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E. Narazani, I. Shima

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e-mail: de-child@unito.it
Web site: <http://www.child-centre.it>

Edlira Narazani¹, Isilda Shima²

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Abstract

In this paper we analyze the effects of Minimum Guaranteed Income (MGI) schemes on labor supply by applying a behavioral micro-simulation tax-benefit model. The database used in this study is composed of Italian households during the year 1998, extracted from Bank of Italy's SHIW1998. The Tax-Benefit Model applied is the static micro-simulation model of EUROMOD. A household labor 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 behavioral micro simulation tax-benefit are performed at national and regional level. Our main finding is that changes in labor supply due to these tax-transfer rules are small and this is in favor of such income support policies. Concerning tax-transfer rules without hours constraint, such as UBI and NIT, they imply labor 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.

Keywords: Household Labor supply, discrete choice models, minimum income guarantee, regional differences

¹ University of Turin

² European Center for Social Welfare Policy and Research

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1. Introduction

In order to enhance active inclusion policies, coordination between reforms in the tax system, active labor market policies and social protection schemes is 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 labor supply decision, at intensive margin (hours of work) and at the extensive margin (participation in the labor market). Therefore the empirical analysis of the effect of the MGI on labor 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.³

The Italian labor market is characterized by significantly different employment patterns across various regions. Therefore, the peculiarities of the Italian labor market and the partial application of RMI in some regions underlies an interesting experimental environment. Consequently, the main focus of this paper is to investigate whether there are significant differences between the regions as regards the behavioral and welfare effects of MGI reforms and discuss further their effect on labor participation decisions by applying a behavioral microsimulation tax-benefit model. Thus, the analysis of redistributive and labor 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 EUROMOD project⁴, which is a microsimulation tool that allows representation of household's budget constraint, and the distributional impact of changes to personal tax-benefit amounts due to specific policy reforms. Hence, using the Euromod, different labor 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 microeconomic model of household labor supply similar to the one developed by Aaberge et al. (1999). The model is used with the purpose of simulating the distributive and labor supply impact under different tax regimes such as negative income tax (NIT) and workfare tax (WT). Finally, the impact on labor

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⁴ (The source of database is the Household survey income and wealth (SHIW), Bank of Italy, 1998)

supply and disposal income level under these tax regimes is compared with the scenario when the universal basic income (UBI)⁵ 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 labor supply decisions at national level in general, and at regional level in particular, and provide some evidence relevant for testing the above hypothesis.

The rest of the paper is organized as follows. The next section discusses the RMI experiment in Italy, taxes, benefits, poverty level and employment trend at intensive and extensive margin by regions. The third section discusses the features of the microeconomic 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.⁶ The family benefit is a means tested benefit based on evidence of household income and the amount decreases while the family 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

⁵ 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 Parijs 2003.

⁶ "Assegni familiari" 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.

crisis or plant downsizing. Young people seeking their first employment and other people introduced for the first time to the labor 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 households⁷.

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)⁸ analyse the redistributive and labor supply effects of extending at national level the RMI and show that it has a positive impact on inequality and poverty while the overall labor 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 positive and desirable effects in these regions, 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 microeconomic model of labour supply using EUROMOD dataset for Italy. The estimated labor 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

⁷ 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".

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 one decision-maker (i.e. singles) or 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:

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

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)

Ω = 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).⁹

y^n = vector of exogenous household gross incomes

X^n = net household income

$R(\cdot)$ = 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).

The first two constraints say that the hours of work h_i are chosen within a discrete set of values, Ω , 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:

⁹ The hourly earnings estimation is available from the authors upon request.

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

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

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.¹⁰ 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 ε is i.i.d. extreme value of Type I, it is the probability that a given household chooses (f, m) is given by:

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

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

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

3.2. Utility function specification

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

¹⁰ 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.

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

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

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

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

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

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 value¹¹. 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:

¹¹ 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.

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

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

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

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

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

$$(11) \quad U_F = \begin{cases} 1 \rightarrow \textit{female_unemployed} \\ 0 \rightarrow \textit{otherwise} \end{cases} \quad U_M = \begin{cases} 1 \rightarrow \textit{male_unemployed} \\ 0 \rightarrow \textit{otherwise} \end{cases}$$

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

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

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)¹².

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 θ^{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:

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

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.

The possible reforms are a matter of considerable debate in Italy. On one hand, there is a quest for a flatter profile of the marginal tax rates in order to reduce disincentives and enhance efficiency. On the other hand, it is recognized that basic income support reforms provide transfers that are not cost-effective and do not respond to any explicit design of social or family policy. As a consequence, the system needs to be rationalized on a more transparent and universalistic basis. The ideas pertaining to this second issue converge on proposing some type of basic income scheme, either in the form of a universal transfer or in the form of transfer compensate incomes up to a basic level. Therefore, the quests for more efficiency via a flatter tax profile and for more equality via a more cost-effective system of income support should not be considered as mutually exclusive.

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:

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

¹² 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.

Where t_{FT} is a constant marginal tax rate. Besides incorporating the idea of minimizing distortions, it is also a benchmark system, useful for comparison.

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:

$$(15) \quad Tax_{NIT} = \begin{cases} t_{NIT}(Y - a * Poverty) \rightarrow Y > a * Poverty \\ 0 \rightarrow otherwise \end{cases}$$

and complementary which the benefits as below:

$$(16) \quad Benefit_{NIT} = \begin{cases} a * Poverty - Y \rightarrow Y \leq a * Poverty \\ 0 \rightarrow otherwise \end{cases}$$

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.¹³ 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 so¹⁴ 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:

$$(17) \quad Benefit_{WF} = \begin{cases} a * Poverty - Y \rightarrow (Y \leq a * Poverty) \& (h_M > H) \text{ or } (h_F > H) \\ 0 \rightarrow otherwise \end{cases}$$

¹³ 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:

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

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

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, given the other parameters of the tax-transfer rules. The MGI is represented by the simulated amount level of the benefits, which is determined by the poverty line explained in the appendix. 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 labor supply and their welfare measured in terms of expected maximum utility, considering the whole country and its regions.¹⁵ 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

¹⁵ 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.

revenue and the percentage of winners and losers for each policy disaggregated by gender and region.

Intensive Margin - Hours of Work

Looking at the labor supply decisions disaggregated by region and gender we notice that for the current model, male labor supply is slightly higher¹⁶ in the south than in the north while the opposite holds for female labor supply. Furthermore, we find that (Figure 1, Table 3) there are no labor disincentives both for males and females in case of WF Rule for both regions. As regards the NIT and UBI rules there are no labor 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 labor supply. However, Both UBI and NIT induce labor disincentives more in the South than in the North, with larger disincentives the greater is the generosity of the benefits. However, changes in labor 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 labor 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 labor supply changes across quintiles. Looking at NIT and UBI rules, male labor disincentives predominate for the lowest income quintiles in the whole country and moving from the lowest to the highest quintile, labor disincentives fade away in both regions and across tax transfer rules. Regional differences show up only in case of female such that disincentive effects are 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 regions and reach the lowest level for the first income quintile in case of females and last income quintile in case of males.

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 regions, in case of

¹⁶ In average, males in the south work only 41 minutes more than in the north, while females work almost two hours less.

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 labor supply behavior of the household's members may be attributable to their inclusion in these income support schemes.

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 regions and genders. The difference consists in the fact that for the WF rule the generosity level will have a positive impact on male labor supply while it will almost not affect that of females. For the NIT and UBI rules, male labor supply is almost neutral to the generosity level while female labor 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 labor supply elasticity at part time than at full time employment spell while female labor supply is almost inelastic. This result connotes that tax transfer rules without hour's constraint induce a more elastic labor supply amongst full time female working population while tax transfer rules with hour's constraint such as workfare induce a more elastic labor supply amongst the male part time participation either for north or for the south of Italy.

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.

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 level¹⁷. This implies that if there would be winners and losers¹⁸ 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.

*Sen's Welfare Index*¹⁹

Here, 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 behavioral 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 labor supply due to these tax-transfer rules are small and this is in favor of such income support policies. However, tax-transfer rules without hours constraint such as Universal Basic Income and Negative Income Tax imply labor disincentives more in the south than in the north of the country. Furthermore, benefit receivers undergo a smaller labor disincentive effect than 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 labor supply amongst full-time female working population while tax transfer rules

¹⁷ 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%.

¹⁸ 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.

¹⁹ 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.

with hour's constraint such as workfare induce a more elastic labor 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 differences in terms of welfare and behavioral effects in the design of plausible and sustainable tax-transfer policies.

References

Aaberge, R., Colombino U. (2000): "Equality of Opportunity versus Equality of Outcome as a basis for Evaluating Tax regimes: Empirical Evidence based on Italian data" CHILD working paper n.11.

Aaberge, R., J.K. Dagsvik and S. Strøm (1995): "Labor Supply Responses and Welfare Effects of Tax Reforms", *Scandinavian Journal of Economics* 4, 635-659.

Aaberge, R., Colombino U. and S. Strøm (1999): "Labor Supply in Italy: An Empirical Analysis of Joint Household Decisions with Taxes and Quantity Constraints", *Journal of Applied Econometrics*, 14, 403-422.

Aaberge, R., Colombino U. and S. Strøm (2004): "Do More Equal Slices Shrink the Cake? An Empirical Investigation of Tax-Transfer Reform Proposals in Italy", *Journal of Population Economics*, 17, 767-785.

Atkinson, A (1999): "The contributions of Amartya Sen to Welfare Economics", *Scandinavian Journal of Economics*, 101(2), 173-90.

Baldini M., Bosi P. and Toso S. (2002): "Targeting welfare in Italy, Old problems and Prospective on reforms," *Fiscal Studies*, 23(1) pp. 105-33.

Berliri and Parisi (2006), "The Distributive and Labor Supply Impacts of the Minimum Insertion Income: The case of Italy", *International Advances in Economic Research*, 12(2), pp. 213-227.

Duncan, A. and C. Giles (1996): "Labour supply incentives and recent Family Credit reforms", *Economic Journal*, 106, 142-157.

Van Soest A. (1994): Structural models of family labor supply: A discrete choice approach, *Journal of Human Resources*, 30, 63-88.

Van Soest, A. (1995): "Structural models of family labor supply", *Journal of Human Resources*, 30, 63-88.

Van Soest, A, Das, M. and Gong, X., (2002): A structural labour supply with flexible preferences, *Journal of Econometrics*, 107, 345-374

Van Soest, A. and M. Das (2001): "Family labor supply and proposed tax reforms in the Netherlands", *Journal of Human Resources*.

Appendix 1

Table 1 Conditional logistic estimation

Number of observations	2324
LR Chi Square	8843,37
Prob > chi2	0
Log_likelihood	7128,163

	Coefficient	Std. Err.	t value	Significance
Disposable Income				
Costant	0,001	0,001	2,560	**
Square	0,000	0,000	-4,510	***
Age_male	0,000	0,000	-4,700	***
Age_female	0,000	0,000	0,189	***
Number of children	0,000	0,000	-1,150	
Children under 6	0,000	0,000	0,290	
Children from 6 to 10	0,000	0,000	2,080	**
Leisure Female				
Costant	0,332	0,050	0,294	***
Square	-0,003	0,000	-7,660	***
Age	0,001	0,000	4,270	***
Number of children	0,001	0,003	0,370	
Children under 6	0,009	0,004	2,130	**
Children from 6 to 10	0,010	0,005	2,120	**
Leisure Male				
Costant	0,190	0,037	5,210	***
Square	-0,002	0,000	-8,560	***
Age	0,000	0,000	0,340	
Number of children	-0,005	0,003	-1,470	*
Children under 6	0,002	0,005	0,460	
Children from 6 to 10	0,008	0,006	1,500	*
Fixed Effect Dummies				
Participation_male	-3,661	0,308	-11,900	***
Participation_female	-4,423	0,247	-17,880	***
Part_time_male	0,563	0,290	0,107	*
Part_time_female	1,413	0,251	0,251	***
Full_time_male	3,236	0,354	9,130	***
Full_time_female	2,999	0,323	9,280	***
Extra_time_male	2,342	0,367	6,390	***
Extra_time_female	1,586	0,411	0,185	***
Unemployment_male	-0,149	0,129	-1,150	

Unemployment_female -1,793 0,078 -23,120 ***

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

Table 2 Descriptive statistics on the observed and predicted sample

Variable	Current		Predicted	
	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	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
Unemployment_female	0,09	0,28	0,09	0,02
Number of observations in the North				1424
Number of observations in the South and Center				900

The table 2 presents the observed and predicted labor supply and income components indicating that the model predicts quite well our interest variables.

Table 3 Labor 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 Labor 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*

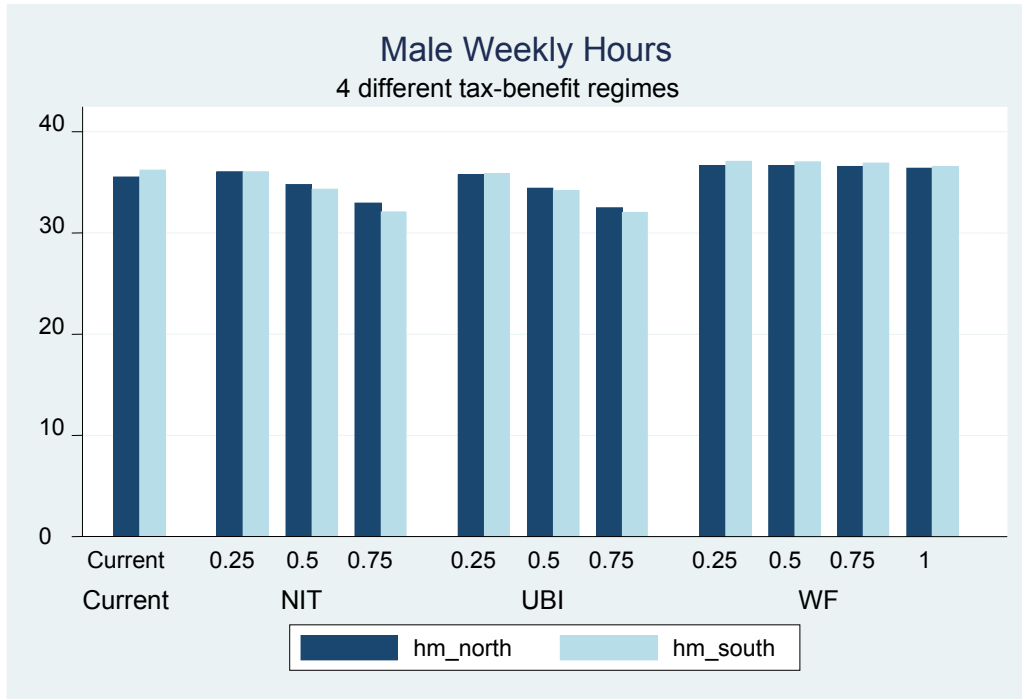
Table 5 Change in Hours by Income Quintile, Gender and Region

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		
<hr/>													
SOUTH		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	-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		

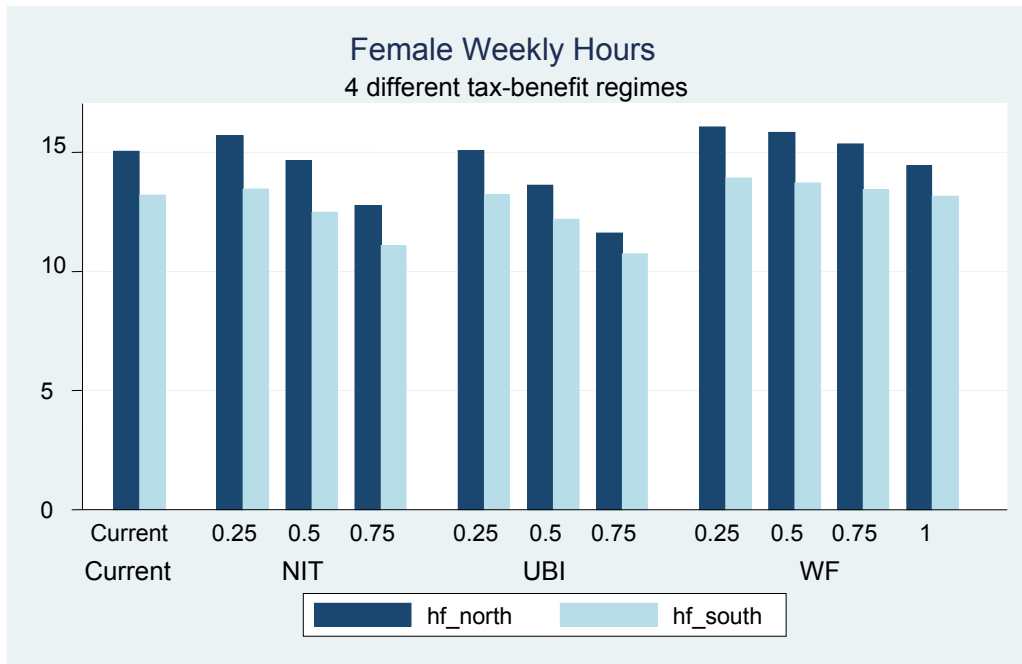
Table 6 Changes in Average Hours for Benefit Receivers versus Non Receivers

		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

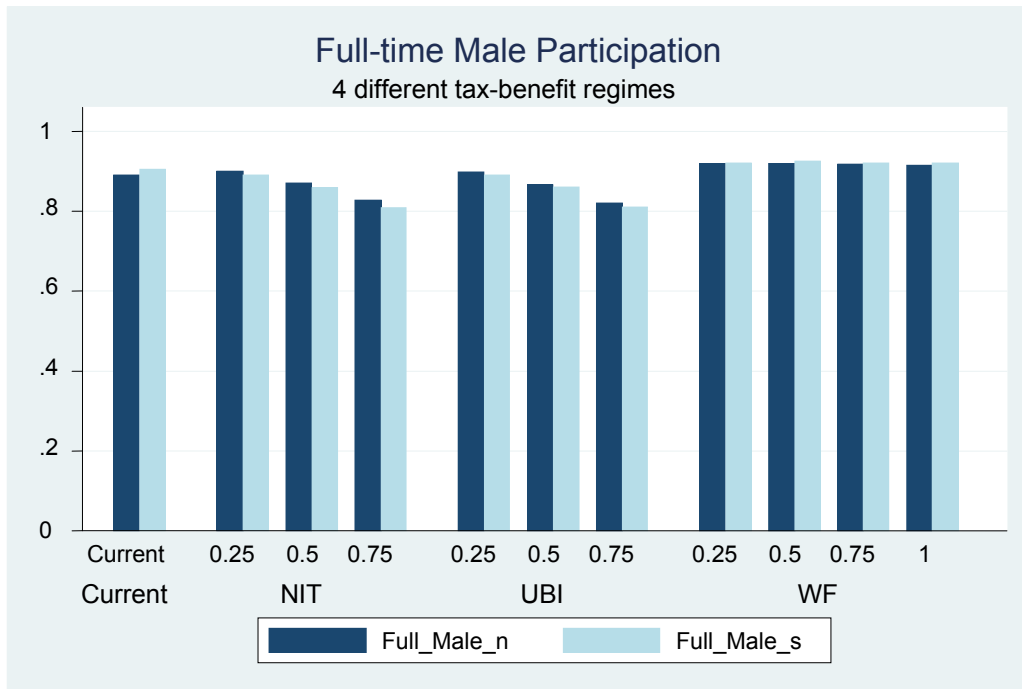
Graph 1



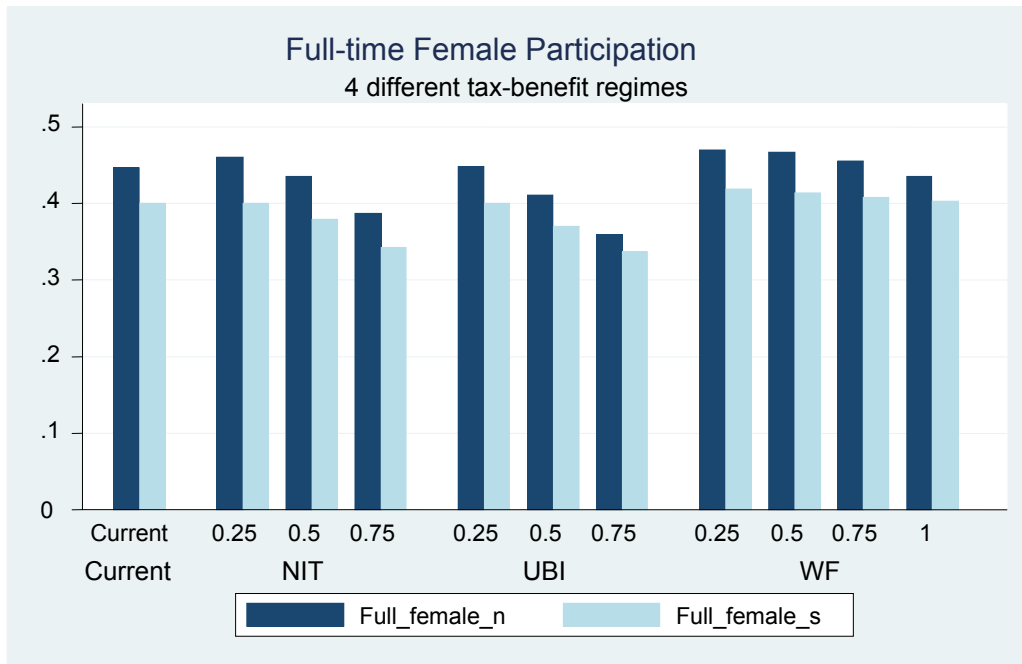
Graph 2



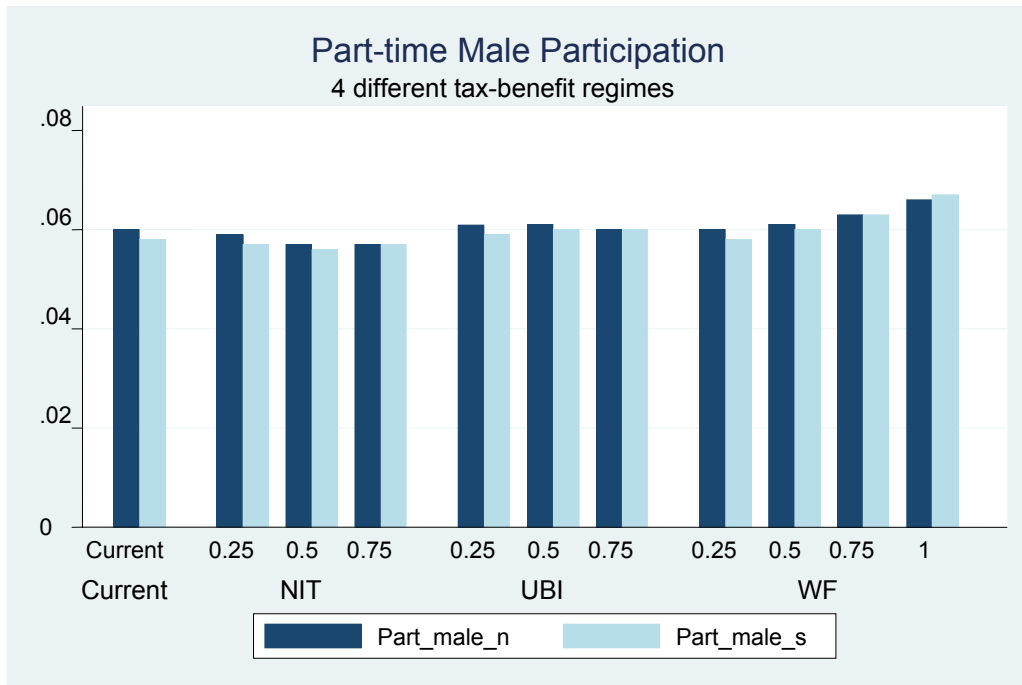
Graph 3



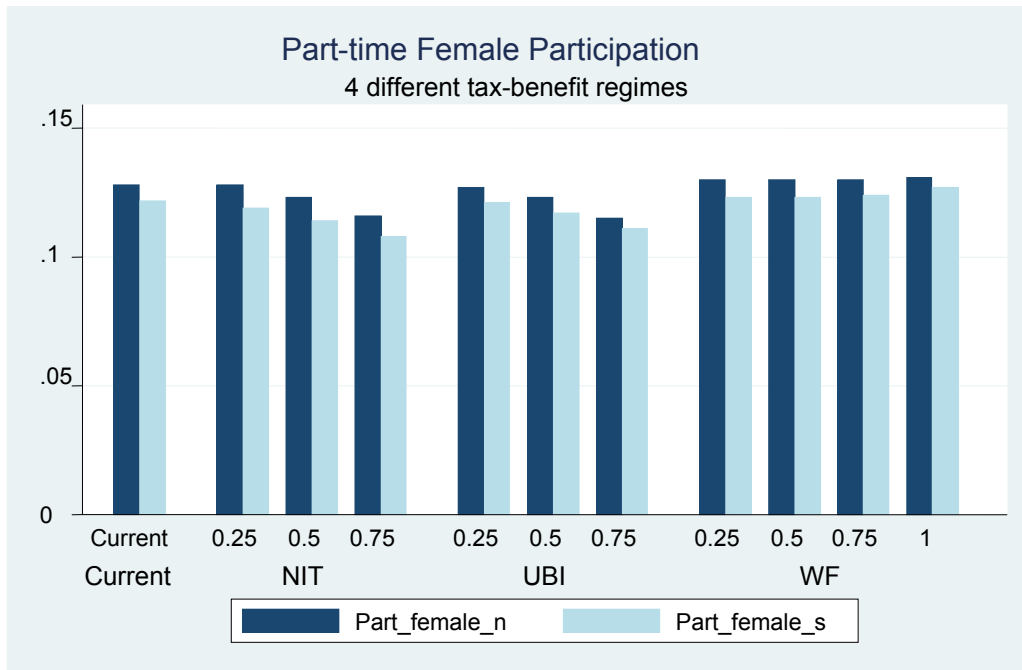
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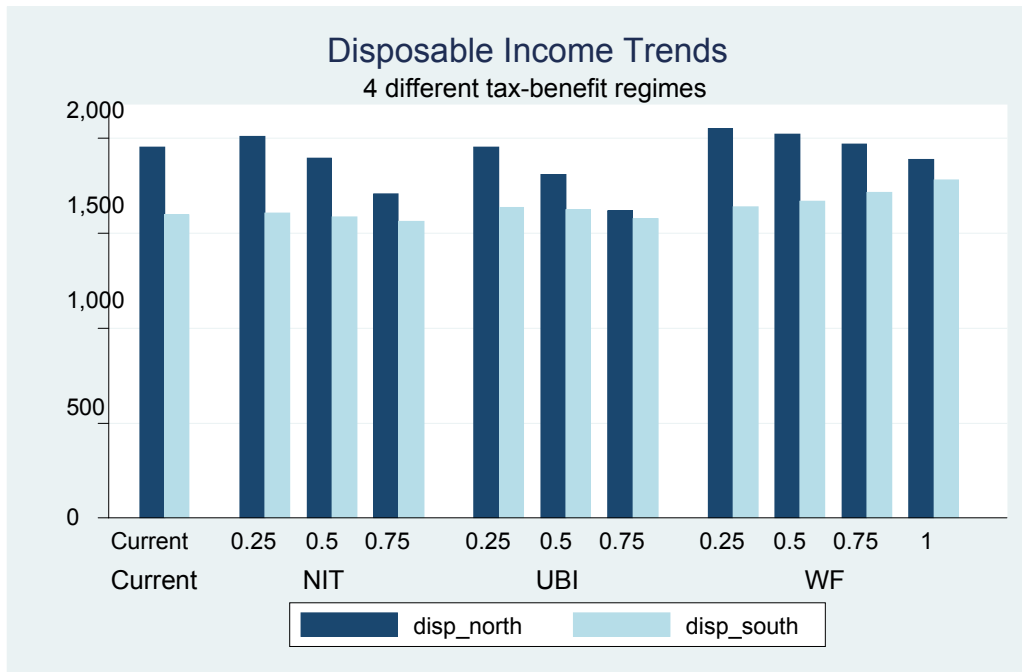
Graph 5



Graph 6



Graph 7



Graph 8

