Five Crossroads on the Way to Basic Income: An Italian Tour

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ABSTRACT

Five Crossroads on the Way to Basic Income: An Italian Tour*

The current Italian income support policies are defective with respect to both efficiency and equity. A more effective design must face five crucial choices: universal vs. categorical policies; transfers vs. subsidies; unconditional vs. means-tested policies; coverage; flat vs. progressive tax rules. Using a microeconometric model and a social welfare methodology, we simulate the effects of 30 versions of three basic types: guaranteed minimum income, unconditional basic income and wage. The simulation preserves fiscal neutrality and adopts a methodology that allows for market equilibrium and ensures a consistent comparative statics interpretation of the results. The social welfare optimal policy is an unconditional transfer coupled with a wage subsidy, with a total benefit amounting to about 70% of the poverty level, or – depending on the social welfare criterion – a pure unconditional transfer amounting to 100% of the poverty level.

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* This paper uses EUROMOD for computing the budget constraints under the current tax-benefit system when preparing the data set for estimating the microeconometric model. EUROMOD is a tax-benefit microsimulation model for the European Union that enables researchers and policy analysts to calculate, in a comparable manner, the effects of taxes and benefits on household incomes and work incentives for the population of each country and for the EU as a whole. EUROMOD was originally designed by a research team under the direction of Holly Sutherland at the Department of Economics in Cambridge, UK. It is now developed and updated at the Microsimulation Unit at ISER (University of Essex, UK). Edlira Narazani, Marilena Locatelli and Flavia Coda Moscarola, research assistants at the Department of Economics Cognetti De Martiis, have contributed to various stages of this work by performing econometric estimations, statistical tests and policy simulations. Financial support by the Compagnia di San Paolo is gratefully acknowledged.

1. Introduction

In this paper we explore the feasibility and the optimal features of a universal policy of income support in Italy. The empirical evidence (e.g. Baldini et al. 2002, Aaberge et al. 2004, Sacchi 2005, Colonna and Marcassa 2012, Baldini and Toso 2013) suggests that the current Italian income support policies are defective with respect to both efficiency goals (e.g. supporting labour mobility) and equity goals (e.g. reducing poverty and economic insecurity) and because of the lack of a basic universal support mechanism. Moreover, since 2008 the economic crisis has put much stress on the current policies, confirming their shortcomings and stimulating a debate on the need for a redesign.[1] This paper is meant to provide an empirical contribution to the debate. In principle the formulation of the problem is provided by optimal taxation theory, i.e. we aim at designing an income support mechanism that replaces the actual policies and maximizes a given social welfare function subject to a public budget constraint. However, instead of looking for an analytical solution we adopt a computational-empirical approach. Namely, we use a microeconometric model and a social welfare methodology in order we explore and evaluate various alternatives mechanisms.[2] In illustrating the motivations, the methods and the results, we will refer to five issues that emerge as crucial in the analysis of reforms, whether hypothetical or implemented.

1. Is a universal income support mechanism feasible and desirable as an alternative to the categorical and selective current policies? We will investigate whether universalistic reforms are feasible with respect to the public budget constraint and desirable according to a social welfare criterion.
2. Should the mechanism consist of a transfer or a subsidy or a combination of the two? Most numerical simulations done with the model of Mirrlees (1971) suggest as an optimal system a tax-transfer schedule with a lump-sum transfer, very high marginal tax rates on low income and almost constant marginal tax rates on average and high income. This scenario seems to have inspired many reforms (implemented or discussed) in the three decades 1970-80-90. A second scenario emerges at the end of the 90s, with contributions (e.g. Diamond 1998 and Saez 2001, 2002) that make Mirrlees' model more amenable to econometric applications, e.g. Immervoll et al. (2007), Haan et al. (2007), Blundell et al. (2009). A frequent result emerging from these empirical exercises – based on Saez (2002)'s theoretical model - is the superiority of policies such as in-work benefits, or tax-credit on low earnings. Analogous policies have been in part implemented or considered as alternatives to mean-tested transfers in various

[1] In 2012 the Italian Parliament has introduced a reform of labour market and income support policies. Although the reform is being declared as inspired by more universalistic principles and it contains indeed some move toward that direction, so far it does not seem to change the basic characteristics of the current system.

[2] The approach is close to Fortin et al. (1993) and Aaberge et al. (2004). More complex exercises, where a social welfare index is maximized with respect to the parameters of the tax rule, within a class of piecewise-linear rules, are presented by Aaberge and Colombino (2012, 2013) and Blundell and Shephard (2012). A project specifically focussed on a flexible computational optimization of income support policies is illustrated in Colombino (2012).

countries during the last decade.[3] Although nothing prevents the design of mechanisms that combine the transfers and subsidies, the theoretical nature of the optimal taxation literature (even in its empirical applications) in practice has forced the analysis to address transfer-based and subsidy-based mechanisms as if they were strictly alternative. In what follows we consider transfer-based, subsidy-based and mixed policies.

3. Should a transfer be unconditional or conditional (mean-tested)? Theoretical contributions tend to be ambiguous: for example Besley (1990) concludes for the superiority of mean-testing, while Sadka et al. (1982) favour unconditional policies. The transfers mentioned at point 2) are typically conditional. However, the alternative of unconditional transfers deserves consideration at least because by construction avoids "poverty traps" and entails low administrative costs.[4] Moreover, recent ex-post reform evaluations (Barrientos and Lloyd-Sherlock 2002) and experimental evidence (Standing 2008, Blattman et al. 2013) suggest that unconditional transfers might promote more efficient choices in education, production and occupational career. Given the model and the data used, our study will only be able to throw light on the issues of the relative redistributive performance, the poverty trap and the incentives to participation; however, the evidence mentioned above strongly motivates the interest in analysing the alternative conditional/unconditional policies.

4. How generous should the policy be? The typical level of a guaranteed income (in proposed or implemented reforms) – either as a transfer or though a subsidy – is not larger than the poverty level and in most cases is much lower, mainly because the mechanisms are usually designed as complementary with respect to other welfare and social policies. In this paper we will investigate the performance of transfers or subsidies of different amounts up to the Poverty Level.

5. Should taxes (that also finance the income support mechanism) be progressive or flat? Universal transfers have been frequently proposed together with the flat-tax (e.g. Atkinson 1995). The transfer makes the system progressive anyway, even when coupled with a flat tax rate (which is attractive on its own for its simplicity and transparency). A different motivation for the flat tax is that it promises to counterbalance the costs and/or the (supposedly) negative incentives coming from income support with better incentive to labour supply for the (supposedly) most productive fraction of the population. These last motivations must be checked against many arguments in favour of progressive marginal rates (e.g. Diamond and Saez 2011), in particular, among them, the empirical evidence upon the intensive and extensive labour supply elasticities (e.g. Aaberge and Colombino 1999, 2004, 2013; Meghir and Phillips 2008). In our simulation

[3] Recent empirical analysis of the effects of policies such as in-work benefits or tax credits include, among others, Fang and Keane (2004) for the US, Francesconi et al. (2009) for the UK and Aaberge and Flood (2008) for Sweden.

[4] Studies of the US found that administrative costs of unconditional programs are 2.5% compared to a range 4.8% - 13.5% for means tested programs (van de Walle and Neads, Eds., 1996).

exercise both flat-tax and progressive-tax versions of the alternative income support mechanisms are analysed.

2. The reforms

We simulate and evaluate alternative hypothetical reforms that replace the actual tax-transfer system. They are stylized cases representative of the different scenarios that are discussed or even actually implemented in many countries. A key parameter in the definition of the policies is the threshold G defined as follows. Let

x_i = total net available income (current) of household *i* (including both couples and singles).

N_i = total number of components of household i.

Define the "individual-equivalent" income: $\tilde{x}_i = x_i / \sqrt{N_i}$ and the Poverty Line $P = \text{median}(\tilde{x})/2$. Then $G_i = aP\sqrt{N_i}$, where *a* is a proportion. The "square root scale" is one of the equivalence scales commonly used in OECD publications. For each reform we simulate three versions with different values of *a*: 1, 0.75 and 0.50. For example, $G = 0.5P\sqrt{3}$ means that for a household with 3 components the threshold is ½ of the Poverty Line times the equivalence scale $\sqrt{3}$.

Guaranteed Minimum Income (GMI). Each individual receives a transfer equal to $G - I$ if single or $G/2 - I$ if partner in a couple provided $I < G$ (or $I < G/2$), where I denotes individual taxable income. This is the standard conditional (or means-tested) income support mechanism, close to a Negative Income Tax (Friedman 1962; Tobin 1966) with a 100% marginal reduction rate.

Unconditional Basic Income (UBI). Each individual receives an unconditional transfer equal to *G* if single or *G/2* if partner in a couple. It is the basic version of the system discussed for example by Van Parijs (1995) and also known in the policy debate as "citizen income" or "social dividend" (Meade 1995; Van Trier 1995).

Wage Subsidy (WS). Each individual receives a 10% subsidy on the gross hourly wage and her/his income is not taxed as long as her/his gross income (including the subsidy) does not exceed *G* if single or *G/2* if partner in a couple. In essence, this is close to various in-work benefits or tax-credits reforms introduced in the USA (Earned Income Tax Credit), in the UK (In-Work Benefits) and recently also in Sweden. Figari (2011), Colonna and Marcassa (2012) and De Luca et al. (2012) simulate the performance of hypothetical reforms of the in-work benefit or tax-credit type in Italy.

GMI + WS and **UBI + WS** are mixed mechanisms where the transfer is complemented by the wage subsidy: in these cases the threshold *G* is reset as 0.5*G*. A mixed system close to GMI+WS is proposed by De Vincenti and Paladini (2009).

For each of the above five types we distinguish two versions: a flat tax version, in which the tax rule applied to incomes above *G* for singles or *G/2* for the partners of couple is a fixed proportion t; a progressive tax version, in which the tax rule is progressive and replicates the current system with marginal tax rates proportionally adjusted according to a constant τ. The parameters t and τ are endogenously determined within the reform simulation so that the total net tax revenue is equal to the one collected under the current tax-transfer system.

Altogether we have 5 (types) × 3 (values of *a*) × 2 (tax rules) = 30 reforms. We chose to consider a large set of general reform design since we think this approach is more appropriate for the current status of the debate in Italy: more explorative rather than focussed on a specific policy. The Appendix provides a more detailed description of the reforms by specifying net available income as a function of taxable income.

3. The microeconometric model

3.1. Household behaviour

The basic modelling framework belongs to the Random Utility family. We will consider households with two decision-makers (couples) or one decision-maker (singles). In both cases the decision-makers are aged 20 – 55 and are not retired nor students. Of course there might be other people in the household, but their behaviour is taken as exogenous. We adopt a "unitary" representation of the household decision process.[5] Couple *n* is assumed to solve the following problem

$$\begin{aligned} &\max_{h_F, h_M, j} U^n(C, h_F, h_M, j) \\ &\text{s.t.} \\ &(h_F, h_M, j) \in \Omega \\ &C = R(w_F^n h_F, w_M^n h_M, y^n) \end{aligned} \qquad (1)$$

where

$U^n(C, h_F, h_M, j)$ = utility function

h_g = average weekly hours of work required by the chosen job in the choice set for partner of gender g = F (female) or M (male);

w_g^n = hourly wage rate of partner g;

y^n = vector of exogenous household gross incomes;

C = net disposable household income;

j = unobserved (by the analyst) characteristics of the household-job match;

Ω = opportunity set containing jobs (h_F, h_M, j), including those with $h_F = 0$ and/or $h_M = 0$;

R = tax-transfer rule that transforms gross incomes into net available household income.

The first two constraints of problem (1) say that the hours of work h_g are chosen within a discrete set of values A including also 0 hours. This discrete set of values can be interpreted as the actual choice set (maybe determined by institutional constraints) or as approximations to the true (possibly continuous) choice set. The

[5] We did not adopt the alternative "collective" approach (e.g. Vermeulen 2006) because of its severe identification requirements (at least with our available data). Moreover, the typical empirical strategy adopted with the collective approach (the so-called decentralized – sharing rule specification) raises some doubts about its applicability to tax reform evaluation problems, since it requires convex opportunity sets and it does not provide a structural representation of the household decision process.

third constraint says that net income C is the result of a tax-transfer rule R applied to gross incomes.

We write the utility function $U^n(C, h_F, h_M, \varepsilon)$ as the sum of a parametric systematic part and a random component:

$$\mathrm{U}^n(C, h_F, h_M, j) = V(R(w_F^n h_F, w_M^n h_M, y^n), h_F, h_M, Z^n; \theta) + \varepsilon(j) \qquad (2)$$

where Z^n is a vector of household characteristics, θ is a vector of parameters to be estimated and the random variable ε accounts for characteristics of the job-household match that are observed by the household but not by the researcher (McFadden 1974).

We denote with $p(h_F, h_M)$ the relative frequency (or probability density function) of jobs of type $(h_F, h_M) \in \Omega$. The random variable ε is assumed to be i.i.d. Type I Extreme Value. By specifying $p(h_F, h_M)$ as "uniform with peaks", it turns out that we can write the probability that household n subject to tax-transfer regime R chooses $h_F = f, h_M = m$ as follows:[6]

$$P^n(f, m; \theta, R) = \frac{\exp\left\{V\left(R(w_F^n f, w_M^n m, y^n), f, m, Z^n; \theta\right) + \sum_{k=1}^{4} \gamma_{Fk} D_{Fk}(f) + \sum_{k=1}^{4} \gamma_{Mk} D_{Mk}(m)\right\}}{\sum_{(h_F, h_M)} \exp\left\{V\left(R(w_F^n h_F, w_M^n h_M, y^n), h_F, h_M, Z^n; \theta\right) + \sum_{k=1}^{4} \gamma_{Fk} D_{Fk}(h_F) + \sum_{k=1}^{4} \gamma_{Mk} D_{Mk}(h_M)\right\}} \qquad (3)$$

where

$$D_{g1}(h_g) = \begin{cases} 1 \text{ if } 17 \le h_g \le 32 \\ 0 \text{ otherwise} \end{cases}$$

$$D_{g2}(h_g) = \begin{cases} 1 \text{ if } 33 \le h_g \le 48 \\ 0 \text{ otherwise} \end{cases}$$

$$D_{g3}(h_g) = \begin{cases} 1 \text{ if } 49 \le h_g \\ 0 \text{ otherwise} \end{cases} \qquad (4)$$

$$D_{g4}(h_g) = \begin{cases} 1 \text{ if } 0 < h_g \\ 0 \text{ otherwise} \end{cases}$$

with g = F (female) or M (male).

In a similar way, a single s of gender g is assumed to solve a constrained utility maximization problem as follows:

[6] See for example Aaberge et al. (1995, 1999), Dagsvik (2000a), Dagsvik and Strøm (2006) and Colombino (2013).

$$\begin{aligned}&\max_{h,j} U_g^s(C,h,j)\\&\text{s.t.}\\&(h,j)\in\Omega_g\\&C=R(w^s h, y^s)\end{aligned} \qquad (5)$$

where
h = average weekly hours of work required by the chosen job.
In this case, the utility function $U_g^s(C,h,j)$ will be written as follows:

$$U_g^s(C,h;j)=V(R(w^s h, y^s),h,Z^s;\theta_g)+\varepsilon(j) \qquad (6)$$

Proceeding as we did with couples we end up with:

$$P^s(g;\theta_g,\gamma_g,R)=\frac{\exp\left\{V\left(R(w_g^s g, y^s),g,Z^s;\theta\right)+\sum_{k=1}^{4}\gamma_{gk}D_{gk}\left(g\right)\right\}}{\sum_h \exp\left\{V\left(R(w_g^s h, y^s),h,Z^s;\theta\right)+\sum_{k=1}^{4}\gamma_{gk}D_{gk}\left(h\right)\right\}} \quad (7)$$

As shown in Colombino (2013), coefficients of the dummies can be given the following interpretation, which turns out to be useful for the development of the equilibrium simulation procedure (Section 4.1):

$$\begin{aligned}&e^{\gamma_{g4}}\propto J_g,\\&e^{\gamma_{gk}}\propto J_{gk}\big/J_g, k=1,2,3.\end{aligned} \qquad (8)$$

where J_g is the number of market jobs available in gender g's opportunity set and J_{gk} is the number of market jobs with hours h such that $D_{gk}\left(h\right)=1$.[7] When computing (3) and (7), the set of hours values is approximated by a discrete set containing the value 0 plus ten values randomly chosen from the ten intervals of weekly hours 1-8, 9-16, 17-24, 25-32, 33-40, 41-48, 49-56, 57-64, 65-72, 73-80. Therefore the singles' and the couples' opportunity sets contain respectively 11 and 121 alternatives.[8] In order to compute net household income C for each alternative we use the EUROMOD Microsimulation model.[9] First, EUROMOD is used to generate the gross incomes since the Italian data are originally collected as net incomes. Gross wage rates are computed by dividing gross earning by hours of work. Given the gross wage rates, we compute gross earnings and incomes at each point in the choice set. Finally, EUROMOD is used again to compute net

[7] Expressions (3) and (7) are close to other multinomial logit models "augmented" by alternative-specific dummies (e.g. Van Soest, 1995; Kornstad and Thoresen, 2007). Here however we adopt a specific structural interpretation of the dummies' coefficients according to expression (8).
[8] A comparison and evaluation of different procedures to specify the choice set is provided by Aaberge et al. (2009).
[9] EUROMOD is a tax-benefit microsimulation model for the European Union that enables researchers and policy analysts to calculate, in a comparable manner, the effects of taxes and benefits on household incomes and work incentives for the population of each country and for the EU as a whole. EUROMOD was originally designed by a research team under the direction of Holly Sutherland at the Department of Economics in Cambridge, UK. It is now developed and updated at the Microsimulation Unit at ISER, Essex, U.K.

income C at each point in the choice set. Wage rates are assumed to be independent of hours of work required on the various jobs available in the choice set.[10]

For the observations with missing data on earnings and/or hours of work, gross wage rates are imputed on the basis of a wage equation estimated on the subsample with data on earnings and hours and corrected for sample selection. The procedure for selection-correction follows Dagsvik (2000b) and is compatible with assuming the same process for the selection of the subsample and the labour supply decision, although it does not a priori constrain the two processes to be identical.[11] The random component of the wage equation is taken into account when computing C and other quantities involving the wage rate and is integrated-out with a simulation procedure.

3.2. Empirical specification of preferences

We choose a quadratic specification since it represents a good compromise between flexibility and ease of estimation:

$$\begin{aligned} V^n = {} & \theta_C C + \theta_F (T-h_F) + \theta_M (T-h_M) + \theta_{CC} C^2 + \theta_{FF} (T-h_F)^2 + \theta_{MM} (T-h_M)^2 + \\ & + \theta_{CF} C(T-h_M) + \theta_{CM} C(T-h_M) + \theta_{FM} (T-h_F)(T-h_M) \end{aligned}$$

$$V^s = \theta_C C + \theta_g (T-h_g) + \theta_{CC} C^2 + \theta_{gg} (T-h_g)^2 + \theta_{Cg} C(T-h_g) \qquad (9)$$

where V^n and V^s denote the systematic part of the utility function respectively for couples and singles and *T* denotes total available time.

Some of the above parameters θs are made dependent on characteristics:

[10] Since also the self-employed are included in the sample, it might be important to drop the independence assumption. We tried to estimate different wage rate functions for different hour intervals but we did not obtain satisfactory results. We can add that we also estimated the model and run some simulations on the wage-employed subsample and we did not obtain important differences.

[11] The estimates of the wage equation are not reported here and are available upon request from the author. It is possible to adopt a simultaneous method of estimation even without restricting the two processes to be identical. However we do not think that a simultaneous method is obviously superior, although in principle it is more efficient than two-step procedures. While the likelihood of the Conditional Logit model has nice properties and ensures an easy convergence of the estimates, the same is not necessarily true of a likelihood that incorporates a wage function to be estimated. Our personal experience with both simultaneous and two-step procedures in practice speaks in favour of the latter as more flexible and robust.

$$\theta_F = \beta_{F0} + \beta_{F1}(\text{Age of the wife}) + \beta_{F2}(\text{Age of the wife})^2 + \\ +\beta_{F3}(\#\text{Children}) + \beta_{F4}(\#\text{Children under 6}) + \beta_{F5}(\#\text{Children 6-10})$$

$$\theta_M = \beta_{M0} + \beta_{M1}(\text{Age of the husband}) + \beta_{M2}(\text{Age of the husband})^2 + \\ +\beta_{M3}(\#\text{Children}) + \beta_{M4}(\#\text{Children under 6}) + \beta_{M5}(\#\text{Children 6-10})$$

$$\theta_g = \beta_{g0} + \beta_{g1}(\text{Age}) + \beta_{g2}(\text{Age})^2 + \\ +\beta_{g3}(\#\text{Children}) + \beta_{g4}(\#\text{Children under 6}) + \beta_{g5}(\#\text{Children 6-10})$$

$$\theta_C = \beta_{C0} + \beta_{C1}(\text{Household's size}).$$

(10)

Notice that the parameters are estimated separately for couples, single females and single males.

3.3. Data and estimates

For the estimation and simulation exercise we use a EUROMOD dataset based on the Survey of Household Income and Wealth (SHIW) 1998. More recent datasets are of course available. However, from the perspective of the policy simulations, pre-2001 data might be preferable since they do not suffer from the turbulent macroeconomic scenarios that characterize the post-2001 years. Since 1998 the basic structure of the tax-transfer system has remained essentially the same, a part from some adjustments in marginal tax rates and in the amount of some transfers.
The inclusion criteria are as follows:

- Couple and single households;
- Employed (self-employed included), unemployed or inactive (students and disabled are excluded);
- Both partners of couple households and heads of single households aged 20 – 55.

The Maximum Likelihood estimates based on the sample of couples, single men and single women (respectively 2955, 291 and 366 observations) are reported in Table 1.

In order to illustrate the behavioural implications of the estimates, in Table 2 we present the labour supply (wage) elasticities by gender, family status and income decile. The elasticities are estimated by microsimulation: namely, we increment the gross wage rates by 1%, compute the change in expected worked hours individual by individual, aggregate the changes across the sample and then translate them into the elasticity measure. The Table confirms the common results of higher elasticities for the females (in particular married females) and elasticities inversely related to the level of income.

[Table 2 approximately here]

Table 3 documents the model’s fitting performance by comparing the observed and the simulated choices of alternative ranges of weekly hours of work. The ability to replicate the observed choice appears to be pretty good, somewhat less satisfactory for singles.

[Table 3 approximately here]

Most of the observations at most of the points in the choice set satisfy the regularity conditions for the utility function (systematic part). In Table 4 we show, for couples and singles, the percentage of observations with utility function increasing in income, increasing in leisure and quasi-concave, when computed at the chosen alternative or at all the alternatives in the choice set. Most of the violations are concentrated on alternatives that are chosen by a small number of households. The regularity statistics at all alternatives in the choice set are particularly important in view of policy simulation and represent a much more severe test than the regularity statistics at the chosen alternative: yet the results turn out to be rather close for the two types of statistics.
[Table 4 approximately here]

4. Policy simulation and evaluation

4.1. The simulation procedure

The simulation has two distinctive features that are not common in the tax reform literature.

First, the reforms are simulated under the constraint of being fiscally neutral, i.e. they generate the same total net tax revenue as the 1998 system. The calibration parameters are a constant tax rate *t* in the Flat tax systems and a proportional change τ of the current marginal tax rates in the Progressive tax systems.

Second, the simulation is conducted under equilibrium conditions. We adopt a procedure – fully explained in Colombino (2013) – that is specifically appropriate for the microeconometric model. The model adopts the widely used refinement consisting of introducing alternative-specific constants, which should account for a number of factors such as the different density or accessibility of different types of jobs, search or fixed costs and systematic utility components otherwise not accounted for.[12] However, the authors adopting the "dummies refinement" so far have performed the simulations while leaving the dummies' coefficients γ's unchanged when computing the new choice probabilities according to expressions (3) and (7). The policy simulation is most commonly interpreted as a comparative statics exercise, where different *equilibria* – induced by different tax-transfer regimes – are compared. We claim that the standard procedure in general is not consistent with the comparative statics interpretation. Since the γ's reflect – at least in part – the number and the composition of available jobs (see expression (8)) and since the number of people willing to work and their distribution across different job types in general change as a consequence of the reforms, it follows that in general the γ's must also change, at least if we adopt a basic notion of equilibrium requiring that the number of people willing to work must equal to the number of available jobs. In this exercise we assume that the number of available jobs depends on the average wage rate according to a constant labour demand elasticity (here set equal to -1).[13] Changes s in the wage rates induce changes in the number of available jobs, in the coefficients γ's (according to expression (8) and in the choice probabilities. In the course of the simulation the wage rate distributions and the coefficients γ's are iteratively adjusted so that the number of available jobs is equal to the number of people choosing to work.

Overall, the simulation requires a two-level procedure. At the "low" level, household choices are simulated given the wage rates, the γ's and the tax-transfer parameters. At the "high" level, the wage rates, the γ's and the tax-transfer parameters are iteratively adjusted so that the total net tax revenue remains constant and the equilibrium conditions are satisfied.

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[12] See for example Van Soest (1995), Aaberge et al. (1995, 1999, 2000, 2004), Aaberge and Colombino (2013), Kalb (2000), Dagsvik and Strøm (2006), Kornstad and Thoresen (2007) and Colombino et al. (2010).

[13] Most of the empirical estimates of the long run labour demand elasticity belong to a range of values close to -1 or -0.5. Colombino (2013) compares the simulation results for various different values of the labour demand elasticity.

The estimated model simulates the effects of alternative hypothetical tax-transfer reforms upon variables such as the number of employed, the taxes paid etc. There are many possible methods that can be used to compute these predictions. We adopt the method of computing the expected value. Let $P^n(f,m;\theta,\gamma,R)$ be the probability that household *n* chooses (f,m) under the R tax-transfer regime, computed on the basis of the estimated parameters. Suppose we are interested in simulating the expected value of some function $\psi^n(f,m)$ of the choices made. We compute the expected value of that variable after the policy is implemented as follows:

$$E(\psi^n(f,m)) = \sum_{(f,m)\in\Omega} \psi^n(f,m)P^n(f,m,Z^n;\theta,\gamma,R). \qquad (11)$$

An analogous procedure is used for singles.

4.2. Social evaluation

We define two Social Welfare functions. They require the following steps.

1) Compute the expected maximum utility attained by household *n* under tax-transfer regime *R*:[14]

$$V^n(R) = \begin{cases} \ln\left(\sum_{(h_F,h_M)} \exp\left\{V\left(R(w_F^n h_F, w_M^n h_M, y^n), h_F, h_M, Z^n;\theta,\gamma\right) + \sum_{k=1}^{4}\gamma_{Fk}D_{Fk}(h_F) + \sum_{k=1}^{4}\gamma_{Fk}D_{Mk}(h_M)\right\}\right) \\ \text{if couple} \\ \ln\left(\sum_h \exp\left\{V\left(R(w^n h, y^n), h, Z^n;\theta,\gamma\right) + \sum_{k=1}^{4}\gamma_k D_k(h) + \sum_{k=1}^{4}\gamma_k D_k(h)\right\}\right) \\ \text{if single} \end{cases}$$

(12)

2) Compute the interpersonally-comparable-metric utility of household *i* under tax regime *R*, $\mu_i(R)$. Let $V^0(R_0)$ be the expected maximum utility attained by a reference household under a reference tax-transfer regime. In this paper we choose as reference household the poorest single and as reference tax-transfer system the current system:

$$V^0(R_0) = \ln\left(\sum_h \exp\left\{V\left(R_0(w^0 h, y^0), h, Z^0;\theta,\gamma\right) + \sum_{k=1}^{4}\gamma_k D_k(h)\right\}\right) \qquad (13)$$

The interpersonally-comparable money-metric utility of household *n* under tax regime *R*, $\mu^n(R)$, is then defined by:

$$\ln\left(\sum_h \exp\left\{V\left(\mu^n(R), h, Z^0;\theta,\gamma\right) + \sum_{k=1}^{4}\gamma_k D_k(h)\right\}\right) = V^n(R). \quad (14)$$

In other words, $\mu^n(R)$ is the net available income needed by the reference household under the reference tax-transfer regime in order to attain the same

[14] For the derivation of the expression for the expected maximum utility see McFadden (1978) and Ben-Akiva and Lerman (1985). The same methodology for empirical welfare evaluation is used by Colombino (1998).

expected maximum utility level of household n under tax-transfer regime R: it is analogous to the "equivalent income" as defined by King (1983).

3) Last, the Gini Social Welfare (GSW) function and the Poverty-adjusted Social Welfare (PAGSW) function are computed as follows:

$$GSW(R) = \mu(R)\left(1 - I(R)\right)$$

$$PAGSW(R) = \mu(R)\left(1 - I(R) - p(R)\right) \tag{15}$$

where:

$\mu(R) = \frac{1}{N}\sum_n \mu^n(R),$

$I(R)$ = Gini coefficient of the sample distribution of $\mu_n(R)$,

p(R) = head-count poverty ratio.[15]

The Social Welfare indexes explicitly incorporate the efficiency-equity trade-off. Efficiency is measured by $\mu(R)$, while Equity is measured by *1 – I(R)* or by *1 – I(R) – p(R)*.

5. Results

Tables 5, 6 and 7 illustrate the main welfare evaluation results. In Table 5 the policies are ranked – the most preferred on top – according to the Social Welfare functions presented in section 4. Each reform is identified by three pieces of information: the income support mechanism (GMI etc.), the Flat (F) or Progressive (P) tax rule and the coverage i.e. the value of *a* (0.5, 0.75 or 1) as defined in section 2. For example, UBI+WS_F_0.75 denotes a policy where the income support mechanism is UBI+WS, the tax rule is Flat and $G = 0.75P\sqrt{N}$. Hereafter the comments to the results are organized along the five issues mentioned in the introduction.

Universal vs. categorical policies. Most reforms rank better, social welfare wise, than the current system under both social welfare criteria. The results are definitively in favour of universalistic reforms as compared with the current categorical policies. Of course this does not imply that we could not design even better categorical policies: the question we are answering here is whether we can improve upon the current policies by moving towards universalism.

Transfer-based vs. subsidy-based policies. The top positions in the rankings of Table 5 are taken by transfer-based mechanisms or by mixed policies envisaging both transfers and subsidies. Under this respect, we observe a marked difference between the GSW criterion and the PAGSW criterion. The former criterion favours the mixed policy UBI+WS while the latter favours a pure UBI. From Table 7 we learn that pure transfer-based policies have a mild impact on labour supply and a major impact on the poverty ratio. Under GMI, female (male) labour supply is on average 963 (1957) compared to 973 (1978) under the current system and analogously under UBI we get 956 (1960); however, GMI and UBI reforms

[15] See Aaberge (2007) for the GSW and Atkinson (1987) for the PAGSW. The formulation we adopt for the PAGSW implies giving the same weight to a percentage point of the Gini index and to a percentage point of the head-count poverty ratio.

push down the poverty ratio respectively to 1.23 and 0.5 (compared to current 4.23). WS reforms produce a modest increase in labour supply (respectively 979.5 for females and 1967 for males) but are much less effective in reducing the poverty ratio, which goes down from 4.23 to 3.88. Mixed policies produce effects somewhat in between pure transfer and pure subsidy policies.

Unconditional vs. means-tested policies. According the social welfare rankings of Table 5, unconditional systems (UBI or UBI+WS) are preferable to conditional ones. This result can be explained by observing (Table 7) that the greater generosity of the unconditional transfers is compensated by the lack of poverty-trap effects, with the following implications: UBI or UBI+WS policies provide on average an annual benefit of 6433 euros compared to 4250 euros provided by GMI or GMI+WS; at the same time, both unconditional and conditional policies induce essentially the same amount of labour; marginal tax rates required for fiscal neutrality are modestly higher for unconditional policies as compared to conditional ones; most important UBI or UBI+WS perform better in reducing poverty.

Coverage. Under GSW, the transfer should cover 75% of the poverty line: this result is somewhat consistent with the actual design of income support policies. However, under the PAGSW the coverage should be 100% of the poverty line, which suggests that the implicit social welfare criterion underlying the actual or currently suggested policies is closer to GSW than to PAGSW.

Progressive vs. flat taxes. Progressive taxes rank best. A contribution to this result comes from the pattern of wage elasticity of labour supply, as in Table 2: higher income households are much less elastic than lower income ones.[16]

[Table 5 approximately here]

In Table 6 we report the result of regressing the value of GWF or PAGWS against a set of variables measuring the key features of the tax-transfer systems. The regressions help to identify the welfare contribution of policy attributes. Under the GSW criterion, the results confirm that the progressivity of the tax rule and the non-conditionality of the income support mechanism have a significant positive effect. The coverage *a* has a positive marginal effect up to around 0.70. The picture produced by the PAGSW criterion is partially different. Coverage has a positive marginal effect even above 1. The effects of Progressive and Unconditional are positive as under the GSW, but less significant. Instead the effect of Subsidy is negative and significant. This last results can be explained as follows. PAGSW give a lot of weight to the Poverty rate. It turn out that transfers are more effective than subsidies in reducing poverty. The policies are designed so that when a subsidy is introduced, the transfer is reduced (or eliminated). The overall consequence is that the effect of Subsidy turns out to be negative under PAGSW.

In summary, the indications for a best mechanism converge on UBI+WS_P_0.75 (under the GSW criterion) or UBI_P_1 (under the PAGSW criterion).

[Table 6 approximately here]

[16] A recent survey by Diamond and Saez (2011) gives support to the superiority of progressive taxes.

Table 7 helps identifying what specific features the best mechanisms have and how they fare from the perspective of other possibly relevant criteria, such as top marginal tax rates or behavioural effects. UBI+WS_P_0.75 (UBI_P_1) envisages an average annual benefit (transfer + subsidy) per household of 8640 (12720) Euros 1998, which represent about 70% (100%) of the Poverty Level. This amount is to be compared with the 101 Euros of the CURRENT system.[17] The percentages of utility-winners and of income-winners are respectively 69 (57) and 65 (58). The percentage poverty rate (head count) is 0.9 (0), to be compared to 4.23 under the CURRENT system.

All the reforms require an increase of marginal tax rates. UBI+WS_P_0.75 requires an 11% increase of the current (1998) marginal tax rates, which means a 51% top marginal tax rate. Under the same scenario UBI_P_1 requires a 60% top marginal tax rate. These figures are high but not at all unrealistic. For example in 2009 the top marginal tax rates in Denmark and Sweden were respectively around 62% and 57%. If the above tax rates were judged for some reasons not feasible (possibly from the point of view of political consensus), it should be noticed that the *menu* of welfare improving reforms is very large. For example, the flat version UBI+WS_F_0.75 would require a 42% flat rate. Therefore we are left we many reforms to choose among according to different *criteria* or constraints. Moreover, instead of increasing the marginal tax rates on income one might think of a different structure of taxation e.g. increasing taxes on wealth and on (selected) consumption expenditures.

The effects on labour supply, negligible for males, are modest for females as well, with small reductions of hours worked except when WS is implemented. As already noted above, by comparing GMI and UBI we see the effect of the poverty trap, present with GMI but not with UBI: the latter pays average benefits three times larger than the former and yet the effect on hours worked is essentially the same. The incentive effect on hours worked of WS, alone or coupled with GMI or UBI, emerges also rather clearly.

With the exception of GMI_F_1 and GMI_P_1, all the reforms imply a percentage of winners above 50% and would therefore win a referendum against the *status quo.*

The transfer-based policies (UBI and GMI) are the most effective ones in reducing poverty. WS leads to poverty rates closer to the status quo. Mixed policies (UBI+WS and GMI+WS) are located somehow half-way between WS and the current system.

[Table 7 approximately here]

6. Conclusions

We used a microeconometric model of labour supply and a social evaluation methodology in order to identify feasible and welfare-improving universalistic income support mechanisms in Italy. We considered five type of mechanism: GMI, UBI, WS, GMI+WS and UBI+WS. Each one has three variants, depending on the degree of coverage with respect to the poverty line: 50%, 75% and 100%.

[17] The 101 Euros transfer in the CURRENT system is just the average of various categorical, conditional or local transfers and benefits (such as unemployment benefits, “cassa integrazione”, family benefits etc.).

Moreover, each type can be coupled either with Flat tax rule or with a Progressive Tax rule. In total we have 5×3×2 = 30 possible reforms. The tax parameter (either the constant flat rate in the Flat rule or the proportional change in the marginal tax rates with respect to the current (1998) system in the Progressive rule) is determined endogenously so that the total net tax revenue remains as under the current system. The simulation adopts a methodology that allows for market equilibrium and ensures a consistent comparative statics interpretation of the simulation results. Under the pure Gini Social Welfare criterion, the best policy is an unconditional basic income coupled with a wage subsidy (amounting to a total benefit close to 70% of the Poverty Level), while under the Poverty-Adjusted Gini criterion Social Welfare criterion the best policy is a pure unconditional transfer not lower than the Poverty Level. More generally, universality, non-conditionality, progressivity, and wage subsidies (under the GSW criterion) emerge as desirable attributes of an income support mechanism preferable to the current system based on categorical and means-tested policies. Evaluation criteria different from the ones chosen in this exercise might of course dictate a different ranking of the policies and different features of the best ones; however the set of policies that are preferable to the current system is very large and suggests the possibility of selecting a universalistic best reform according to many different criteria and constraints.

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Appendix

This Appendix provides a detailed descriptions of the reforms by specifying net available income as a function of taxable income. The symbols used are defined as follows.

$x_F = w_F h_F$ = female gross earnings;

$x_M = w_M h_M$ = male gross earnings;

$x = x_F + x_M$;

y_F = female unearned gross income;

y_M = male unearned gross income;

m = other household net income;

S_F = social security contributions (female);

S_M = social security contributions (male);

$S = S_F + S_M$;

$I_F = g_F + y_F - S_F =$ taxable income (female);

$I_M = g_M + y_M - S_M =$ taxable income (male);

$I = I_F + I_M$;

P = poverty line;

N = number of people in the household;

$G = \alpha P\sqrt{N}$ with α = 1, 0.75, 0.50;

$C_F =$ net available income (female);

$C_M =$ net disposable income (male);

$C = m + C_F + C_M$;

T = taxes paid by the household;

B = benefits or transfers received by household;

q = average propensity to consumption;

r = average VAT rate;

ω = proportional subsidy on the gross wage rate;

$\varphi(.)$ = progressive tax function: it applies the 1998 marginal tax rates multiplied by a constant such that the fiscal neutrality constraint is satisfied, i.e.

$$\sum T^1 - \sum B^1 + r\sum qC^1 + \sum S^1 = \sum T^0 - \sum B^0 + r\sum qC^0 + \sum S^0$$

where the superscript R denotes a generic reform and the superscript 0 denotes the current (1998) system.

The current (1998) marginal tax rates are as follows:

Income Brackets	Marginal Tax Rates
0 – 7.7	18
7.7 – 15.5	26
15.5 – 31	33
31 – 69.7	39
> 69.7	45

Income brackets (originally in Italian *Lire*) are expressed in thousands of Euros. Under the 1998 system the above rates are applied to personal earnings, together with deductions, allowances and benefits. Under the reforms all deductions, tax credits and benefits are cancelled, the income brackets are kept unchanged and the marginal tax rates (either the flat or the progressive ones) are applied to the whole personal income (not just to earnings).

Net available income as a function of taxable income - Couples

	Flat	**Progressive**
GMI	$C_F = \begin{cases} G/2 \text{ if } I_F \le G/2 \\ G/2 + \left(I_F - G/2\right)\left(1-t\right) \text{ if } I_F > G/2 \end{cases}$ $C_M = \begin{cases} G/2 \text{ if } I_M \le G/2 \\ G/2 + \left(I_M - G/2\right)\left(1-t\right) \text{ if } I_M > G/2 \end{cases}$	$C_F = \begin{cases} G/2 \text{ if } I_F \le G/2 \\ G/2 + \varphi\left(I_F - G/2\right) \text{ if } I_F > G/2 \end{cases}$ $C_M = \begin{cases} G/2 \text{ if } I_M \le G/2 \\ G/2 + \varphi\left(I_M - G/2\right) \text{ if } I_M > G/2 \end{cases}$
UBI	$C_F = G/2 + I_M\left(1-t\right)$ $C_M = G/2 + I_M\left(1-t\right)$	$C_F = G/2 + \varphi(I_F)$ $C_M = G/2 + \varphi(I_M)$
WS	$C_F = \begin{cases} \left(I_F + \omega x_F\right) \text{ if } \left(I_F + \omega x_F\right) \le G/2 \\ G/2 + \left(\left(I_F + \omega x_F\right) - G/2\right)\left(1-t\right) \text{if } \left(I_F + \omega x_F\right) > G/2 \end{cases}$ $C_M = \begin{cases} \left(I_M + \omega x_M\right) \text{ if } \left(I_M + \omega x_M\right) \le G/2 \\ G/2 + \left(\left(I_M + \omega x_M\right) - G/2\right)\left(1-t\right) \text{if } \left(I_M + \omega x_M\right) > G/2 \end{cases}$	$C_F = \begin{cases} \left(I_F + \omega x_F\right) \text{ if } \left(I_F + \omega x_F\right) \le G/2 \\ G/2 + \varphi\left(\left(I_F + \omega x_F\right) - G/2\right) \text{if } \left(I_F + \omega x_F\right) > G/2 \end{cases}$ $C_M = \begin{cases} \left(I_M + \omega x_M\right) \text{ if } \left(I_M + \omega x_M\right) \le G/2 \\ G/2 + \varphi\left(\left(I_M + \omega x_M\right) - G/2\right) \text{if } \left(I_M + \omega x_M\right) > G/2 \end{cases}$
GMI+WS	$C_F = \begin{cases} 0.5G/2 \text{ if } \left(I_F + \omega x_F\right) \le 0.5G/2 \\ \left(I_F + \omega x_F\right) \text{ if } 0.5G/2 < \left(I_F + \omega x_F\right) \le G/2 \\ G/2 + \left(\left(I_F + \omega x_F\right) - G/2\right)\left(1-t\right) \text{if } \left(I_F + \omega x_F\right) > G/2 \end{cases}$ $C_M = \begin{cases} 0.5G/2 \text{ if } \left(I_M + \omega x_M\right) \le 0.5G/2 \\ \left(I_M + \omega x_M\right) \text{ if } 0.5G/2 < \left(I_M + \omega x_M\right) \le G/2 \\ G/2 + \left(\left(I_M + \omega x_M\right) - G/2\right)\left(1-t\right) \text{if } \left(I_M + \omega x_M\right) > G/2 \end{cases}$	$C_F = \begin{cases} 0.5G/2 \text{ if } \left(I_F + \omega x_F\right) \le 0.5G/2 \\ \left(I_F + \omega x_F\right) \text{ if } 0.5G/2 < \left(I_F + \omega x_F\right) \le G/2 \\ G/2 + \varphi\left(\left(I_F + \omega x_F\right) - G/2\right) \text{if } \left(I_F + \omega x_F\right) > G/2 \end{cases}$ $C_M = \begin{cases} 0.5G/2 \text{ if } \left(I_M + \omega g_M\right) \le 0.5G/2 \\ \left(I_M + \omega x_M\right) \text{ if } 0.5G/2 < \left(I_M + \omega x_M\right) \le G/2 \\ G/2 + \varphi\left(\left(I_M + \omega x_M\right) - G/2\right) \text{if } \left(I_M + \omega x_M\right) > G/2 \end{cases}$
UBI+WS	$C_F = \begin{cases} 0.5G/2 + (\mathrm{I}_F + wx_F) \text{ if } (\mathrm{I}_F + wx_F) \le 0.5G/2 \\ 0.5G/2 + (I_F + wx_F)(1-t) \text{ if } (I_F + wx_F) > 0.5G/2 \end{cases}$ $C_M = \begin{cases} 0.5G/2 + (\mathrm{I}_M + wx_M) \text{ if } (\mathrm{I}_M + wx_M) \le 0.5G/2 \\ 0.5G/2 + (I_M + wx_M)(1-t) \text{ if } (I_M + wx_M) > 0.5G/2 \end{cases}$	$C_F = \begin{cases} 0.5G/2 + (\mathrm{I}_F + wx_F) \text{ if } (\mathrm{I}_F + wx_F) \le 0.5G/2 \\ 0.5G/2 + \varphi(I_F + wx_F) \text{ if } (I_F + wx_F) > 0.5G/2 \end{cases}$ $C_M = \begin{cases} 0.5G/2 + (\mathrm{I}_M + wx_M) \text{ if } (\mathrm{I}_M + wx_M) \le 0.5G/2 \\ 0.5G/2 + \varphi(I_M + wx_M) \text{ if } (I_M + wx_M) > 0.5G/2 \end{cases}$

Net available income as a function of taxable income - Singles

	Flat	Progressive
GMI	$C=\begin{cases} G \text{ if } I \le G \\ G+\left(I-G\right)\left(1-t\right) \text{ if } I>G \end{cases}$	$C=\begin{cases} G \text{ if } I \le G \\ G+\varphi\left(I-G\right) \text{ if } I>G \end{cases}$
UBI	$C=G+I\left(1-t\right)$	$C=G+\varphi(I)$
WS	$C=\begin{cases} \left(I+\omega x\right) \text{ if } \left(I+\omega x\right) \le G \\ G+\left(\left(I+\omega x\right)-G\right)\left(1-t\right)\text{if } \left(I+\omega x\right)>G\,/ \end{cases}$	$C=\begin{cases} \left(I+\omega x\right) \text{ if } \left(I+\omega x\right) \le G \\ G+\varphi\left(\left(I+\omega x\right)-G\right)\text{if } \left(I+\omega x\right)>G \end{cases}$
GMI+WS	$C=\begin{cases} 0.5G \text{ if } \left(I+\omega x\right) \le 0.5G \\ \left(I+\omega x\right) \text{ if } 0.5G < \left(I+\omega x\right) \le G \\ G+\left(\left(I+\omega x\right)-G\right)\left(1-t\right)\text{if } \left(I+\omega x\right)>G \end{cases}$	$C=\begin{cases} 0.5G \text{ if } \left(I+\omega x\right) \le 0.5G \\ \left(I+\omega x\right) \text{ if } 0.5G < \left(I+\omega x\right) \le G \\ G+\varphi\left(\left(I+\omega x\right)-G\right)\text{if } \left(I+\omega x\right)>G \end{cases}$
UBI+WS	$C=\begin{cases} 0.5G+(\mathrm{I}+wx) \;\text{ if }\; (\mathrm{I}+wx) \le 0.5G \\ 0.5G+(I+wx)(1-t) \text{ if }\; (I+wx)>0.5G \end{cases}$	$C=\begin{cases} 0.5G+(\mathrm{I}+wx) \;\text{ if }\; (\mathrm{I}+wx) \le 0.5G \\ 0.5G+\varphi(I_F+wx_F) \text{ if }\; (I_F+wx_F)>0.5G \end{cases}$

TABLES

Table 1. Parameter estimates

	Couple		Single female		Single male	
	Coeff.	*Std. Err.*	Coeff.	*Std. Err.*	Coeff.	*Std. Err.*
β_{F0}	0.3302	*0.0366*	0.1563	*0.0844*		
β_{F1}	-0.0078	*0.0013*	-0.0085	*0.0034*		
β_{F2}	$.1051\times10^{-3}$	$.0173\times10^{-3}$	$.1062\times10^{-3}$	$.0425\times10^{-3}$		
β_{F3}	0.0086	*0.0016*	0.0098	*0.0062*		
β_{F4}	-0.0018	*0.0022*	-0.0026	*0.0138*		
β_{F5}	0.0031	*0.0023*	0.0131	*0.0137*		
β_{M0}	0.0338	*0.0424*			0.2237	*0.0895*
β_{M1}	0.0017	*0.0019*			-0.0053	*0.0035*
β_{M2}	$-.0218\times10^{-3}$	$.0237\times10^{-3}$			$.0694\times10^{-3}$	$.0453\times10^{-3}$
β_{M3}	0.0036	*0.002*			-0.0685	*0.0368*
β_{M4}	-0.0106	*0.0029*			0.0615	*0.0592*
β_{M5}	-0.0077	*0.003*			0.0635	*0.0495*
β_{C0}	$.4311\times10^{-3}$	$.1284\times10^{-3}$	$-.1394\times10^{-3}$	$.3449\times10^{-3}$	$.2968\times10^{-3}$	$.3975\times10^{-3}$
β_{C1}	$-.0251\times10^{-3}$	$.0175\times10^{-3}$	$.0433\times10^{-3}$	$.0574\times10^{-3}$	$-.0642\times10^{-3}$	$.0792\times10^{-3}$
θ_{CC}	$-.9121\times10^{-8}$	$.4500\times10^{-8}$	$-.0142\times10^{-6}$	$.0246\times10^{-6}$	$-.8870\times10^{-8}$	2.6900×10^{-8}
θ_{FF}	$-.8251\times10^{-3}$	$.2055\times10^{-3}$	$.8978\times10^{-3}$	$.4239\times10^{-3}$		
θ_{MM}	$.3973\times10^{-3}$	$.1527\times10^{-3}$			$-.0417\times10^{-3}$	$.4962\times10^{-3}$
θ_{CF}	$-.1920\times10^{-5}$	$.0770\times10^{-5}$	$.0570\times10^{-4}$	$.0332\times10^{-4}$		
θ_{CM}	$-.1010\times10^{-5}$	$.0030\times10^{-5}$			$-.1230\times10^{-5}$	$.4210\times10^{-5}$
θ_{FM}	$.1992\times10^{-3}$	$.0799\times10^{-3}$				
γ_{F1}	3.0781	*0.2208*	4.0696	*0.5614*		
γ_{F2}	5.223	*0.3015*	7.0778	*0.7957*		
γ_{F3}	5.2606	*0.3515*	6.3633	*0.9287*		
γ_{F4}	-3.356	*0.1714*	-1.1311	*0.3892*		
γ_{M1}	3.6737	*0.2608*			2.9974	*0.6701*
γ_{M2}	8.3143	*0.3484*			6.7868	*0.9447*
γ_{M3}	8.9178	*0.3948*			7.2329	*1.0857*
γ_{M4}	-0.8085	*0.2018*			-0.7927	*0.487*
Log-Likelihood	-9381		-643		-505	
No of observation	2955		366		291	
Pseudo-R^2	33.81%		26.72%		27.69%	

Table 2. Labour supply elasticities

		Female		Male	
	Decile of household income	Own wage elasticities	Cross elasticities	Own wage elasticities	Cross elasticities
Singles	I	2.88		0.62	
	II - IX	0.19		0.12	
	X	0.00		0.00	
Couples	I	4.35	0.80	0.31	0.00
	II - IX	1.00	-0.20	0.10	-0.02
	X	0.13	-0.17	0.06	-0.02

Table 3. Observed and simulated labour supply choices. Proportion of households in each weekly hours bracket

Weekly hours	Female				Male			
	Single		Married		Single		Married	
	Observed	*Simulated*	Observed	*Simulated*	Observed	*Simulated*	Observed	*Simulated*
0	0.169	*0.169*	0.477	*0.477*	0.086	*0.086*	0.049	*0.049*
1-8	0.008	*0.025*	0.006	*0.013*	0.017	*0.023*	0.004	*0.010*
9-16	0.025	*0.007*	0.016	*0.008*	0.014	*0.009*	0.010	*0.003*
17-24	0.109	*0.140*	0.089	*0.100*	0.048	*0.067*	0.030	*0.040*
25-32	0.079	*0.049*	0.063	*0.052*	0.045	*0.026*	0.022	*0.013*
33-40	0.462	*0.376*	0.261	*0.207*	0.502	*0.447*	0.521	*0.481*
41-48	0.074	*0.159*	0.034	*0.088*	0.117	*0.172*	0.141	*0.181*
49-56	0.014	*0.037*	0.027	*0.036*	0.093	*0.106*	0.121	*0.132*
57-64	0.036	*0.019*	0.014	*0.013*	0.048	*0.042*	0.060	*0.055*
65-72	0.014	*0.011*	0.008	*0.004*	0.017	*0.017*	0.027	*0.025*
73-80	0.010	*0.008*	0.005	*0.002*	0.013	*0.005*	0.015	*0.011*

Table 4. Regularity of the utility function (systematic part)

	Percentage of observations with utility increasing w.r.t. leisure		Percentage of observations with utility increasing w.r.t. income		Percentage of observations with utility increasing w.r.t. income and quasi-concave	
	At the chosen alternative	*At all alternatives in the choice set*	*At the chosen alternative*	*At all alternatives in the choice set*	*At the chosen alternative*	*At all alternatives in the choice set*
Singles	100.0	100.0	94.0	91.0	90.9	88.3
Couples	100.0	100.0	96.6	96.4	94.3	91.6

Table 5. Ranking of the policies according to the social welfare functions

GSW-Ranking			PAGSW-Ranking		
Income support mechanism	Tax rule	Coverage	Income support mechanism	Tax rule	Coverage
UBI+WS	P	0.75	UBI	P	1
UBI	P	0.5	UBI	F	1
UBI	P	0.75	UBI	P	0.75
WS	P	0.75	GMI	F	1
UBI+WS	P	0.5	GMI	P	1
WS	P	0.5	UBI	F	0.75
UBI	P	1	UBI+WS	P	1
GMI+WS	P	0.5	UBI	P	0.5
GMI+WS	P	0.75	UBI+WS	F	1
WS	P	1	GMI+WS	P	1
WS	F	1	GMI	P	0.75
UBI	F	0.75	UBI+WS	P	0.75
UBI	F	1	UBI	F	0.5
UBI+WS	F	1	GMI	F	0.75
UBI	F	0.5	GMI+WS	F	1
GMI	P	0.5	UBI+WS	F	0.75
WS	F	0.75	GMI+WS	P	0.75
BI+WS	F	0.75	GMI	P	0.5
GMI+WS	F	1	UBI+WS	P	0.5
GMI+WS	F	0.75	GMI+WS	F	0.75
WS	F	0.5	WS	P	1
GMI	P	0.75	GMI	F	0.5
UBI+WS	F	0.5	UBI+WS	F	0.5
UBI+WS	P	1	GMI+WS	P	0.5
GMI+WS	P	1	WS	P	0.75
GMI+WS	F	0.5	WS	F	1
GMI	F	0.75	GMI+WS	F	0.5
CURRENT					WS
GMI	F	1	WS	P	0.5
GMI	F	0.5	CURRENT		
GMI	P	1	WS	F	0.5

Table 6. Effects of policy attributes on Social Welfare

Regression coefficients (*t-Statistics in parenthesis*)

	GSW	PAGSW
Constant	94233.08 (*12.22*)	88787.22 (*70.80*)
Progressive	12.37 (*3.37*)	457.59 (*1.32*)
Coverage	87.22 (*2.37*)	8260.96 (*2.19*)
Coverage^2	-65.46 (-*2.48*)	-2995.58 (-*1.11*)
Unconditional	16.49 (*4.72*)	274.49 (*0.77*)
Subsidy	2.16 (*0.62*)	-1944.72 (-*5.43*)

Note to Table 3:
Progressive = 1 if tax rule is progressive (0 otherwise)
Coverage = the value of *a* as defined in Section 2 (for the CURRENT system we set $a = 0.1$);
Coverage^2 = Coverage squared;
Unconditional = 1 if income support mechanism is UBI or UBI+WS (0 otherwise);
Subsidy = 1 if income support mechanism is WS or UBI+WS or GMI+WS (0 otherwise).

Table 7. Behavioural, fiscal and welfare effects of the policies

Transfer and/or subsidy	Tax rule	Coverage	male average annual hours of work	female average annual hours of work	Average annual disposable income	top marginal tax rate	Average annual transfer and/or subsidy	proportion of winners	head-count poverty ratio (%)
GMI	F	0.5	1965	965	26448	0.31	2316	0.54	3.09
GMI	F	0.75	1963	957	26364	0.37	3228	0.53	0.93
GMI	F	1	1960	948	26244	0.45	4272	0.47	0.01
GMI	P	0.5	1965	965	26400	0.46	2316	0.64	2.50
GMI	P	0.75	1963	957	26304	0.48	3228	0.58	0.84
GMI	P	1	1959	947	26076	0.51	4272	0.48	0.01
GMI+WS	F	0.5	1966	972	26556	0.36	4872	0.58	3.90
GMI+WS	F	0.75	1965	969	26520	0.40	5220	0.62	2.79
GMI+WS	F	1	1964	965	26448	0.45	5604	0.61	1.55
GMI+WS	P	0.5	1966	973	26496	0.48	4860	0.68	3.44
GMI+WS	P	0.75	1965	969	26472	0.49	5220	0.67	2.31
GMI+WS	P	1	1963	965	26304	0.51	5592	0.60	0.81
UBI	F	0.5	1963	964	26460	0.41	6816	0.61	0.88
UBI	F	0.75	1961	956	26352	0.50	9768	0.58	0.06
UBI	F	1	1958	948	26208	0.60	12720	0.54	0.00
UBI	P	0.5	1963	965	26388	0.51	6816	0.66	0.52
UBI	P	0.75	1960	956	26232	0.55	9768	0.61	0.04
UBI	P	1	1956	947	26040	0.60	12720	0.57	0.00
UBI+WS	F	0.5	1966	971	26556	0.38	7176	0.60	3.32
UBI+WS	F	0.75	1965	967	26520	0.42	8640	0.63	1.97
UBI+WS	F	1	1963	963	26472	0.47	10116	0.62	0.73
UBI+WS	P	0.5	1965	972	26508	0.50	7176	0.70	2.53
UBI+WS	P	0.75	1963	969	26496	0.51	8640	0.69	0.90
UBI+WS	P	1	1960	962	26220	0.54	10092	0.57	0.23
WS	F	0.5	1968	979	26676	0.34	4236	0.62	4.64
WS	F	0.75	1967	979	26676	0.36	4224	0.63	4.16
WS	F	1	1967	979	26688	0.39	4224	0.66	3.65
WS	P	0.5	1967	980	26616	0.46	4224	0.70	4.19
WS	P	0.75	1967	980	26676	0.47	4224	0.72	3.63
WS	P	1	1966	979	26580	0.48	4224	0.68	3.02
CURRENT			1968	973	26292	0.45	1212	--	4.23