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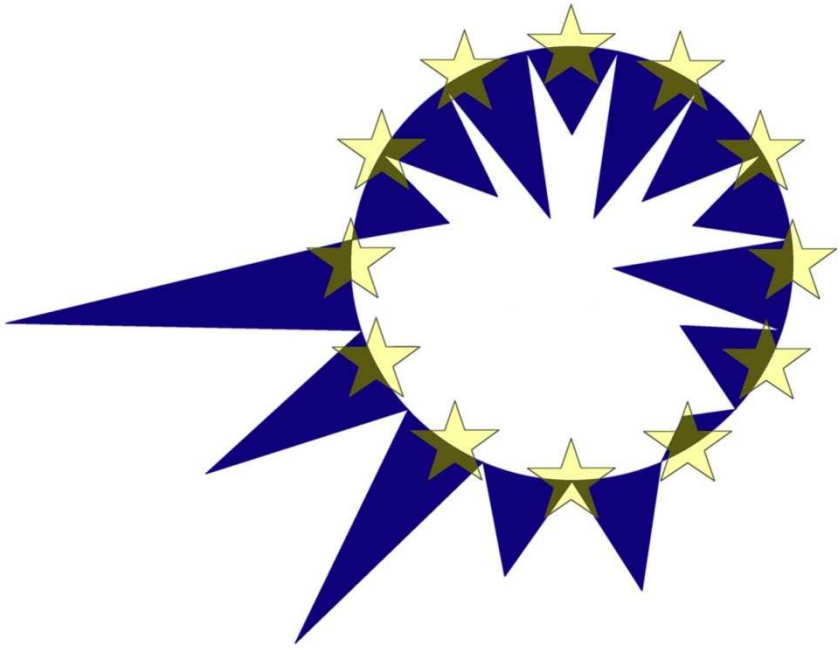

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# LABOUR SUPPLY MODELLING IN ITALY WHEN MINIMUM INCOME SCHEME IS AN OPTION

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# Labour Supply Modelling in Italy when Minimum Income Scheme is an option*

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* This paper uses EUROMOD version 27a. EUROMOD is continually being improved and updated and the results presented here represent the best available at the time of writing. Any remaining errors, results produced, interpretations or views presented are the authors' responsibility. EUROMOD relies on micro-data from twelve different sources for fifteen countries. This paper uses data from the European Community Household Panel (ECHP) User Data Base made available by Eurostat; the Survey of Household Income and Wealth (SHIW95) made available by the Bank of Italy.

# Labour Supply Modelling in Italy when Minimum Income Scheme is an option[1]

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## Abstract

In this paper we analyze the effects of Minimum Guaranteed Income (MGI) schemes on labour supply of Italian married couples by applying a behavioural micro-simulation tax-benefit model. The Tax-Benefit Model applied is the static micro-simulation model of EUROMOD. A household labour supply model is simulated with different tax rules where MGI is an option. The simulated tax regimes are Negative Income Tax (NIT), Workfare Tax (WF) and Universal Basic Income (UBI). These exercises of behavioural micro-simulation tax-benefit are performed at national and regional level. Our main finding is that changes in labour supply due to these tax-transfer rules are small and this is in favour of such income support policies. Concerning tax-transfer rules without hour's constraint, such as UBI and NIT, they imply labour disincentives more in the South than in the North of the country, and the effect is amplified with the increase of generosity level. Considering the welfare effects of these tax-transfer rules, we find that there are more "winners" than "losers" in the south than in the north as there are more households participating in these MGI schemes due to their low income status.

**JEL Classification:** C25; H24; H31, I38

**Keywords:** Labour Supply; Discrete Choice Model; Minimum Guaranteed Income; Regional Differences

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## 1. Introduction

In order to enhance active inclusion policies, coordination between reforms in the tax system, active labour market policies and social protection schemes are required. The MGI schemes are considered to have a positive effect on poverty risk reduction, but in addition they may have negative effects on the labour supply decision, at the intensive margin (hours of work) and at the extensive margin (participation in the labour market). Therefore the empirical analysis of the effect of the MGI on labour supply is an empirical issue which deserves special attention. In the case of Italy, the welfare protection system with respect to other EU countries lacks the option of minimum guaranteed income schemes. A MGI scheme – called Reddito Minimo d'Inserimento (RMI) - was introduced, temporarily and partially on an experimental basis, in 1999 as a measure to combat poverty and social exclusion, aimed in particular at households exposed to the risk of marginalisation. It was intended to target socially volatile individuals and groups characterised by low employment and bad income opportunities.[2]

The Italian labour market is characterized by significantly different employment patterns across various areas. Therefore, the peculiarities of the Italian labour market and the partial application of RMI in some areas underlies an interesting experimental environment. Consequently, the main focus of this paper is to investigate whether there are significant differences between the areas as regards the behavioural and welfare effects of MGI reforms and discuss further their effect on labour participation decisions by applying a behavioural microsimulation tax-benefit model. Thus, the analysis of redistributive and labour supply effects of such schemes under the current and alternative tax-benefit systems is extended at national and regional level.

The dataset used in this study is the one created by the EUROMOD project, which is a microsimulation tool that allows representation of households' budget constraints, and the distributional impact of changes to personal tax-benefit amounts due to specific policy reforms. Hence, using Euromod, different labour supply alternatives will be specified and the respective gross income will be generated; cash benefits and taxes will be calculated, accounting for the demographic characteristics of individuals and households. This database is the input of the simulation exercises of different tax regimes. The simulations are based on a

[2] Communication from t EUROPEAN COMMISSION concerning a consultation on action at EU level to promote the active inclusion of the people furthest from the labour market Ministry of Labour and Social Policy April 2006

microeconometric model of household labour supply similar to the one developed by Aaberge et al. (1999). The model is used with the purpose of simulating the distributive and labour supply impact under different tax regimes such as negative income tax (NIT) and workfare tax (WT). Finally, the impact on labour supply and disposal income level under these tax regimes is compared with the scenario when the universal basic income (UBI)[3] regime is applied.

The most likely scenario claimed so far when MGI schemes takes place is that the introduction of such schemes, apart from the desirable effects on social inclusion, can have undesirable effects such as disincentives to work, especially among low income earners. Therefore in this paper, we discuss the effects MGI would have on low income earners and their labour supply decisions, focusing on regional differences, and provide some evidence relevant for testing the above hypothesis.

The rest of the paper is organized as follows. The following section discusses the RMI experiment in Italy; taxes, benefits, poverty level and employment trend at intensive and extensive margin by areas. The third section discuses the features of the microeconometric model, the dataset and the simulated MGI schemes. The results are presented in the fourth section. The simulations of NIT, WF and UBI are presented and discussed in the fourth section. The last section concludes.

## 2. The tax-benefit context and Italian MGI

In order to understand the real mechanism of minimum income schemes and its efficiency as regards to poverty, the actual functioning needs to be constructed and discussed in detail. The system of Italian social insurance basically is similar to the French and German model as regards the categorization and the insurance fundamentals. They differ only in providential measures related to wage levels and the contributive history. Unlike France and Germany, since 1978 there is a national health system of universal type. Similar to Spain and Portugal, there is no universal child benefit scheme.[4] The family benefit is a means tested benefit based on evidence of household income and the amount decreases while the family

[3] Universal basic income implies that all individuals are eligible for a minimum income and the benefit is not means-tested benefits. The only countries where such system is in force are Alaska and since 1998 Portugal (although with a modest amount). See Van Pariijs 2003.

[4] "Assegni famigliari" is a mean-tested transfer tied to the number of household components who are not self-sufficient. It does not apply to the self-employed.

income increases and increases with the number of household members. The fiscal system in these years has been modified often by the adjustment of marginal tax rates. However, in spite of this apparent universality as regards the direct transfers to categorical types, the redistribution via tax-benefit system is limited.

With regard to unemployment benefits, there are two types: the ordinary unemployment benefits, that covers 50% of the last salary, with a maximum for 6 months, and mobility unemployment benefits that covers approximately 80% of the last salary, up to a maximum and for no longer than one year (it is related to the pension contributions). The second type regards to massive lay-offs in case of crisis or plant downsizing. Young people seeking their first employment and other people introduced for the first time to the labour market or after having left it (especially for women) are not entitled to any special benefit.

The experimental RMI scheme was introduced in 1999 as measure for combating poverty and social exclusion, aiming in particular to reach those households exposed to the risk of marginalisation. It was intended to target socially vulnerable individuals and groups characterised, in general, by low employment and income opportunities. The RMI involved 39 municipalities during the 1999/2000 period. The eligibility criteria in order to receive the RMI were income thresholds under which households were deemed to be at risk of poverty. These income thresholds were applied using a specific equivalence scale depending on size and characteristics of the households[5].

The RMI was carried out with the intention of covering the whole country but was concentrated mainly to the Southern municipalities. The distribution of experimental municipalities was such that 24 out of the 39 municipalities were in the South, 10 in the Centre and the rest of 5 in the North. The regional differences in the socio-economic and demographic elements influence the outcome of RMI with respect to the redistributive effect on income and labour supply. Berliri and Parisi (2006) analyse the redistributive and labour supply effects of extending at national level the RMI and show that it has a positive impact on inequality and poverty while the overall labour supply decreases and in particular for single persons. We can expect that better social and economic setting in northern-central part of Italy may have a

[5] Article 1(1) of Legislative Decree No 237 of 18 June 1998: RMI "is a measure for combating poverty and social exclusion by supporting the economic and social conditions of people exposed to the risk of social marginalisation and incapable, due to psychological, physical or social reasons, of maintaining themselves and their children". According to Article 1(2) of the same Legislative Decree, the RMI "involves measures aimed at pursuing the social integration and economic independence of the beneficiary individuals and households through individualised programmes and payments to supplement their incomes".

positive and desirable effects in these areas, while hostile conditions, such as a high level of unemployment, apart from the positive effects on poverty reduction can be accompanied by negative undesirable effects on labour supply and the risk of falling into and staying longer in the poverty trap especially for low income earners.

## 3. General framework of the model and tax regime simulation

### 3.1 General framework

The procedure in the paper is as follows: first we estimate through a conditional logit a common microeconometric model of labour supply using EUROMOD dataset for Italy. The estimated labour supply model is used to simulate the optimal choices made by households under the constraint of constant net tax revenues when four different tax regimes are applied. These regimes are: the flat tax, the negative income tax, the work-fare tax regime which includes a constraint of working hours in addition to the negative income tax and the universal basic income which offers every household a basic income.

The basic framework is essentially derived from Aaberge et al. (1999, 2004). We will consider households with two decision-makers (i.e. couples). There might be other people in the household, but their behavior will be taken as exogenous.

Household n is assumed to maximise a utility function $U^n(X, h_{F,} h_M)$ under the constraints:

$$
\begin{aligned}
& h_F \in \Omega \\
& h_M \in \Omega \\
& X^n = R(w_F^n h_F, w_M^n h_M, y^n)
\end{aligned}
\qquad (1)
$$

Where:

$h_i =$ average weekly hours of work required by the j-th job in the choice set for partner i (F = female, M = male)

$\Omega =$ set of discrete values (12 alternatives for each household, as 0-80 weekly hours of work)

$w_i^n =$ hourly wage rate of partner i. In order to simulate potential in-work disposable income for those who are observed to be out of work in the data, the hourly earnings equation is estimated

after having estimated the inverse Mill's ratio (use of Heckman procedure to generate the gross hourly wage).[6]

$y^n =$ vector of exogenous household gross incomes

$X^n =$ net household income

$R(.) =$ tax-transfer rule that transforms gross incomes into net available household income. The tax rule is applied on yearly gross income which is generated by multiplying the average weekly income by 52 (number of weeks per year). When the unemployment alternative is chosen, benefits related to this spell will measure the initial unemployment benefits that people currently in work would receive if they become unemployed compared with their current labour income. [7]

The first two constraints say that the hours of work $h_i$ are chosen within a discrete set of values, $\Omega$ including also 0 hours (i.e. non-participation or unemployment). This discrete set of $h_i$ values can be interpreted as the actual choice set (maybe determined by institutional constraints) or as approximations to the choice set. The third constraint says that net income $X$ is the result of a tax-transfer rule $R$ applied to the gross income.

We write the utility function as the sum of a systematic part and a random component:

$$U^n(X, h_F, h_M) = V(X, h_F, h_M; Z^n, \theta) + \varepsilon \qquad (2)$$

where $Z^n$ is a vector of household characteristics, $\theta$ is a vector of parameters to be estimated and $\varepsilon$ is a random variable capturing the effect of unobserved variables upon the evaluation of $(X, h_F, h_M)$ by household n.

[6] The hourly earnings estimation is available from the authors upon request.

[7] As Euromod doesn't contain information on contribution records of the individuals, the unemployment benefits are computed upon several assumptions about eligibility to unemployment insurance benefits. See Immervoll and O'Donoghue 2002, Euromod WP No.EM4/01 "Welfare benefits and work incentives: an analysis of the distribution of net replacement rates in Europe using Euromod, a multi-country microsimulation model" for a complete description of the calculating procedure of unemployment benefits.

Let $R(w_F^n f, w_M^n m, y^n)$ be the net available income when the household choices are $(f, m)$ calculated using the tax/benefit algorithm EUROMOD. Euromod is able to calculate the income composition of households counting for the demographic characteristics and tax-benefit rules of different tax regimes.[8] As regards the data, the dataset used in this study is extracted from the Survey of Households Income of Wealth, 1996, and covers 2324 households (married couples and as well as cohabiting couples) in the 20 to 55 age group. None of the spouses are self-employed and none of them are on disability or other type of benefits. We exclude also civil servants and students.

Under the assumption that $\varepsilon$ is i.i.d. extreme value of Type I, probability that a given household chooses $(f, m)$ is given by:

$$P^n(f, m; \theta) = \frac{\exp\{V(R(w_F^n f, w_M^n m, y^n), f, m; Z^n, \theta)\}}{\sum_{h_F \in \Omega} \sum_{h_M \in \Omega} \exp\{V(R(w_F^n f, w_M^n m, y^n), f, m; Z^n, \theta)\}} \tag{3}$$

If $(f^n, m^n)$ is the observed choice for the n-th household, the ML estimate of $\theta$ is

$$\theta^{ML} = \arg\max_\theta \sum_{n=1}^{N} \ln P^n(f^n, m^n; \theta)$$

## 3. 3.2. Utility function specification

The utility function specification is a quadratic function which allows for diminishing marginal utility through the quadratic terms.

$$V(X, h_F, h_M; b) = b_x X + b_F (T - h_F) + b_M (T - h_M) + b_{FF} (T - h_F)^2 + b_{MM} (T - h_M)^2 + \\ + b_{xF} X (T - h_F) + b_{MxM} X (T - h_M) \tag{4}$$

[8] The database created by the Euromod incorporates different alternatives of hours of work and the respective budget sets and is the input of the simulation exercises of different tax regimes.

Some of the above parameters $b$ depend on household or individual characteristics $Z$.

(5) $$b_F = b_{F1}(Age_{wife}) + b_{F2}(\#children) + b_{F3}(\#children_{under6}) + b_{F4}(\#children_{6-10})$$

(6) $$b_M = b_{M1}(Age_{husband}) + b_{M2}(\#children) + b_{M3}(\#children_{under6}) + b_{M4}(\#children_{6-10})$$

(7) $$b_x = b_{x1}(Age_{husband}) + b_{x2}(Age_{wife}) + b_{x3}(\#children) + b_{x4}(\#children_{under6}) + b_{x5}(\#children_{6-10})$$

## 4. 3.3 Choice set specification and hours distribution

Assuming the original data contain weekly hours, one could set a maximum number of 80 average hours per week, and then starting from 0 to 80 hours, we can construct a set of 12 alternatives for each individual by specifying the interval of hours of work and sample randomly within this interval which has a length of 8 hours. The first two alternatives refer to zero hours of work, but the first one refers to the inactivity status and the second one to the unemployment status. The combination of the alternative sets of male and female provides the set of the alternatives for the households composed by the 144 alternatives (12*12). The actual observed hours will be rounded to the closest discrete value[9]. The basic idea can be appropriately modified when one observes directly annual hours or weeks worked.

Most countries show a more or less pronounced concentration of people around hours corresponding to full-time and part-time. The model sketched above is typically unable to reproduce these peaks. A useful trick consists in adding dummies. For the sake of illustration, suppose there are only peaks at full-time. Suppose we classify full-time as working between 33 and 48 hours per week on average. Then we define the dummies:

(8) $$G_F(h_F) = \begin{cases} 1 \rightarrow 33 \le h_F \le 48 \\ 0 \rightarrow otherwise \end{cases} \qquad G_M(h_M) = \begin{cases} 1 \rightarrow 33 \le h_M \le 48 \\ 0 \rightarrow otherwise \end{cases}$$

[9] Like in Aaberge et al. (1995, 1999) the alternatives in the choice set are sampled from a density function: as a consequence the choice sets may differ across households. In our case, for example, the third alternative may be chosen randomly within the interval 1-8 weekly hours of work. We follow up to the 12th alternative in the interval 73-80 and the hours of work will be sampled within this interval. This procedure is probably more efficient but also more cumbersome from the computation point of view.

To capture the effect of part time, extra time, work participation we construct ion the same way dummies as below:

(9) $$P_F(h_F)=\begin{cases}1\rightarrow 17\le h_F\le 32\\ 0\rightarrow otherwise\end{cases} \qquad P_M(h_M)=\begin{cases}1\rightarrow 17\le h_M\le 32\\ 0\rightarrow otherwise\end{cases}$$

(9) $$O_F(h_F)=\begin{cases}1\rightarrow h_F>48\\ 0\rightarrow otherwise\end{cases} \qquad O_M(h_M)=\begin{cases}1\rightarrow h_M>48\\ 0\rightarrow otherwise\end{cases}$$

(10) $$W_F(h_F)=\begin{cases}1\rightarrow h_F>0\\ 0\rightarrow otherwise\end{cases} \qquad W_M(h_M)=\begin{cases}1\rightarrow h_M>0\\ 0\rightarrow otherwise\end{cases}$$

(11) $$U_F=\begin{cases}1\rightarrow female\_unemployed\\ 0\rightarrow otherwise\end{cases} \qquad U_M=\begin{cases}1\rightarrow male\_unemployed\\ 0\rightarrow otherwise\end{cases}$$

Calling all these fixed effects dummies with a common variable D the probability function will be expressed as:

(12) $$P^n(f,m;\theta)=\frac{\exp\left\{V(R(w_F^n f,w_M^n m,y^n),f,m;Z^n,\theta)+\gamma_F D_F(f)+\gamma_M D_M(m)\right\}}{\sum_{h_F\in\Omega}\sum_{h_M\in\Omega}\exp\left\{V(R(w_F^n f,w_M^n m,y^n),f,m;Z^n,\theta)+\gamma_F D_F(f)+\gamma_M D_M(m)\right\}}$$

The dummies can be interpreted as reflecting quantity constraints on the labour market (as in Aaberge et al., 1995, 1999), or specific utility of full-time, part time, extra time jobs, or maybe both (as in van Soest, 1995)[10].

## 5. 3.4. Simulation of the reforms

Let us suppose we are interested in some alternative tax-transfer rule $R_A$. For a given choice $(f,m)$, it will produce a net available income for the n-th household equal to $R_A(w_F^n f, w_M^n m, y^n)$. Let $P_A^n(f,m;\theta^{ML})$ be the corresponding choice probability computed on the basis of the estimated parameter $\theta^{ML}$ and of the new tax-transfer rule. If we are interested in simulating the expected value of some function $\varphi^n(f,m)$, we simply compute:

$$(13) \qquad E(\varphi^n(f,m)) = \sum_{f\in\Omega}\sum_{m\in\Omega}\varphi^n(f,m)P_A^n(f,m;\theta^{ML})$$

The simulation of different tax regimes consists in finding the tax rate which equalizes the predicted net tax revenues under these tax regimes with net tax revenues the state recovers from the current system.

In what follows, we simulate 4 tax benefit systems that in one way or another try to embody the above criteria. The first is a proportional or flat tax (FT). If Y represents total gross disposable income after social insurance, the tax to be paid by the household is:

$$(14) \qquad Tax_{FT} = t_{FT}Y$$

Where $t_{FT}$ is a constant marginal tax rate and the existing tax deductions and tax credits are extracted. Besides incorporating the idea of minimizing distortions, it is also a benchmark system, useful for comparison.

[10] Van Soest and Das (2001) use a different mechanism to account for "peaks and holes" in observed hour distribution, namely fixed cost of working. This leads, however, to a more complicated estimation and therefore we would not advise the adoption of this procedure in the basic model estimation.

The second tax-benefit exercise is a negative income tax (NIT), where a flat tax is complemented with a transfer (a negative tax) that guarantees households' income up to a basic level and the taxes to be paid by households are set as:

$$(15) \qquad Tax_{NIT} = \begin{cases} t_{NIT}(Y - a*Poverty) \rightarrow Y > a*Poverty \\ o \rightarrow otherwise \end{cases}$$

and complementary which the benefits as below:

$$(16) \qquad Benefit_{NIT} = \begin{cases} a*Poverty - Y \rightarrow Y \leq a*Poverty \\ o \rightarrow otherwise \end{cases}$$

The poverty line is set equal to the median of gross income multiplied by a coefficient K which takes several values ranging from 0.5 for the households without children to 2.4 for those with no less than 5 children.[11] The parameter (a) is set equal to 0.25, 0.5. 0.75 and 1 as a standard equivalence scale. This parameter determines the generosity of the tax benefit scheme and goes with the scheme generosity so[12] that the more generous the system the higher is the parameter a. Therefore a*Poverty is guaranteed income level for the household while $t_{NIT}$ is a constant marginal tax rate. The guaranteed income replaces all current family benefits and transfers (see the Appendix).

Then we apply as a third exercise the so-called WorkFare (WF) system, which essentially is a modification of NIT where the transfer is also conditional on a minimum amount of weekly hours of work. Under this reform, while the taxes to be paid by the household are the same as in the case of NIT, the benefits differ as below:

$$(17) \qquad Benefit_{WF} = \begin{cases} a*Poverty - Y \rightarrow (Y \leq a*Poverty) \,\&\, (h_M > H) or (h_F > H) \\ o \rightarrow otherwise \end{cases}$$

[11] The coefficient K is set equal to 1.33, 1.63, 1.90, 2.16 and 2.40 respectively for the households with 1, 2, 3, 4 and 5 (or more) children.

where $h_M$ and $h_F$ represent the total hours worked by the wife and the husband and $H$ is a minimum required number of hours worked (set equal to 15, 20, 36 in the simulations). Although similar to the NIT, the WF system is interesting to analyze because under certain conditions it can be proved to be Pareto-superior to NIT.

The last exercise refers to the universal basic income tax-benefit system, which means that a basic income to meet essential needs, and in which all households are taxed as in the flat tax system, is granted to all households on an unconditional basis. Thus the taxes and benefits are recovered as follows:

(18) $Tax_{UBI} = t_{UBI} Y$

(19) $Benefits_{UBI} = a * Poverty$

In all the tax-benefit systems simulations, the disposable income is a function of wife and husband's earnings and other income. The system of NIT and WF are interpreted as alternatives that try to compound the criterion of lessening distortions from high marginal tax rates and the criterion of redesigning the basic income support system in a more effective way. Since the actual income support policies are thought to be rather wasteful and occasionally even inequitable, there might be scope for reforms that are able to increase both efficiency and equality.

For each simulation there is a tax rate that is determined by generating the same total tax revenue as of 1998 tax-benefit system, given the other parameters of the tax-transfer rules. The revenue neutrality constraint considers both the revenues related to personal income tax and the simulated household income transfers and consents to determine the pertinent marginal tax rate via a simulation algorithm.

The MGI is represented by the simulated amount level of the benefits, which is determined by the poverty line. Different tax-benefit rules generate different impacts on the utility of the household, which are reflected by the changes in the level of disposable level of income and leisure.

## 4. Results

Here we show the results of the simulations of different tax-benefit rules on household labour supply and their welfare measured in terms of expected maximum utility, considering the whole country and its areas.[13] Tables 3 and 4 show the simulated change in working hours, full-time and part-time participation, disposable income, Gini index of disposable income, simulated tax rate, tax revenue and the percentage of winners and losers for each policy disaggregated by gender and area.

### 5.1.1 Intensive Margin - Hours of Work

Looking at the labour supply decisions disaggregated by area and gender we notice that for the current model, male labour supply is slightly higher[14] in the south than in the north while the opposite holds for female labour supply. Furthermore, we find that (Figure 1, Table 3) there are no labour disincentives both for males and females in case of WF Rule for both areas. As regards the NIT and UBI rules there are no labour incentives for females either in the north or in the south except for the lowest generosity level. The former holds also for males in the north while in the south, any generosity level does not affect positively labour supply. However, Both UBI and NIT induce labour disincentives more in the South than in the North, with larger disincentives the greater is the generosity of the benefits. However, changes in labour supply due to these tax-transfer rules are small and this is in favor of such income support policies.

*Disaggregating hours of work by income quintiles*

In table 5 the labour supply changes are disaggregated by income quintiles. We'll focus our analysis on the above-mentioned tax-transfer reforms with generosity levels (such as the highest for NIT and UBI and the lowest for WF) that make easier the interpretation of labour supply changes across quintiles. Looking at NIT and UBI rules, male labour disincentives predominate for the lowest income quintiles in the whole country and moving from the lowest to the highest quintile, labour disincentives fade away in both areas and across tax transfer rules. Regional differences show up only in case of female such that disincentive effects are

[13] The simulations related to the flat tax rule are not included here as the main intention of this paper is to assess the impact of guaranteed minimum schemes. They are available upon request.

[14] In average, males in the south work only 41 minutes more than in the north, while females work almost two hours less.

almost insignificant in the north while in the south they get similar across quintiles under the NIT rule (almost 2 hours less) and become more noticeable for the last income quintile (the rich) under the UBI rule (almost 4 hours less). Under the WF rule with the lowest generosity level, incentives effect are very small in both areas and reach the lowest level for the first income quintile in case of females and last income quintile in case of males.

5.1.1.1 Characteristics of benefit receivers

Because of the construction of the eligibility criteria based on the number of household components and gross income, the households benefiting from NIT and WF tax-benefit rules, are evidently those numerous with younger parents and lower income. As table 6 shows, under the NIT rule, benefit receivers undergo a smaller disincentive effect than the others in both areas, in case of males, and a very similar effect in case of females. Under the WF rule, the positive changes in working hours are quite comparable between benefit and non benefit receivers with a slight dominance for non-benefit receivers. Thus, no considerable differences in labour supply behavior of the household's members may be attributable to their inclusion in these income support schemes.

### 5.1.2 Extensive Margin – Full time and Part time Participation

As regards to the extensive margin decision we will distinguish between full time and part time participation. We find that full time participation rates (graph 3-4) share almost the same trend as we found at the intensive margin for hours worked. As regards the part time participation (graph 5-6), a different trend as opposed to the full time participation is observed in both areas and genders. The difference consists in the fact that for the WF rule the generosity level will have a positive impact on male labour supply while it will almost not affect that of females. For the NIT and UBI rules, male labour supply is almost neutral to the generosity level while female labour supply is negatively sloped in a similar way as in the full time participation. Therefore, the generosity of WF tax transfer rules induces males to higher labour supply elasticity at part time than at full time employment spell while female labour supply is almost inelastic. This result connotes that tax transfer rules without hour's constraint induce a more elastic labour supply amongst full time female working population while tax transfer rules with hour's constraint such as workfare induce a more elastic labour supply amongst the male part time participation either for north or for the south of Italy.

#### 5.1.2.1 Disposable Income

As regards the disposable income and tax-benefit system, we notice from the graph 7 that the increase in the generosity level, which implies higher benefits distributed to the low income households, go along with an increase in tax revenues and a decrease in disposable income in the North. The tax benefit systems that endow the northern households with a disposable income superior to the current system are NIT at the lowest generosity level and all WF except the highest generosity level. On the contrary, in the south, a reverse trend is observed for the WF such that an increase in generosity and tax revenues is followed by an increase of the disposable income. Accordingly, for an increasing generosity level under WF rule we find an increase of the household disposable income in the south. This is due to the higher participation of the southern households in the MGI compared to their counterpart in the north.

#### 5.1.2.2 Gini Inequality index

Looking at the Gini coefficient (graph 8), the more generous the minimum scheme the lower is the inequality coefficient either in the north or in the south. However, the most generous NIT and WF rules generate less inequality compared to the baseline system. In terms of income distribution and regional differences between the south and the north, the reduction in inequality is sharper in the south than in the north bringing to a lower GINI inequality index for the highest generosity level[15]. This implies that if there would be winners and losers[16] from the implementation of these new tax benefit reforms, there are more "winners" than "losers" in relative term in the south than in the north and this is quite reasonable, as there are more households participating in these MGI schemes due to their low income status. All minimum income schemes make the south better off except the lowest generosity level under the WF rule.

[15] The post reform system with the highest generosity level L brings to a reduction in Gini coefficient compared to the pre reform system from 0.22 to 0.16 in the North and from 0.25 to 0.15 in the south respectively by 38% and 67%.

[16] As winners (losers) we define all households with a post-reform utility higher (lower) than the pre-reform utility where the utility is measured mainly as a function of disposable income and leisure.

5.1.2.3 Sen's Welfare Index[17]

In graph 9 we show two measures of social welfare based first on income distribution and second on utility using the Sen Welfare index. Sen's welfare index defines the social welfare function as the product of the average income (utility) and an inequality index (here we consider Gini index). A comparison of social welfare utility-based on the current and new MGI models reveals greater welfare using the WF tax benefit rule as opposed to the baseline model in the north, while in the South, the social welfare improves for any generosity level of UBI and for any generosity level of WF and NIT except the lowest one. Welfare based on the generosity of NIT and UBI schemes is more meaningful for the south as a large proportion of households would participate in it without hour's constraint.

## 5. Conclusion

This paper evaluates the behavioural and welfare effects of different tax-transfer rules such as negative income tax, workfare and universal basic income using a sample of 2324 Italian households across considering regional differences. Our main finding is that changes in labour supply due to these tax-transfer rules are small and this is in favour of such income support policies. However, tax-transfer rules without hours constraint such as Universal Basic Income and Negative Income Tax imply labour disincentives more in the south than in the north of the country. Furthermore, benefit receivers undergo a smaller labour disincentive effect that the others in case of males and almost similar in case of females. Looking at the extensive margin, we find that tax transfer rules without hour's constraint induce a more elastic labour supply amongst full-time female working population while tax transfer rules with hour's constraint such as workfare induce a more elastic labour supply amongst the male part time participation either for north or for the south of Italy.

Considering the welfare effects of these tax-transfer rules, we find that there are more "winners" than "losers" in relative term in the south than in the north and this is quite reasonable, as there are more households participating in these MGI schemes due to their low income status. All minimum income schemes make the south well off except the lowest generosity level under the WF rule. To conclude, it is quite crucial to consider regional

[17] As the notion of Gini index is mainly related to the inequality of income distribution, we use the Sen Index to measure the social welfare function.

differences in terms of welfare and behavioural effects in the design of plausible and sustainable tax-transfer policies.

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# Appendix 1

**Table 1 Conditional logistic estimation**

| | |
|---|---|
| Number of observations | 2324 |
| LR Chi Square | 8843.37 |
| Prob > chi2 | 0 |
| Log_likelihood | 7128.16 |

| | Coefficient | Std. Err. | t value | Significance |
|---|---|---|---|---|
| **Disposable Income** | | | | |
| Costant | 0.1364 | 0.0533 | 2.56 | ** |
| Square | -0.0010 | 0.0002 | -4.51 | *** |
| Age_male | -0.0053 | 0.0011 | -4.7 | *** |
| Age_female | 0.0041 | 0.0011 | 3.92 | *** |
| Number of children | -0.0113 | 0.0098 | -1.15 | |
| Children under 6 | 0.0046 | 0.0156 | 0.29 | |
| Children from 6 to 10 | 0.0346 | 0.0166 | 2.08 | * |
| Leisure_male | 0.0019 | 0.0002 | 8.27 | *** |
| Leisure_female | -0.0012 | 0.0002 | -6.58 | *** |
| **Leisure Female** | | | | |
| Costant | 0.3317 | 0.0500 | 6.64 | *** |
| Square | -0.0027 | 0.0004 | -7.66 | *** |
| Age | 0.0012 | 0.0003 | 4.27 | *** |
| Number of children | 0.0010 | 0.0028 | 0.37 | |
| Children under 6 | 0.0093 | 0.0044 | 2.13 | ** |
| Children from 6 to 10 | 0.0097 | 0.0046 | 2.12 | ** |
| Leisure_male | 0.0013 | 0.0001 | 10.69 | *** |
| **Leisure Male** | | | | |
| Costant | 0.1902 | 0.0365 | 5.21 | *** |
| Square | -0.0023 | 0.0003 | -8.56 | *** |
| Age | 0.0001 | 0.0004 | 0.34 | |
| Number of children | -0.0050 | 0.0034 | -1.47 | |
| Children under 6 | 0.0025 | 0.0055 | 0.46 | |
| Children from 6 to 10 | 0.0083 | 0.0055 | 1.5 | |
| **Fixed Effect Dummies** | | | | |
| Participation_male | -3.6607 | 0.3077 | -11.9 | *** |
| Participation_female | -4.4234 | 0.2474 | -17.88 | *** |
| Part_time_male | 0.5629 | 0.2898 | 1.94 | |
| Part_time_female | 1.4126 | 0.2511 | 5.62 | *** |
| Full_time_male | 3.2362 | 0.3543 | 9.13 | *** |
| Full_time_female | 2.9985 | 0.3232 | 9.28 | *** |
| Extra_time_male | 2.3422 | 0.3666 | 6.39 | *** |
| Extra_time_female | 1.5864 | 0.4111 | 3.86 | *** |
| Unemployment_male | -0.1486 | 0.1290 | -1.15 | |
| Unemployment_female | -1.7926 | 0.0775 | -23.12 | *** |

***, **, * mean significant respectively at 0.001, 0.005 and 0.01 level.

Table 1 shows the estimated coefficients of the conditional logit model. The marginal utility of income is positive over the whole sample and decreasing either for leisure or income (the negative sign of the squared leisure and income). However in order to check for the global concavity character of the utility function we have further calculated the first derivative of utility with respect to net income. Almost 90% of the sample satisfies the quasi-concavity conditions and this is important for the predictive capability of the labour supply model. The interaction term between income and leisure is negative and significant different from zero implying that income is not separable from leisure. On the other hand, the incidence of small children (0-10 years) makes women more leisure disposed which imply that their leisure is mainly spent on child caring activities. Moreover the estimates say that men and women prefer to share the leisure time together by performing common activities.

**Table 2: Descriptive Statistics on the Observed and Predicted Sample**

| | **Current** | | **Predicted** | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std.Dev.** | **Mean** | **Std.Dev.** |
| Taxes | 514,28 | 473,59 | 533,97 | 410,01 |
| Benefits | 166,62 | 409,50 | 190,44 | 406,31 |
| Net Taxes of Benefits | 347,66 | 645,77 | 343,54 | 517,23 |
| Gross Income | 2258,26 | 1629,80 | 2260,60 | 1237,33 |
| Social Insurance Contributions | 94,55 | 117,89 | 101,01 | 111,25 |
| Net Income | 1816,04 | 1062,22 | 1816,04 | 824,62 |
| Hours_male | 35,81 | 14,66 | 35,77 | 4,04 |
| Hours_female | 14,34 | 17,80 | 14,34 | 3,93 |
| Participation_male | 0,86 | 0,34 | 0,90 | 0,08 |
| Participation_female | 0,46 | 0,50 | 0,43 | 0,10 |
| Unemployment_male | 0,06 | 0,23 | 0,06 | 0,04 |
| Unemploymet_female | 0,09 | 0,28 | 0,09 | 0,02 |
| Number of observations in the North | | | | 1424 |
| Number of observations in the South and Centre | | | | 900 |

Note: Current refers to the data extracted in 1996 under the tax-transfer system 1998.
All monetary variables are converted in EURO.

**Table 3 labour Supply & Redistributive Effect Simulation for the Southern and Central part of Italy**

| | Average Income | GINI Income | Average utility | Gini Utility | Hours male | Hours female | Marginal Tax rate | Social welfare Income based | Social welfare utility based | Winners in absolute term | Winner in % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Current** | | | | | | | | | | | |
| | 1597 | 0,25 | 24,25 | 0,03 | 36,18 | 13,2 | 0,2 | 1198 | 23,62 | | |
| **NIT + Flat** | | | | | | | | | | | |
| a=0.75 | 1561 | 0,16 | 24,43 | 0,03 | 32,08 | 11,07 | 0,48 | 1307 | 23,75* | 739 | 82 |
| a=0.50 | 1585 | 0,24 | 24,29 | 0,03 | 34,31 | 12,48 | 0,29 | 1205 | 23,63 | 778 | 86 |
| a=0.25 | 1605 | 0,29 | 24,18 | 0,03 | 36,20 | 13,46 | 0,2 | 1140 | 23,55 | 554 | 62 |
| **WF + Flat (H = 20)** | | | | | | | | | | | |
| a=1.00 | 1780 | 0,15 | 24,38 | 0,03 | 36,56 | 13,14 | 0,48 | 1513* | 23,7 | 579 | 64 |
| a=0.75 | 1716 | 0,21 | 24,29 | 0,03 | 36,86 | 13,43 | 0,32 | 1361 | 23,63 | 653 | 73 |
| a=0.50 | 1667 | 0,26 | 24,24 | 0,03 | 37,01 | 13,71 | 0,23 | 1234 | 23,59 | 490 | 54 |
| a=0.25 | 1637 | 0,3 | 24,15 | 0,03 | 37,08 | 13,91 | 0,18 | 1154 | 23,52 | 380 | 42 |
| **UBI + Flat** | | | | | | | | | | | |
| a=0.75 | 1575 | 0,12 | 24,41 | 0,03 | 31,98 | 10,74 | 0,71 | 1384 | 23,75* | 712 | 79 |
| a=0.50 | 1623 | 0,18 | 24,34 | 0,03 | 34,18 | 12,18 | 0,5 | 1331 | 23,68 | 753 | 84 |
| a=0.25 | 1635 | 0,25 | 24,27 | 0,03 | 35,85 | 13,22 | 0,32 | 1234 | 23,61 | 753 | 84 |

**Table 4 labour Supply & Redistributive Effect Simulation for the Northern part of Italy**

| | Average Income | GINI Income | Average utility | Gini Utility | Hours male | Hours female | Marginal Tax rate | Social welfare Income based | Social welfare utility based | Winners in absolute term | Winner in % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Current** | | | | | | | | | | | |
| | 1954 | 0,22 | 24,38 | 0,03 | 35,5 | 15,05 | 0,2 | 1532 | 23,75 | | |
| **NIT + Flat** | | | | | | | | | | | |
| a=0.75 | 1706 | 0,18 | 24,46 | 0,03 | 32,91 | 12,76 | 0,48 | 1407 | 23,8* | 866 | 61 |
| a=0.50 | 1894 | 0,22 | 24,37 | 0,03 | 34,78 | 14,65 | 0,29 | 1477 | 23,71 | 1072 | 75* |
| a=0.25 | 2008 | 0,24 | 24,29 | 0,03 | 36,01 | 15,68 | 0,2 | 1530 | 23,66 | 945 | 66 |
| **WF + Flat (H = 20)** | | | | | | | | | | | |
| a=1.00 | 1887 | 0,16 | 24,42 | 0,03 | 36,37 | 14,45 | 0,48 | 1578* | 23,76* | 609 | 43 |
| a=0.75 | 1969 | 0,21 | 24,37 | 0,03 | 36,55 | 15,34 | 0,32 | 1564 | 23,74 | 825 | 58 |
| a=0.50 | 2021 | 0,23 | 24,32 | 0,03 | 36,63 | 15,82 | 0,23 | 1560 | 23,69 | 846 | 59 |
| a=0.25 | 2051 | 0,24 | 24,27 | 0,03 | 36,66 | 16,06 | 0,18 | 1563 | 23,64 | 799 | 56 |
| **UBI + Flat** | | | | | | | | | | | |
| a=0.75 | 1617 | 0,13 | 24,37 | 0,03 | 32,48 | 11,61 | 0,71 | 1407 | 23,74 | 825 | 58 |
| a=0.50 | 1809 | 0,17 | 24,38 | 0,03 | 34,39 | 13,61 | 0,5 | 1501 | 23,66 | 924 | 65 |
| a=0.25 | 1953 | 0,21 | 24,37 | 0,03 | 35,74 | 15,07 | 0,32 | 1543 | 23,74 | 1069 | 75* |

**Table 5 Change in Hours by Income Quintile, Gender and Area**

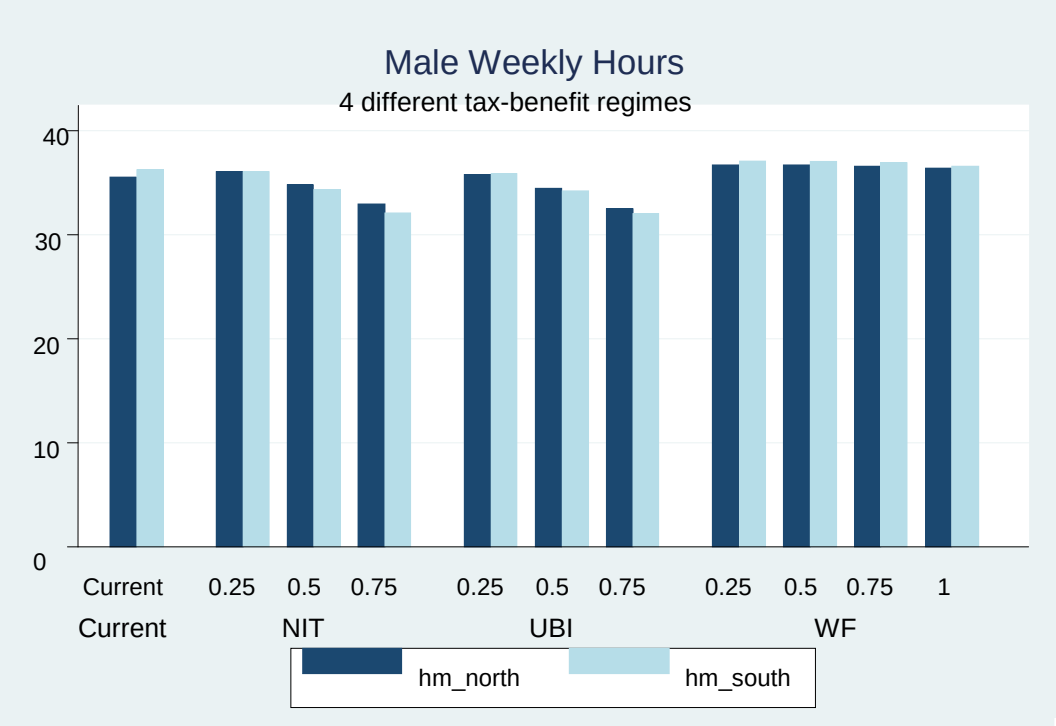
| **NORTH** | **Quintile** | **NIT** | | | **WF** | | | | **UBI** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **0,25** | **0,5** | **0,75** | **0,25** | **0,5** | **0,75** | **1** | **0,25** | **0,5** | **0,75** |
| ***Male*** | **I** | 0,39 | -1,56 | -3,96 | 1,57 | 1,46 | 1,21 | 0,83 | 0,14 | -1,67 | -3,87 |
| | **II** | 0,32 | -1,35 | -3,82 | 1,16 | 1,07 | 0,85 | 0,4 | -0,09 | -1,84 | -4,11 |
| | **III** | 0,41 | -1 | -3,25 | 1,06 | 0,98 | 0,8 | 0,42 | -0,05 | -1,66 | -3,86 |
| | **IV** | 0,85 | -0,24 | -2,13 | 1,31 | 1,26 | 1,18 | 0,93 | 0,43 | -0,94 | -2,92 |
| | **V** | 0,61 | 0,55 | 0,2 | 0,68 | 0,88 | 1,24 | 1,76 | 0,76 | 0,56 | -0,32 |
| | ***All*** | *0,51* | *-0,72* | *-2,59* | *1,16* | *1,13* | *1,05* | *0,87* | *0,24* | *-1,11* | *-3,02* |
| ***Female*** | **I** | 0,01 | -0,07 | -0,17 | 0,05 | 0,03 | 0,01 | -0,01 | -0,01 | -0,07 | -0,16 |
| | **II** | 0,03 | -0,04 | -0,17 | 0,07 | 0,05 | 0,02 | -0,03 | 0 | -0,09 | -0,21 |
| | **III** | 0,04 | -0,03 | -0,16 | 0,07 | 0,05 | 0,02 | -0,04 | 0 | -0,1 | -0,23 |
| | **IV** | 0,05 | -0,02 | -0,15 | 0,07 | 0,05 | 0,02 | -0,05 | 0 | -0,11 | -0,25 |
| | **V** | 0,06 | 0,01 | -0,12 | 0,08 | 0,06 | 0,03 | -0,05 | 0,01 | -0,09 | -0,27 |
| | ***All*** | *0,04* | *-0,03* | *-0,15* | *0,07* | *0,05* | *0,02* | *-0,04* | *0* | *-0,1* | *-0,23* |

| **SOUTH** | **Quintile** | **0,25** | **0,5** | **0,75** | **0,25** | **0,5** | **0,75** | **1** | **0,25** | **0,5** | **0,75** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Male*** | **I** | -1,01 | -3,36 | -5,75 | 0,88 | 0,83 | 0,65 | 0,31 | -0,87 | -2,93 | -5,33 |
| | **II** | -0,36 | -2,62 | -5,34 | 0,99 | 0,84 | 0,49 | -0,01 | -0,56 | -2,58 | -5,06 |
| | **III** | 0,3 | -1,46 | -3,96 | 1,29 | 1,17 | 0,91 | 0,45 | -0,05 | -1,87 | -4,17 |
| | **IV** | 0,28 | -1,18 | -3,48 | 1,02 | 0,94 | 0,77 | 0,4 | -0,12 | -1,76 | -4 |
| | **V** | -0,12 | -0,78 | -1,98 | 0,27 | 0,36 | 0,54 | 0,73 | -0,12 | -0,89 | -2,47 |
| | ***All*** | *-0,18* | *-1,87* | *-4,1* | *0,9* | *0,83* | *0,68* | *0,38* | *-0,34* | *-2* | *-4,2* |
| ***Female*** | **I** | -0,57 | -1,56 | -2,01 | 0 | -0,35 | -0,19 | 0,7 | -0,17 | -0,55 | -1,07 |
| | **II** | 0,09 | -0,83 | -2,08 | 0,59 | 0,49 | 0,14 | 0,04 | 0,03 | -0,7 | -1,67 |
| | **III** | 0,31 | -0,6 | -2 | 0,75 | 0,63 | 0,37 | -0,05 | 0,03 | -0,95 | -2,24 |
| | **IV** | 0,56 | -0,49 | -2,29 | 0,97 | 0,75 | 0,34 | -0,41 | 0,01 | -1,36 | -3,15 |
| | **V** | 0,91 | -0,13 | -2,26 | 1,25 | 0,99 | 0,49 | -0,62 | 0,19 | -1,55 | -4,18 |
| | ***All*** | *0,26* | *-0,72* | *-2,13* | *0,71* | *0,51* | *0,23* | *-0,06* | *0,02* | *-1,02* | *-2,46* |

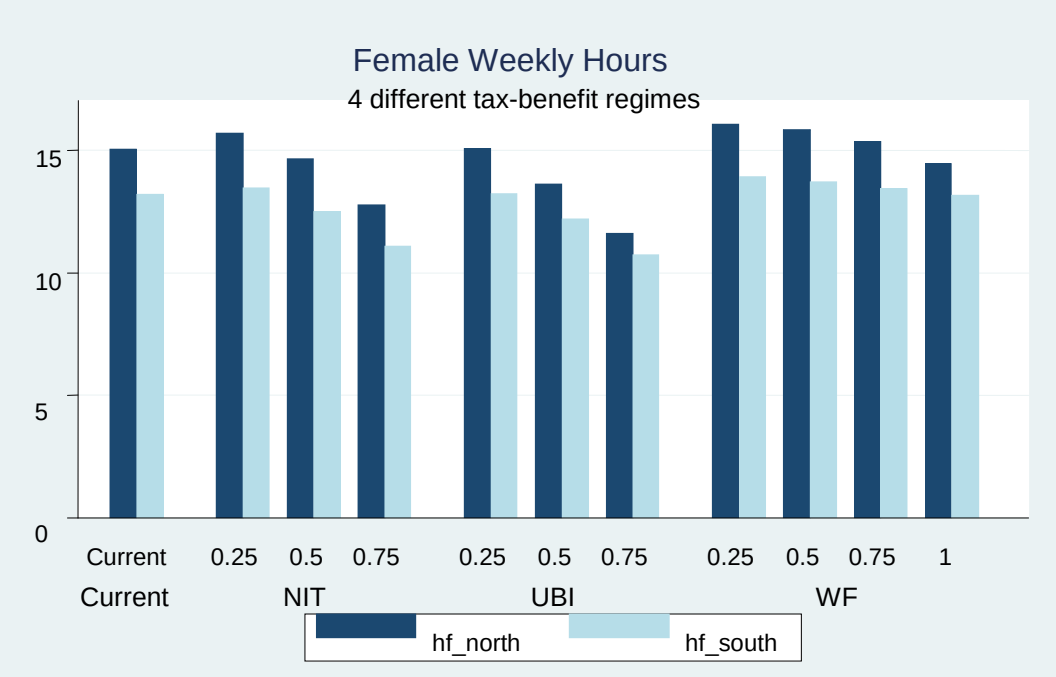
**Table 6 Changes in Average Hours for Benefit Receivers versus Non Receivers**

| | | NIT | | | WF | | | |
|---|---|---|---|---|---|---|---|---|
| **North** | | **0,25** | **0,5** | **0,75** | **0,25** | **0,5** | **0,75** | **1** |
| ***Male*** | Receiver | 0,15 | -1,52 | -3,88 | 0,9 | 0,92 | 0,68 | 0,26 |
| | Non_receiver | -0,6 | -2,7 | -5,2 | 1,17 | 1,14 | 1,08 | 0,95 |
| ***Female*** | Receiver | 0,45 | -0,7 | -2,28 | 0,21 | 0,45 | 0,26 | -0,1 |
| | Non_receiver | -0,12 | -1,04 | -1,99 | 1,02 | 0,78 | 0,28 | -0,67 |
| | Receivers in % | 55,00 | 10,82 | 17,19 | 0,00 | 0,02 | 0,06 | 0,12 |
| **South** | | | | | | | | |
| ***Male*** | Receiver | 0,55 | -0,62 | -2,33 | 0,92 | 0,86 | 0,59 | 0,13 |
| | Non_receiver | -0,13 | -1,67 | -3,61 | 0,89 | 0,82 | 0,72 | 0,47 |
| ***Female*** | Receiver | 0,64 | -0,39 | -2,29 | -0,28 | -0,07 | 0,16 | 0,55 |
| | Non_receiver | -0,09 | -0,64 | -2,18 | 0,74 | 0,57 | 0,25 | -0,3 |
| | Receivers in % | 10,19 | 20,18 | 30,61 | 2,50 | 9,21 | 18,13 | 27,32 |

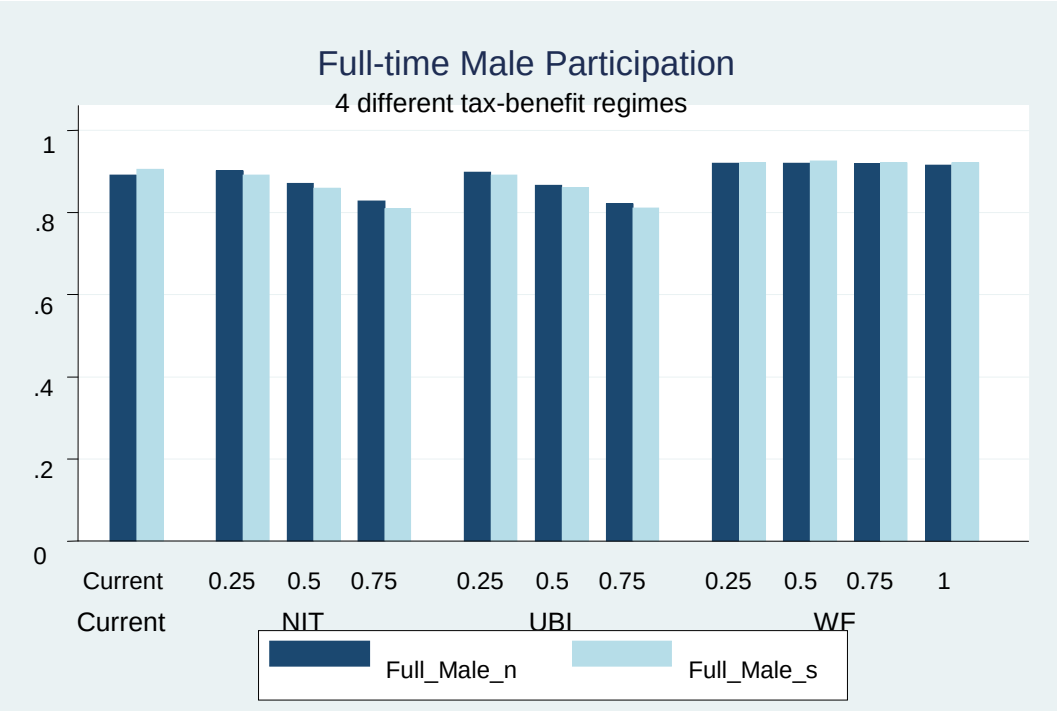
**Graph 1**



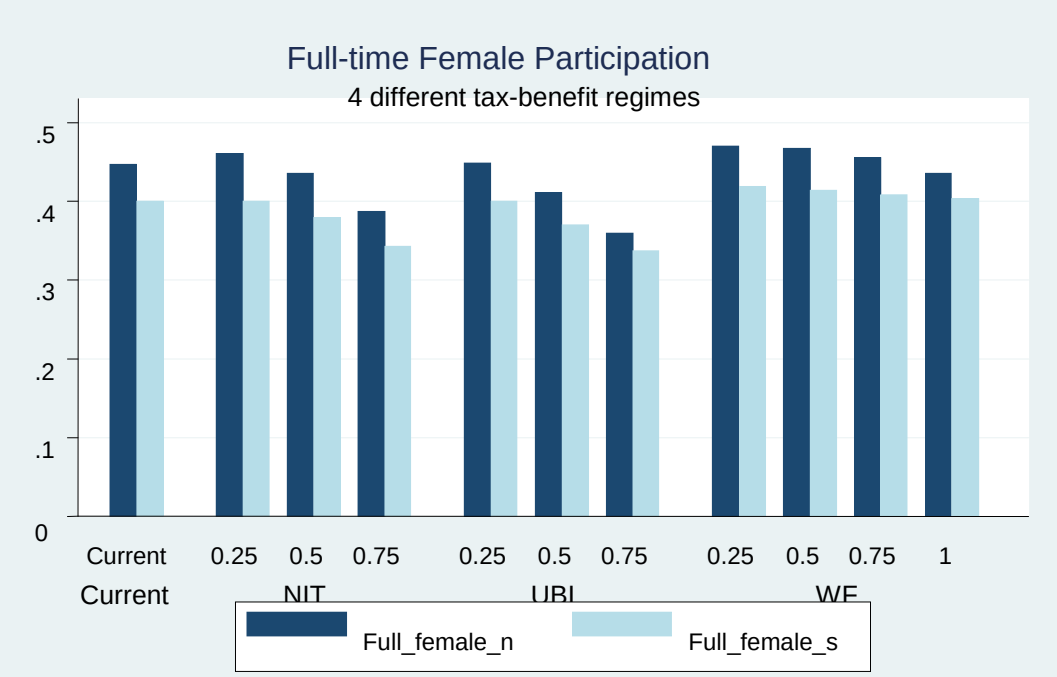

**Graph 2**



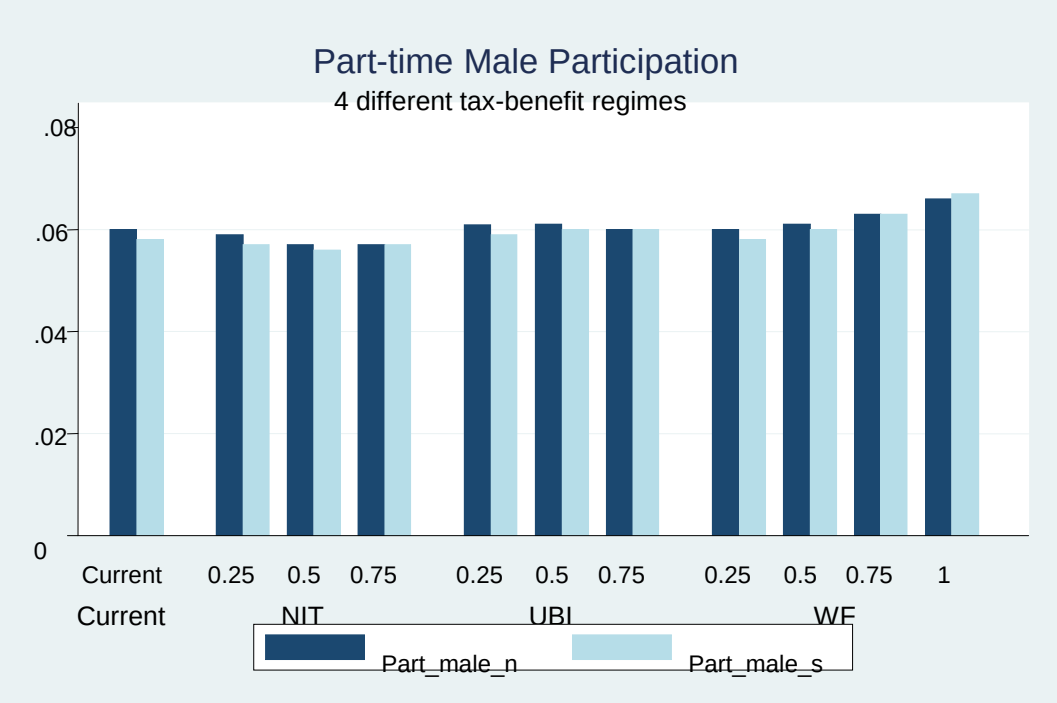
**Graph 3**



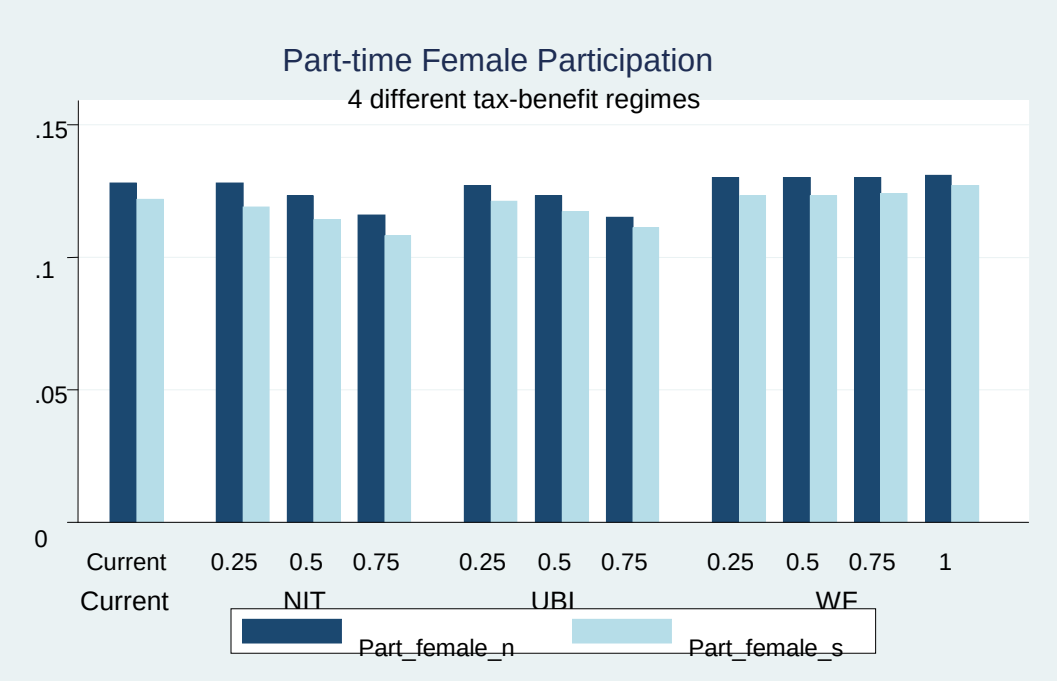

**Graph 4**



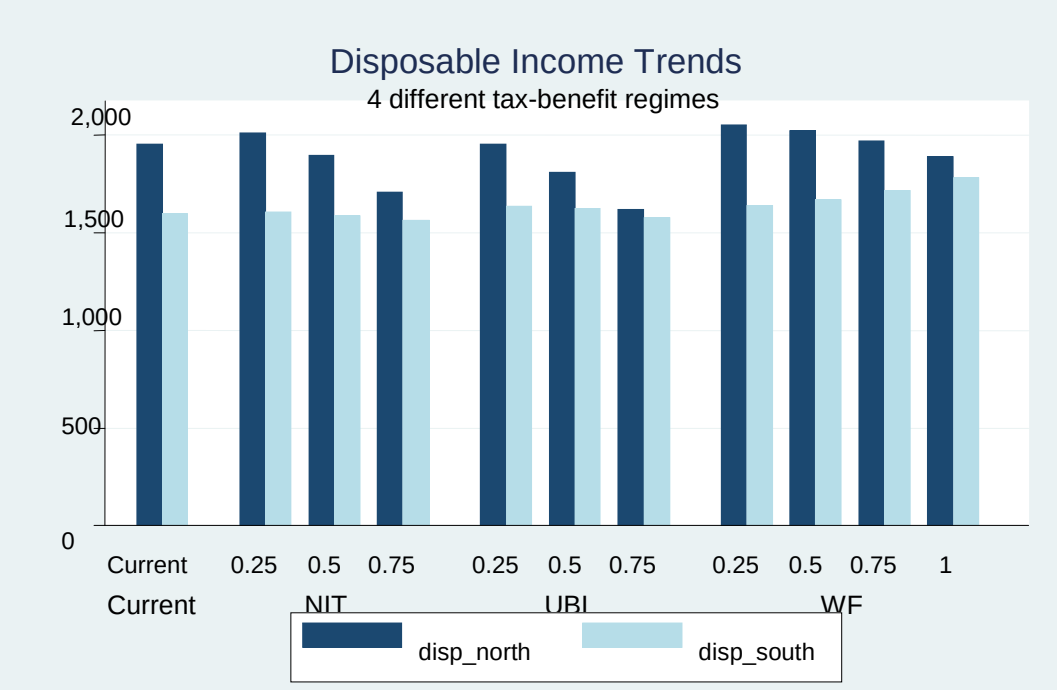
**Graph 5**



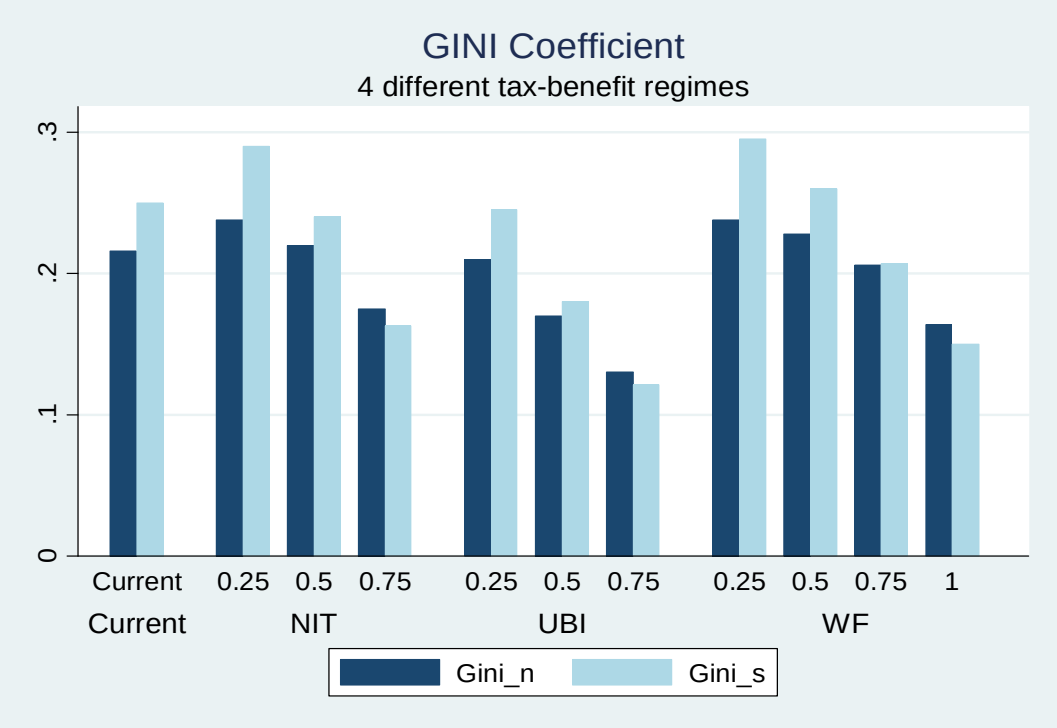

**Graph 6**



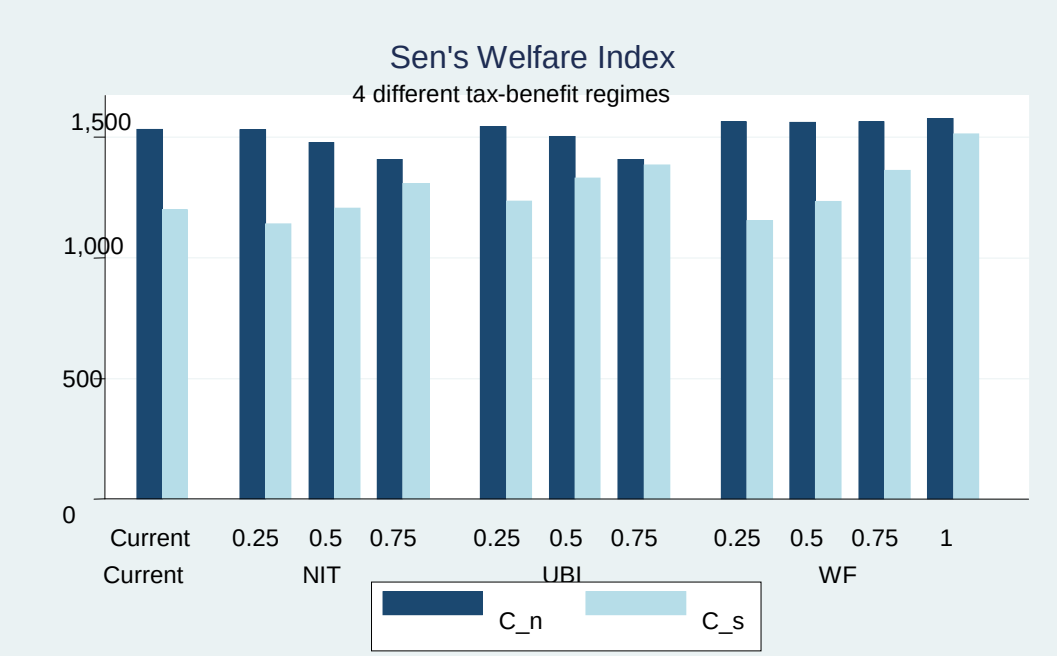
**Graph 7**




**Graph 8**



**Graph 9**


Sen's Welfare Index
4 different tax-benefit regimes
1,500
1,000
500
0
Current
0.25
0.5
0.75
0.25
0.5
0.75
0.25
0.5
0.75
1
Current
NIT
UBI
WF
C_n
C_s