full time. According to the proposed scheme, this person is entitled to a benefit in the amount of RSD 80 thousand per year, until the income exceeds an upper limit (of RSD 190 thousand). After this threshold, the benefit is being phased out at a rate of 0.37.

The second family based IWB scheme ("Family FIWB2") is related to lone parents and couples working part time (lone parents and couples with children working at least 16 hours per week and couples without children working at least 30 hours per week). In case they earn less than RSD 210 thousand per year, they are entitled to a full annual benefit of RSD 100 thousand, which is being phased out at a rate of 0.37 when the total income exceeds the threshold.

The third family based IWB scheme ("FIWB 3") relates to lone parents and couples working full time (40 hours or more, per week). They are entitled to a full benefit of RSD 120 thousand if their income is below the threshold of RSD 230 thousand. When the income exceeds this ceiling, the benefit is gradually phased out at a rate of 0.37.

In order to have working incentives not only for people with low earnings, but also for people with low hourly wages, an individual based benefit scheme - IIWB is created. IIWB treats all the workers in the same manner regardless of their family status. Namely, all individuals working at least 16 hours per week and earning income below RSD 255 thousand per year are entitled to this wage subsidy. IIWB is not linear, as in the case of family based FIWB, but is being phased in at a rate of 0.36, reaching a maximum

amount at an income level of RSD 172 thousand, when gradually phasing out at a rate of 0.37.

In the analysis, the ratios between the thresholds of eligibility and the maximum amounts of the benefit is determined through iterative simulations in order to simulate a benefit which costs 0.14% of contemporary Gross Domestic Product. This is equivalent to existing expenditures on major monetary social assistance programmes in Serbia.

5. Results

5.1 Heckman wage equation, utility function and labour supply elasticities

The estimated coefficients of the Heckman wage and selection equations are presented in Table A1 in the Appendix. The coefficients have the expected signs and magnitudes. The selection bias is present in the sample for women, but not in the sample for men. This means that female selection into the labour force is not random and it depends on factors such as education, number of children younger than three and between three and six years, marital status, whether a partner works or not[6].

The parameter estimates for the utility function are shown in Tables A4 to A4b in the Appendix. Utility functions determine the marginal utility (disutility) of income and hours of work taking into account the preference heterogeneity captured by the demographic characteristics (age, education and parenthood) and the fixed costs of working. Our results indicate a positive and diminishing marginally utility of income, and increasing negative marginal utility of hours worked. The same trend in marginal utilities is observed for singles (both men and women) and for couples. The results further show that the marginal utility of income decreases with age (at diminishing rate) for singles and with the level of education for both singles and couples. On the other hand, marginal disutility of working hours is increasing with age and level of education for both singles and couples. Furthermore, parenthood has low impact on preferences of singles due to small sample size of single mothers and fathers, while it increases the utility of income and decreases disutility of working hours for couples.

Starting from the estimated utility function, we have calculated the labour supply elasticities (both at extensive and intensive margin). Elasticities are obtained by increasing the gross hourly wage by 1% under the pre-reform tax-benefit system, simulating the changes in the participation rate and in the average number of working hours.

[6]The results are robust to the changes of the sample of the non-employed (unemployed vs inactive) and the exclusion of the informal employment. The robustness checks are available at request.

Table 3: Hours of work and participation elasticity for singles and couples

	Singles			Couples		
	Total	Females	Males	Total	Females	Males
Hours elasticity	0.511	0.435	0.631	0.329	0.432	0.268
Participation elasticity	0.478	0.404	0.592	0.307	0.409	0.245
N	1,992	915	1,077	3,086	1,543	1,543

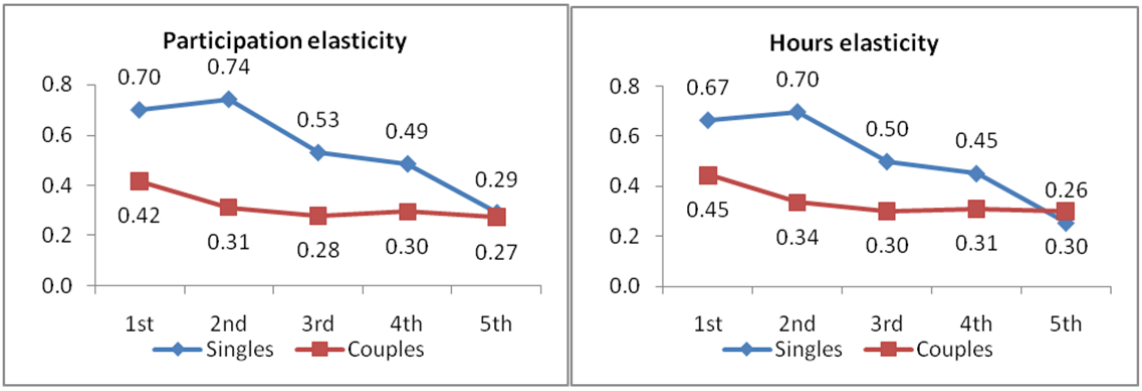
Estimated elasticities are presented in Table 3. For single women elasticities are slightly lower, while for men higher than elasticities found in other countries. Meghir and Phillips (2010) summarize the relevant empirical estimates of the labour supply and report a range of participation elasticities for single women going from 0.65 to 1.41 and elasticity close to zero for highly educated single men, and elasticity of 0.23 for low skilled single men.

For individuals in couples the results are in accordance with expectations: *i)* women have higher labour supply elasticity than men, which is due to traditional role of men as primary breadwinner (this is particularly the case in traditional societies), *ii)* men in couples have lower labour supply elasticity than single men, which is also related to the role of primary earner, but also the consequence of increase in fixed living costs after formation of the family.

In general, estimated elasticities for individuals in couples in Serbia are lower than the range of estimated elasticity in other empirical studies for developed countries (e.g. Meghir and Phillips, 2010) find labour supply elasticity of married men of 0.43). A lower elasticity in Serbia, compared to developed countries can be partly explained by the fact that total unemployment in Serbia is much higher which creates a large pool of individuals looking for a job, making workers more inelastic in terms of their labour supply.

According to the optimal taxation literature, IWB can be considered as optimal transfers when labour supply elasticities are large (Brewer *et al.*, 2010). Our results suggest that both participation and hour elasticities are higher at lower income levels, the difference across income levels being particularly significant for single persons. Such a result could be explained by a larger prevalence of income effects over substitution effects for low income earners.

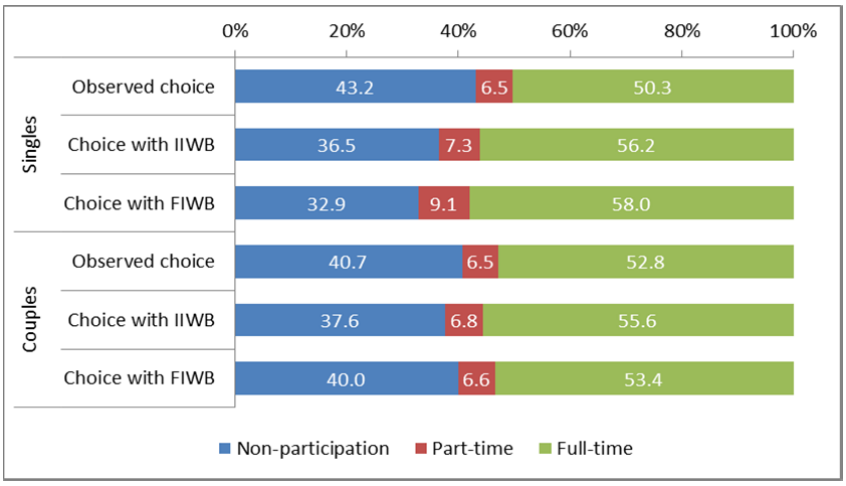
Figure 2: Labour market participation choices without and with IWB per quintiles



5.2 Labour supply effects of in-work benefits

Starting from the estimated preferences in the utility function and the simulated changes in disposable income due to the introduction of in-work benefits, the changes in probabilities associated with different labour supply choices (non-participation, part time and full time) have been evaluated (Figure 3).

Figure 3: Labour market participation choices without and with IWB



Both IIWB and FIWB schemes would trigger a decline in non-participation of single persons, the effects being larger in case of FIWB (non-participation would decline by 10.2 pp), then in case of IIWB (fall in non-participation by 6.7 pp). Under both schemes the most newly activated individuals would opt for full time employment, while only limited number of them would switch from inactivity to part time employment.

Although both IIWB and FIWB programs would also yield positive effects on labour market participation of individuals in couples as well, the effects on labour supply of this subgroup would be smaller than in case of single persons. Thus, IIWB scheme would trigger decrease in non-participation of coupled individuals by 3.1 pp, while FIWB would lead to decline in inactivity by 0.7 pp. These results imply that IIWB

scheme would be more efficient in reducing non-participation of persons in couples, while FIWB would be more useful in tackling the issue of inactivity of single individuals. The difference in labour supply effects of IIWB and FIWB for these two subgroups is the consequence of the difference in design of these policies.

Since IWB schemes are also aimed at reducing poverty, the effects of hypothetical IWB schemes in Serbia are observed separately for low income population (those in the 1st quintile) and for high income individuals (those in the 5thquintile).

Figure 4: Labour market participation choices without and with IWB – 1st quintile

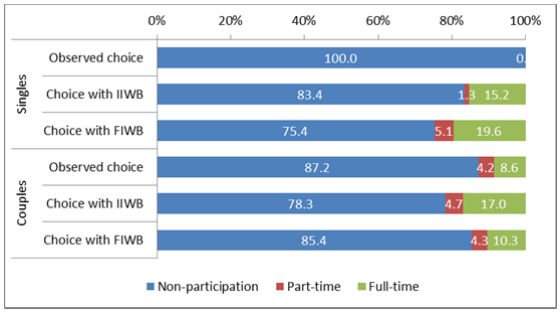
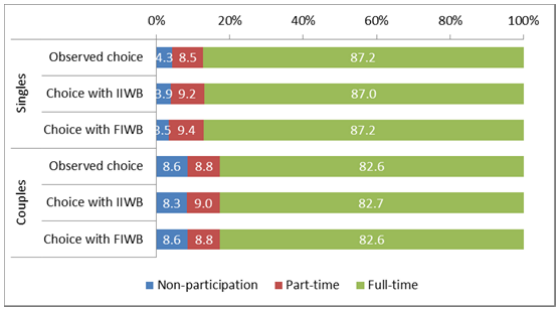


Figure 5: Labour market participation choices without and with IWB – 5th quintile



The results presented in Figure 4 and Figure 5 show that both IWB schemes would considerably boost labour market participation of the people from the first quintile. Before the introduction of IIWB, no single individuals from the bottom quintile have participated at the labour market, while after the introduction of IIWB 15.2 percent of them would switch from non-participation to full-time employment, while 1.3 percent of them would opt for part time employment. In case of an FIWB the labour supply effects on the bottom quintile individuals would be even larger – 19.6 percent would switch to full time employment and 5.1 percent to part time employment. On the other hand, both IWB schemes would have practically no effect on the participation of singles from the fifth (top) income quintile.

The results are to certain extent similar for people in couples both IIWB and FIWB schemes would be more efficient in reducing non-participation of those at the bottom of income distribution, then for those at the top. As in the case of single individuals, the most of those who become active in searching for a job would opt for full time employment. Similarly to the overall analysis, IIWB would be more beneficial than FIWB in stimulating labour supply of low income married individuals, since it would lead to decline in their non-participation by 8.9 pp, while the effects of FIWB would be smaller (decline in non-participation by 1.8 pp). This is particularly important bearing in mind the fact that labour non-participation is extremely high for low income/low skilled population in Serbia.

Analysis of labour supply effects by income levels suggest that both for singles and couples, IWB schemes would have larger labour supply effects in the case of low-wage earners, than for those with high incomes, which implies that these schemes would be beneficial from poverty and inequality reduction perspective as well. This is confirmed by the change in the Gini coefficient calculated before and after the introduction of IIWB or FIWB. Since FIWB would perform better in terms of labour supply of low income singles, while IIWB would perform better for low income couples, the overall effect on change in income distribution would be almost equal. The results show that after the introduction of IIWB, the Gini coefficient would decline from 0.386 to 0.363, while in the case of FIWB it would drop to 0.359. Slight differences in equalizing effects may arise from the fact that low earners receive the full amount of the benefit under the FIWB scheme, while in the case of IIWB, the benefit is gradually phased-in, reaching a full amount only when a threshold amount of earned income is generated. On the other hand, the fact that under FIWB the beneficiary is receiving the full amount of benefit even when earning a low amount of income, could discourage low-paid earners to increase labour supply above the minimum level necessary to qualify for this benefit. Although the equity-efficiency trade-off is common when introducing family and individual-based in-work benefits, our results show that such a trade-off in Serbia would not be significant, since the differences in equalizing effects of IIWB and FIWB would be relatively small.

6. Conclusions

It is often argued that high unemployment and inactivity rates as well as considerable informal employment in Serbia is due to an unfavourable design of the tax and benefit system, under which low-paid workers accepting a formal job (especially part time job), tend to lose more through withdrawal of benefits and increase in labour taxes, then they get compensated through wages. This is particularly true for individuals with a low earnings capacity, that is, persons with low-education attainment and no or little work experience. They constitute the majority of those who are inactive or work in the informal sector.

Tax and benefit policy reforms in OECD countries in recent years have been focused on solving the twin problem of in-work poverty and persistent labour market difficulties of low-skilled individuals. Employment-conditional cash transfers to individuals facing particular labour-market challenges have been a core element of IWB policies for some time and are now in use in more than half of the OECD countries. In the meantime, plenty of empirical studies emerged, showing significant positive employment effects among those primarily targeted by the payment of these benefits. However, there is no evidence so far on the effects of these policies in Central and Eastern European countries. To our knowledge, this is the first paper that provides an evaluation of the labour supply and distributional effects of in-work benefit programs in a country coming from this region. Given that the labour market structure and the

design of tax and benefit system in Serbia are quite similar to other Western Balkans countries, we believe that that the results of our analysis for Serbia could be of interest to a wider range of countries in the region.

Results obtained in this paper suggest that both IIWB and FIWB would trigger decline in non-participation, the effects of FIWB being larger for singles, while IIWB would have higher impact on labour supply of individuals in couples. Furthermore, both IWB schemes would have larger impact on stimulating labour supply of individuals with low income then for those at the top of income distribution, which is important since non-participation is extremely high among the low income population. This means that IWB policies in Serbia would help in reducing non-participation, but to certain degree also in reducing inequality and poverty. The difference in the size of effects of IIWB and FIWB, depending on the income level and marital status is the consequence of the difference in design of IIWB and FIWB policies, but also the result of variation in labour supply elasticities by income levels and marital status.

It is important to keep in mind that when there is involuntary unemployment, not all individuals who want to work are successful at finding one. The employment effect of an in-work benefit depends on both the motivation of individuals to look for a job, but also on the labour market's capacity to accommodate them. In other words, during times of economic prosperity there will be bigger employment gains after the introduction of IWB than during crises.

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References

Aaberge R, Colombino U, Strøm S (1999) Labor supply in Italy: an empirical analysis of joint household decisions, with taxes and quantity constraints. Journal of Applied Econometrics 14: 403-422.

Arandarenko M, Vukojević M (2008) Labour costs and labour taxes in Western Balkans. World Bank

Arandarenko M, Vladisavljević M, Žarković-Rakić J (2012) From inactivity to work: analysis of the public policies impact and factors affecting inactivity. FREN, Belgrade.

Baldini M, Bosi P, Toso, S (2002) Targeting welfare in Italy: old problems and perspectives on reform. Fiscal Studies 23(1): 51–75

Bell K (2005) Tackling poverty and making work pay: can tax credits do better? Presentation given at Institute for Fiscal Studies, 15 September 2005. http://www.ifs.org.uk/docs/bell_taxcredits05.ppt#5

Blundell, R. W, Duncan A, McCrae J, Meghir C (2000) The labour market impact of the working families tax credit. Fiscal Studies, 21 (1): 75-103

Blundell R (2006) Earned income tax credit policies: impact and optimality. The Adam Smith Lecture, 2005. Labour Economics 13: 423–443

Brewer M (2006) Tax credits: fixed or beyond repair? Green Budget – January 2006. http://www.ifs.org.uk/budgets/gb2006/06chap7.pdf

Colonna F, Marcassa S (2011) Taxation and labour force participation: the case of Italy. Available at: www-3.unipv.it/websiep/2011/201199.pdf

De Luca G, Rossetti C, Vuri D (2012) In-work benefits for married couples: an ex-ante evaluation of eitc and wtc policies in Italy, IZA Discussion Papers 6739, Institute for the Study of Labor (IZA)

Eissa N, Hoynes H (1998) The earned income tax credit and the labour supply of married couples. NBER Working paper No. 6856

Eissa N, Liebman J.B (1996) Labour tax supply response to the earned income tax credit. The Quarterly Journal of Economics 111: 605-637

Figari F (2010) Can in-work benefits improve social inclusion in the southern European countries? Journal of European Social Policy 20 (4): 301-315

Figari F (2011) From housewives to independent earners: Can the tax system help Italian women to work?. Institute for Social and Economic Research, University of Essex Working paper series, No. 2011-15 June 2011

Heckman J (1976) The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models, Annals of Economic and Social Measurements 5: 475-492

Heckman J (1979) Sample specification bias as a selection error, Econometrica 47: 153-162

Immervoll H, O'Donoghue C (2001) Welfare benefits and work incentives: An analysis of the distribution of net replacement rates in Europe using EUROMOD, a multi-country microsimulation model. EUROMOD working paper EM4/01

Immervoll H, Pearson M (2009) A good time for making work pay? taking stock of in-work benefits and related measures across the OECD. IZA Policy Paper No 3

Koettl J (2010) Does formal work pay in Serbia? The role of labour taxes and social benefit design in providing disincentives for formal work. A Technical Note prepared for the World Bank

Krstić G, Sanfey P (2011) Earnings inequality and informal economy: evidence form Serbia, Economics of Transition, 19(1), pp. 179-199

Krstić G, Arandarenko M, Arsić M, Radulović B, Ranđelović S, Janković I (2013) The shadow economy in Serbia: new findings and recommendations, Foundation for Advancement of Economics and USAID Study, Belgrade

Leibfritz W (2008) Increasing employment in FYR Macedonia: The role of labour taxation. A Policy Note prepared for the World Bank

Leppik L (2006) In-work benefits: literature review, PRAXIS Center for Policy Studies

McFadden D (1974) Conditional logit analysis of qualitative choice behaviour, In: Zarembka P (ed.) Frontiers in econometrics. Academic Press, New York

Meyer B, Rosenbaum D (2000) Making single mothers work: recent tax and welfare policy and its effects. National Tax Journal 53(4, part 2): 1027-1062

Mojsoska- Blazevski N (2012) Taxation of labour: the effect of labour taxes and costs on employment in Macedonia. Post-Communist Economies 24(2): 241-256

Orsini K (2006) Is Belgium Making Work Pay? CES Working Paper

Orsini K, Bargain O (2006) In-work policies in Europe: killing two birds with one stone? Labour Economics 13 (6): 667-693

Owens J (2006) Fundamental tax reform: an international perspective. National Tax Journal LIX(1): 131–64

Ranđelovic S, Žarković Rakić J (2013) Improving working incentives: evaluation of tax policy reform using SRMOD, International Journal of Microsimulation 6(1): 157-176

St Martin A, Whiteford P (2003) More jobs and better pay. OECD Observer No. 239, September 2003

Saez E (2002) Optimal income transfer programs: intensive versus extensive labour supply responses, The Quarterly Journal of Economics 117: 1039–73

Scholtz J. K (1994) The earned income tax credit: participation, compliance, and anti-poverty effectiveness. National Tax Journal 47: 59–81

Scholtz, J. K (1996) In-work benefits in the United States: the earned income tax credit. Economic Journal 106: 156–69

Sutherland H (2009.) EUROMOD: Past, Present and Future. In: Lelkes O, Sutherland H (eds.), Tax and Benefit Policies in the Enlarged Europe: Assessing the Impact with Microsimulation Models. Surrey, UK: Ashgate

Van Soest A (1995) Structural models of family labour supply: a discrete choice approach, Journal of Human Resources 30: 63-88

World Bank (2010) Does formal work pay in Serbia? The role of labour taxes and social benefit design in providing disincentives for formal work. Technical Note.

Appendix 1

Table A1: Wage equation for females and males, with Heckman correction

	Females		Males	
	Coef.	Std. Err.	Coef.	Std. Err.
Hourly wage rate (ln)				
Secondary ed.[a]	0.544***	-0.049	0.149***	-0.032
Tertiary ed.	1.253***	-0.063	0.633***	-0.045
Work exp.	0.056***	-0.007	0.008	-0.005
Work exp.^{2}	-0.001***	0.000	0	0
Urban	0.090***	-0.024	0.122***	-0.023
Constant	3.284***	-0.115	4.602***	-0.076
Employment (1 = in employment)				
Secondary ed. .[a]	0.760***	-0.061	0.241***	-0.069
Tertiary ed.	1.380***	-0.079	0.483***	-0.092
No. children 1-3	-0.347***	-0.078	-0.03	-0.074
No. children 3-6	-0.151***	-0.047	-0.074	-0.068
Partner works	0.170***	-0.058	0.272***	-0.067
Mar. status	0.318***	-0.073	-0.193**	-0.077
Age	0.225***	-0.017	0.267***	-0.015
Age^2	-0.003***	0	-0.003***	0
Nationality	0.105*	-0.059	-0.067	-0.076
Reg. unem. rate	-0.454	-1.204	-2.443	-1.728
Constant	-4.907***	-0.367	-4.015***	-0.407
Rho	**0.901**	**0.031**	**-0.112**	**0.084**
Sigma	0.627	0.036	0.500	0.016
Lambda	0.565	0.050	-0.056	0.042
Observations		3460		3044
Log-likelihood		-3099.649		-2822.734
Wald test: joint significance [Chi2 (5)]		588.69		320.03
Prob > Chi2		0.000		0.000
Wald test: independency of equations [Chi2 (1)]		**81.8**		**1.75**
Prob > Chi2		0.000		0.19

Table A2: Preference Estimates for singles (Conditional Logit)

	Total	Females	Males
Income	**6.849*** **	**5.102*** **	**9.173*** **
*Age	-0.222***	-0.207***	-0.228***
*Age^2	0.003***	0.002***	0.003***
*Secondary ed.[(a)]	-2.227***	-0.685	-4.556***
*Tertiary ed.	-2.261***	-0.757	-4.396***
* Children [(b)]	-0.18	0.498	-0.650*
Square	-0.009***	-0.013	-0.011***
Income* Hours of work	0.001	0.001	0.001
Hours of work	**-0.576*** **	**-0.522*** **	**-0.645*** **
*Age	0.017***	0.018***	0.017***
*Age^2	-0.000***	-0.000***	-0.000***
*Secondary ed. [(a)]	0.075***	0.033**	0.138***
*Tertiary ed.	0.079***	0.046**	0.122***
* Children [(b)]	-0.013	-0.063**	0.029*
Square	0.005***	0.004***	0.005***
Fixed costs	(omitted)	(omitted)	(omitted)
* Children	-0.302	-0.174	-0.037
N (c)	5,976	2,745	3,231
AIC	3053.425	1406.324	1628.17
Pseudo R Square	0.31	0.316	0.325
Wald test: joint significance [Chi2 (16)]	**1354.74**	**636.02**	**769.92**
Prob > Chi2	0.000	0.000	0.000

Notes to table A7

[(a)]Primary education omitted

[(b)]Dummy variable for single family with child

[(c)]Number of singles in the sample (1,992) multiplied by number of choices in simulation (3)

Table A2a: Preference estimates for couples (Conditional logit) – base model

	Total	Females	Males
Income	0.668***		
Square	-0.005***		
Hours of work		-0.237***	-0.173***
Square		0.005***	0.004***
N [a]	13,887		
AIC	4933.57		
Pseudo R Square	0.274		
Wald test: joint significance [Chi2 (30)]	1859.07		
Prob > Chi2	0		

Notes to table A7

[a]Number of couples in the sample (1,543) multiplied by number of choices (9)

Table A2b: Preference estimates for couples (Conditional logit) – full model

	Total	Females	Males
Income	0.122		
*Age		0.016	-0.022
*Age^2		0.000	0.000
*Secondary ed.[a]		-0.298**	0.246**
*Tertiary ed.		-0.340**	0.209*
* Children [b]	0.358***		
Square	-0.004***		
Income * Hours of work		0.000	0.000
Hours of work		-0.422***	-0.300***
*Age		0.010***	0.009***
*Age^2		-0.000***	-0.000***
*Secondary ed. [a]		0.043***	-0.003
*Tertiary ed.		0.052***	-0.006
* Children [b]		-0.033***	-0.017**
* Female and male hours interaction		0.000***	
Square		0.005***	0.004***
Fixed costs		(omitted)	(omitted)
* Children		-0.043	0.189
N [c]	13,887		
AIC	4,485.55		
Pseudo R Square	0.347		
Wald test: joint significance [Chi2 (30)]	2,355.08		
Prob > Chi2	0.000		

Notes to table A7

[a]Primary education omitted

[b]Dummy variable for single family with child

[c]Number of couples in the sample (1,543) multiplied by number of choices (9)