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MINIMUM INCOME AND HOUSEHOLD LABOUR SUPPLY

by Francesca Carta* and Fabrizio Colonna**

Abstract

This paper examines the impact of Guaranteed Minimum Income (GMI) schemes on work incentives at the household level. We show that these schemes create strategic complementarities between partners' employment decisions. When one partner is non-employed or earns a low wage, the household is more likely to receive the benefit, which then discourages the other partner from working to avoid losing the benefit. The disincentive to work instead does not apply to partners of high earners whose income exceeds the programme threshold. This leads partners to coordinate their decisions so that both are non-employed. The negative impact of the GMI on labour supply is therefore more pronounced in economies with many single-earner households. Focusing on Italy, where the employment rate of married women is low and a relatively generous GMI programme was introduced in 2019, we use a structural labour supply model to estimate that the GMI would primarily reduce the employment rate of married men with non-working wives and increase the number of households in which neither partner works. Married women would be less affected due to the high employment rate of their husbands.

JEL Classification: H31, I38, J21, J22, J31.

Keywords: household labour supply, female labour force participation, labour earnings, transfers, tax-system.

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1 Introduction[1]

The rise in income inequality and poverty rates in OECD countries in recent decades has sparked renewed interest in anti-poverty measures and how to better support the poor. According to Eurostat data, spending on income support programmes has increased across EU countries on average over the past 15 years. In Europe, the primary scheme to support the poor is the guaranteed minimum income (GMI), a means-tested transfer that supplements family income up to a specified threshold.

In GMI schemes, the unit eligible for the transfer is the household and the amount of the benefit depends on the family income. Consequently, individual monetary incentives to work depend on the income and employment status of the partner. Such jointnesses in the tax-transfer function typically penalize the employment of second earners (often married women). For example, under joint taxation and a progressive tax rate schedule, the marginal tax rate increases with family income, reducing the financial gain associated with the employment of the second earner.

In this paper, we first examine theoretically how the GMI differentially affects the incentives to work for partners. For singles, where there is no interaction between partners, the GMI acts similarly to an individual income support,[2] which discourages the labour supply of workers facing lower wage offers, typically women. For couples, however, the GMI introduces strategic complementarities that are absent from traditional individual-based schemes. If one partner is non-employed, or her wage is low enough to qualify the family for the subsidy, the other partner may find it advantageous to remain non-employed to avoid losing the benefit. This disincentive to work disappears for partners of high earners whose income is already too high to qualify for the scheme. Therefore, a GMI is expected to have larger labour supply effects in economies where a lower employment rate of married women increases the share of single-earner households and, when looking at couples, mainly affects the labour supply of men.

We test the the implications of the model by quantifying the labour supply effects associated with a relatively generous GMI scheme introduced in Italy in 2019,[3] known as *reddito di cittadinanza* (RdC).[4] Italy is characterized by low employment rates among

[1]The views expressed in the article are those of the authors only and do not involve the responsibility of the Bank of Italy. We are grateful to Federico Cingano, Laura Hospido, Eliana Viviano, seminar and conference participants at Universitat Autonoma de Barcelona, Bank of Italy, LAGV and COSME-GEW for their helpful comments. All errors are ours.

[2]Examples include unemployment benefits, the amount of which depends only on the worker's earnings and not on those of her family members, or the universal basic income, a form of support that is usually granted to the individual regardless of her family's income.

[3]The programme is in the spirit of other European GMI schemes — such as those implemented in the other main euro area economies —, which are means-tested but not targeted at specific demographic subgroups of the population (as is the case in the US or the UK instead).

[4]In 2024, the Italian government replaced the RdC scheme with a new programme, "assegno per l'inclusione" (AdI). The new scheme introduces stricter demographic and economic requirements, but relaxes the residence requirement for foreigners (see Bovini et al. (2023) for a more detailed description

married women, resulting in a relatively high share of single-earner households. First, we compute the participation tax rates — a standard measure of fiscal incentives to work — for singles and married individuals. We demonstrate that RdC strongly reduces the monetary incentives to work, primarily affecting singles and first earners (the sole working partner in single-earner households). The employment of second earners is discouraged only in households that remain potentially eligible for RdC when their partners are already employed. We then quantify the labor supply effects using a structural model fitted to the Italian economy, with data from the Survey on Income and Living Conditions (SILC).

We find that among singles, where there is no interaction between partners, the introduction of RdC reduces employment more for women than for men (by 1.8 and 1.0 percentage points, respectively), as the former typically face lower wages. For both sexes, the effect is mainly due to a reduction in flows from non-employment to employment. For couples, we do not observe significant effects for married women, but married men are largely more likely to be non-employed after the introduction of RdC. As predicted by the model, the decline in male employment mainly affects households that were single-earner in the pre-RdC scenario: with RdC, the share of couples in which neither partner works increases by 2.1 p.p., mainly driven by a reduction in the share of households in which only the husband works (-1.8 p.p.); on the contrary, the share of households in which both partners work remains essentially unchanged. Overall, the introduction of RdC reduces the employment rate of married men by 2.1 p.p. (-2.3 p.p. for those with children) and increases the share of unemployed by 1.6 p.p. (1.8 p.p.). The husbands who leave employment are those living with wives who would not work even in the absence of RdC, given the high costs of participation (mainly due to the presence of children) and low wage offers. We then simulate the effects of an "equivalent" individual-based transfer, which takes into account the partner's income individually and compares it to half of the RdC threshold relevant to the household. This arrangement would reduce female labour supply, increase the share of single-earner households and reduce the share of dual-earner households. Compared to an individual-based transfer, RdC therefore has a much smaller impact on the labour supply of married women, who already have particularly low participation rates in Italy. Under this alternative individual-based subsidy, the main margin of the household's response would have been the labour supply of the wife, exposed to lower wages.

Focusing only on labour supply effects, our analysis suggests that there is a potential trade-off between family *vs* individual-based income schemes.[5] On the one hand, the labour supply of second earners is less discouraged under a GMI scheme than under

and assessment of the new scheme).

[5]In this paper we compare individual and family-based transfers abstracting from equity considerations.

an individual-based subsidy. On the other hand, a GMI scheme encourages low-wage partners to be non-employed, increasing the proportion of households in which both partners do not work and are dependent on income support programmes.

We contribute to several strands of the economic literature. First, we speak to the literature that analyzes the labour supply effects of income programmes targeted to the poor.[6] The majority of studies use a structural approach.[7] They find that very generous and long-lasting transfers with high implicit tax rates on earnings are associated with lower employment rates among recipients (Moffitt, 1992), especially among women and younger individuals, who are characterised by a higher labour supply elasticity (Gurgand and Margolis, 2008; Meghir and Phillips, 2010). When social transfers instead partially decay with earnings, they are not associated with a reduction in employment and labour market participation (Hoynes, 1997; Moffitt, 2002), even if in the presence of generous transfers (Franz et al., 2012; Bargain and Doorley, 2017). Concerning this literature, we examine how the GMI system jointly affects partners' labour supply decisions and we show that the subsidy encourages coordination among partners with the same employment status, which may have important consequences for the couple's future dependence on social safety nets. The paper closest to ours is Gurgand and Margolis (2008). We differ from them in two main ways. First, while they focus only on recipients, we examine the impact of incentives on the labour supply of the entire population, also analysing the incentives for those who could leave employment and enter the programme. Second, in estimating the structural model, they consider only single individuals (who make up two-thirds of the sample used) to avoid complicated issues of collective labour supply decisions, while we explicitly model the couple dimension. Our analysis rationalizes the effects found by Christl and De Poli (2021), according to which it is mainly married men's employment that responds to changes in social assistance in Austria, despite women having a higher labour supply elasticity.

Second, we contribute to the debate on the desirability of universal basic income (UBI) in relation to GMI (or negative income tax, NIT) systems. In its purest definition, UBI

[6]The literature agrees that minimum income schemes significantly reduce poverty — especially extreme poverty —, but the analyses are mainly limited to short-run effects (see Hoynes et al., 2006; Hoynes and Schanzenbach, 2009; Scholz et al., 2009; Fox et al., 2015).

[7]The quasi-experimental literature is smaller because of the difficulty of finding credible exogenous variation for identification, as programmes are often run at the federal level and target large portions of the population for which it is difficult to define plausibly comparable treatment and control groups. The causal estimates confirm the results of the structural models, according to which high implicit taxes on earnings embedded in income transfers reduce labour market participation of less educated individuals (Bargain and Doorley, 2011), single mothers (Hoynes and Schanzenbach, 2012; Bergolo and Cruces, 2021) and young individuals (Lemieux and Milligan, 2008), at least in the short run (Terracol, 2009). On the other hand, there could be an increase in the supply of labour in the informal sector (Bergolo and Cruces, 2021). Active labour market policies (ALMP), usually implemented with social transfers, seem to have a low effectiveness in rebalancing labour supply incentives in the formal sector (Miller et al., 2015), both because of the characteristics of the population to which they are targeted and because of implementation inefficiencies.

is an unconditional cash transfer given to all individuals — regardless of age, income, etc. — and intended to replace the inefficient current social safety net or as a response to the inadequate wages, especially for the low-skilled, offered by the labour markets (Van Parijs, 2004). In practice, the idea of UBI is extremely costly to fully implement, and some form of conditionality/means testing has usually been introduced in most UBI proposals and pilots (Hoynes and Rothstein, 2019). The individual-based income scheme envisaged in our analysis differs from a pure UBI in that eligibility is means-tested and the amount of the benefit depends on individual income. However, the main similarity is the unit eligible for the transfer, i.e. the individual. There has been little research in the literature on the different economic effects of these programmes on the labour supply of couples. There may be some advantages to providing income at the individual level. Extensive evidence from developing countries shows that providing income support to women — who are typically more unskilled and out of the labour force — has more beneficial effects on child outcomes and well-being (Thomas, 1994; Duflo, 2003; Emerson and Souza, 2007). However, we show that individual-based schemes would have more negative effects on the labour supply of married women, consistent with the findings of Horstschräer et al. (2010). On the other hand, the proportion of families in which neither partner works would fall dramatically compared to a family-based system, which would be less disincentive for married women to work.

Finally, we refer to the literature that studies how the tax-transfer system affects the labour supply of married women (see Eissa and Hoynes, 2004; Guner et al., 2012; Blundell et al., 2016; Bick and Fuchs-Schündeln, 2017; Borella et al., 2023 among many others; Aaberge et al., 2004; Colonna and Marcassa, 2015; Marino et al., 2016 as for Italy). Similarly to previous papers analysing the Italian tax-transfer system, we focus on a form of jointness arising from the design of family benefits, since the tax unit in Italy is the individual. We adopt a static framework, similar to Colonna and Marcassa (2015). They study the impact of tax credits for dependent spouses and children on the labour supply of married women. The tax credit for the dependent spouses is granted to first earners (husbands) and declines with the income of the spouse. The non-employment (or low-paid employment) of the second earner (wife) reduces the taxation of husbands; the implicit marginal tax rate on earnings increases with the income of the wife for low-paid women and decreases for their husbands. This encourages specialization within the household and reduces the labour supply of wives. In our paper, we study a different form of jointness in the transfer function introduced by RdC. Under RdC, the non-employment (or low-pay employment) of the second earner implies a 100% implicit marginal tax on low-wage husbands. Low-paid partners may both prefer not to work. Women as secondary earners only face a 100% implicit tax on earnings due to RdC if the family is still eligible for the subsidy given the husband's employment decision and wage. As the amount of the subsidy is non-linear with the number of family components, the wage range over which

women face a 100% implicit tax is overall rather small.

The structure of the paper is as follows. In Section 2 we develop a theoretical model that illustrates how the intra-household allocation of labour differs depending on the presence of a family-based or an individual-based transfer. Section 3 describes the design of the Italian GMI scheme and calculates the participation tax rates faced by single and married individuals. Section 4 develops the empirical model that we structurally estimate using the EU-SILC data for Italy described in Section 5. Section 6 reports the results of the model, some suggestive empirical evidence and the evaluation of the policy reforms of the RdC programme. Finally, Section 7 concludes and draws the main policy implications.

2 A stylized theoretical model

In this section, we show theoretically how a family-based GMI scheme affects the intra-household allocation of labour and how partners interact in the employment decision. We then consider the partners' optimal solutions under an alternative individual-based transfer.

Consider a single-period optimization problem of a household consisting of two partners ($i = m, f$). Each individual receives a job offer and decides whether or not to accept it. If the household's disposable income — as the sum of the partners' earnings — is less than a given threshold $\bar{R}^M$, then the couple is entitled to the GMI subsidy, which is equal to $R = \bar{R}^M - (w_m + w_f)$.[8] We assume that the household utility function is simply given by the sum of the utility functions of the partners (both partners have equal weight in the family), which are linear in consumption and leisure.[9] The parameter α_i represents the individual-specific utility of leisure, which we assume differs between partners, as it may also reflect different abilities in home production. The utility-maximization problem for

[8]Some schemes, such as the French or the German GMI, include only a certain percentage of earnings in the definition of household income ($\gamma^* w$, $\gamma < 1$). For simplicity, we assume that $\gamma = 1$. For $\gamma < 1$ we have that workers will accept to work for lower wages and receive the GMI while working, a feature that is missing in this model. However, such a feature only changes the wage threshold at which working is the individual optimal solution. It does not change the interactions between partners, which are described below.

[9]The model is equivalent to assuming that the partners cooperate and jointly decide whether to work or not by maximizing their individual utility function. The assumptions of a linear utility function and a unitary model of the family imply that the decision to work does not depend on family income or on the partner's decision to work. It depends only on the gains/costs associated with working. These assumptions make the model easy to solve and highlight how the GMI creates interactions between partners in addition to any income effect that would depress labour supply under both the GMI and an individual-based transfer.

couples is as follows:

$$\begin{aligned} \max_{e_m,e_f=0,1} \mathcal{U}(y,l) =& y + \sum_{i=m,f} \alpha_i(1-e_i) && (1) \\ \text{s.t.} \quad y =& \sum_{i=m,f} e_i w_i && \text{if } \sum_{i=m,f} e_i w_i > \bar{R}^M \\ y =& \bar{R}^M && \text{otherwise} \\ \text{and} \quad l_i =& 1-e_i && i=m,f. \end{aligned}$$

Eligibility for the GMI depends on the total income of the household and therefore on the employment of the partners. The household payoffs associated with different combinations of partner employment are:

$$\mathcal{U} = \begin{cases} \bar{R}_M + \alpha_m + \alpha_f & m \text{ and } f \text{ non-employed } (U_m U_f) \\ w_m + \alpha_f & \text{if only partner } m \text{ works } (E_m U_f) \\ w_f + \alpha_m & \text{if only partner } f \text{ works } (U_m F_f) \\ w_m + w_f & \text{if both partners work } (E_m E_f). \end{cases} \quad (2)$$

The GMI introduces interdependencies in the partners' optimal decisions. In the absence of a GMI scheme, a partner's employment status simply depends on her wage offer: partner i works if $w_i \geq \alpha$, that is, if earnings are higher than the net cost of working — the utility of leisure. In the presence of a GMI, the optimal solution for a married individual depends on her partner's employment decision and wage rate.

Comparing the payoffs associated with the different employment statuses of the partners in equation (2), we find that it is optimal for both partners not to work ($U_m U_f$ solution; the first outcome in (2)) if wage offers are sufficiently low:

$$w_m < \bar{R}^M + \alpha_m \quad (3a)$$

$$w_f < \bar{R}^M + \alpha_f \quad (3b)$$

$$w_m + w_f < \bar{R}^M + \alpha_m + \alpha_f. \quad (3c)$$

The first two conditions are standard and defined at the individual level: they require that both individual wages are less than the cost of working, given by the sum of the foregone transfer $\bar{R}^M$ and the value of leisure α_i. In addition, equation (3c) requires that the sum of the partners' wages must be less than the net cost of both partners working, which includes the foregone family transfer and the value of both partners' leisure. If the latter condition is not met, then both partners will work, even if their wages are both relatively low. This is the coordination effect of the GMI: the higher the partner's wage, the lower the wage offer has to be to be rejected.

The employment of only one spouse, i ($E_i U_k$ solution), for example the husband m,

is optimal if:

$$w_m > \bar{R}_M + \alpha_m \tag{4a}$$

$$w_f < \alpha_f. \tag{4b}$$

The first condition implies that individual i ($i = m, f$) will accept a job offer w_i only if it compensates the net cost of working. Since working is only worthwhile if the wage rate is at least $\bar{R}^M + \alpha$, if one spouse accepts a job, the household is no longer eligible for the GMI. The other partner will then only compare her job offers with the value of her leisure time (equation 4b) when making her labour supply decision.

Finally, both partners work (solution $E_m E_f$) if:

$$w_m > \alpha_m \tag{5a}$$

$$w_f > \alpha_f \tag{5b}$$

$$w_m + w_f > \bar{R}_M + \alpha_m + \alpha_f. \tag{5c}$$

The first two conditions only require that wage rates are higher than leisure values, regardless of the level of the GMI subsidy. These conditions are the same for both working partners in the model without the GMI. The third condition is due to the presence of the GMI: the sum of wages must compensate for the foregone transfer and leisure values. This would imply, for example, that a low-paid wife would continue to work as long as her husband's wage is high enough.

Overall, the GMI creates a negative relationship between the partners' wages in such a way that both partners work: the higher the wage of one partner, the lower the minimum wage offer that the other partner must receive in order to accept work. This leads to coordination: given the same wage offer, the higher is the partner's wage, the more likely the other partner is to accept work. In this context, having a non-working partner imposes the highest participation cost, which means that the GMI has a stronger effect on labour supply in single-earner households. The condition for having a single-earner household in the presence of the GMI is more demanding, as it requires that one partner's wage is high enough to accept work and not receive the GMI. At the same time, the other partner needs a very low job offer to turn down a job. Thus, given a distribution of couples' wages, the ranges of partners' coordination (either UU or EE) would be larger under GMI than in an economy without GMI (Figure 1, panels a and b).

To emphasize the role of the GMI in influencing the intra-household allocation of work, we examine the optimal work decisions of partners under an alternative but equivalent individual-based income scheme. Note that the optimal solution of partners under an individual-based scheme is observationally equivalent to that of singles, either under the GMI or under an individual-based scheme. There is no distinction between the GMI and

the individual-based scheme for singles.

In an individual-based scheme all workers would simply compare the offered wage rate with the individual net cost of working. We assume that $\bar{R}^M = \bar{R} = 2\bar{R}^S$, so that the individual-based income provides the same total income to the household if neither partner works, but it is granted at the individual level. Figure 1 (panels b and c) illustrates the distribution of couples across different employment statuses in the presence of GMI (panel b) and under an individual-based income scheme (panel c) in the space of wages (w_m, w_f). Employment outcomes follow the conditions set out in Tables 1 and 2. In the individual-based income programme, by definition, the employment decision of one partner does not depend on the employment or earnings of the other partner. Conversely, in family-based schemes, partners coordinate on the same employment decision. Two main channels are at work: on the one hand, the employment of a single member could prevent the whole household from accessing the programme, thereby reducing the potential negative effect on the labour supply of other family members. On the other hand, all members could coordinate and decide not to enter the labour market in order to maintain the family's eligibility. *A priori*, the overall magnitude of the effect of these schemes on labour supply compared to an individual-based scheme is uncertain.

Overall, our simple model suggests that labour supply effects would be larger if there were a high proportion of single-earner households. The overall effect of the GMI on employment and labour force participation of partners ultimately depends on the income distribution of married families and on the employment decisions of partners.

In what follows, we consider the case of Italy, which is an interesting case study for at least two reasons. First, the employment of married women is particularly low. While the employment of single women is in line with what is observed in the other major European economies, Italian married women are much less likely to be employed. According to the European Labour Force data, the difference in employment rates between single and married women is the highest in Italy: approximately 30.0 p.p.; 20.7 in Spain, 14.4 in Germany and 11.3 in France. This means that the proportion of adults living in single-earner households or in families with no income from work is higher in Italy (74.3%; 70.4 in Spain, 61.8 in France, 50.7 in Germany), which means that the proportion of the population potentially affected by the GMI is higher. Second, the Italian GMI scheme is relatively more generous for single persons than for married persons. Comparing the maximum amounts of the GMIs with the relative poverty thresholds based on OECD data, while the German scheme corresponds to 39% of the poverty line for singles without children, whereas the Italian scheme coresponds to 58%. The corresponding figures for a couple with two children are respectively are 59 and 50% respectively (Carta et al., 2022).

A strongly advocated reform of the Italian scheme is to increase the generosity for larger households. Thanks to the empirical model developed below, we are able to assess

the efficiency costs of the reform in terms of reduced labour supply and to identify policy solutions to address these costs.

3 The institutional setting

3.1 The Italian GMI programme: *reddito di cittadinanza*

Reddito di cittadinanza (RdC) is a national means-tested guaranteed minimum income available to households that meet certain income and asset eligibility criteria.[10] The programme also serves as an active labour market policy (ALMP),[11] as its receipt is linked to obligations aimed at incentivizing participation in the labour market.[12] The duration of the benefit is 18 months, with the possibility of renewal after a 1-month break and no explicit limit on the number of renewals. Table 3 summarizes the economic requirements for eligibility for RdC.

The benefit consists of two parts. Part A is a cash transfer equal to the difference between the relevant equivalized taxable income threshold (EUR 6,000, multiplied by the Equivalence scale (EQ)[13] for households with more than one member) and the taxable income of the household. Earnings are fully included in the definition of taxable income; i.e. for each additional euro of earned income, the RdC amount is reduced by one euro. Part A is provided via a prepaid credit card and can be used to purchase a basket of essential goods. Part B is only granted to tenants and homeowners with a mortgage on their home. Part B contributes to rent or mortgage payments up to an annual ceiling of EUR 3,360 for tenants and EUR 1,800 for mortgage holders. Part B is computed as the minimum between *(i)* the annual rent (or mortgage payment), *(ii)* the relevant Part B ceiling. The sum of Part A and Part B cannot exceed EUR 9,360, multiplied by the

[10] Additional eligibility criteria include being an Italian or EU citizen, or being a close relative of an Italian or EU citizen, or being a permanent resident, or having resided continuously in Italy for at least 10 years. Households in which there is at least one person who resigned without just cause are excluded from the benefit for 12 months after the job separation.

[11] The GMI is called *pensione di cittadinanza* (PdC) if the household components are all over 66 of age or they are disabled if they are younger than 67. The PdC is a pure income support and does not impose any obligation on recipients to participate in the labour market.

[12] All non-employed persons aged 18-64 must submit a declaration of immediate availability for employment and must participate in job search or social reintegration activities. Students, retired or PdC beneficiaries, and disabled persons are exempted from these obligations. Failure to comply with the above requirements results in sanctions (reduction or loss of benefits), including imprisonment in the case of false declarations. At the time of writing, the ALMP component is poorly implemented.

[13] The RdC equivalence scale (EQ) takes into account the size and composition of the family. It assigns a value equal of 1 to the first person in the household, 0.4 to other members over 18, and 0.2 to members under 18. The EQ cannot exceed 2.1 (2.2 for households with a severely disabled person).

equivalence scale. In summary, benefit entitlements are calculated as follows:

$$\begin{cases} RdC = \max\left(0; \underbrace{6000^{*}\text{EQ} - z}_{Part\ A}\right) \\ RdC_{tenant} = \max\left(0; \underbrace{6000^{*}\text{EQ} - z}_{Part\ A} + \underbrace{\min\left(\text{Registered Home Rent}, 3360\right)}_{Part\ B}\right) \\ 480 \leq RdC \leq 9360^{*}\text{EQ} \end{cases} \tag{6}$$

where z is the taxable household income; the registered home rent is the rent paid — if any — for the main dwelling declared on the means-test declaration form.[14]

In the Italian tax system, the tax unit is the individual, not the household. Therefore, the tax function does not depend on the marital status of the individual. However, there are tax credits whose amounts depend on the household's or partner's income, creating jointness in the tax-transfer function (Colonna and Marcassa, 2015; Marino et al., 2016) in addition to RdC. We model the tax and benefit formulas as they were before the introduction of RdC, following OECD (2019).

3.2 Monetary disincentives to work of RdC

To assess the disincentive effects of RdC on the extensive margin of labour supply, we examine how it affects the Participation Tax Rate (PTR). The PTR is a summary measure of work incentives that is widely used in the public economics literature. It is defined as 1 minus the financial gain from working as a share of gross earnings (w):

$$PTR(w) = 1 - \frac{\Delta Y_D}{w} = 1 - \frac{Y_D(w) - Y_D(0)}{w}. \tag{7}$$

The financial gain from working is the change in the household's disposable income $Y_D(\cdot)$ when accepting a job offer that pays gross earnings w. The PTR measures how the tax and benefit system affects the financial return to work relative to gross earnings: the higher the number, the more the tax and benefit system reduces the financial return to work. The PTR typically only takes values between zero — for example, when no tax or benefit is paid — and one. A value greater than one would describe an extreme case of work disincentive, where a worker would actually lose income by working. Moreover, as tax systems are generally not regressive, the PTR is traditionally not decreasing along the income distribution.

In this section, we illustrate how the RdC affects the PTRs of single and married individuals. For the sake of notation, we neglect sources of income that do not depend on

[14] Means-testing in Italy is certified by the ISEE declaration, which provides a measure of family income and wealth, the ISEE parameter. More details are given in Section 5.

employment status and therefore do not alter work incentives, such as non-labour income and non means-tested cash transfers. Moreover, without loss of generality, we focus on individuals who meet all other non-labour income requirements of the RdC scheme: in this way, eligibility depends only on the decision to work and on gross earnings.

Looking first at unmarried individuals, the relevant PTR in the absence of RdC would be:

$$PTR^S(w) = \frac{T(w) - B(w)}{w} \tag{8}$$

where $T(\cdot)$ is the tax function and $B(\cdot)$ represents other benefits, such as tax deductions or credits, available to workers and dependent on total gross earnings, w. Given the progressivity of the tax system, the PTR in (8) is a non-decreasing function of earnings. The RdC transfer, defined as:

$$R^i = max\left(\bar{R}^i - \sum_{k=1}^{N_i} w_k - B\left(w\right), 0\right) \tag{9}$$

which implies a positive transfer up to a threshold $\bar{R}^i$. The latter depends on the size and composition of the household, where N_i is the number of working-age members in the household.

The single's disposable income in the presence of RdC will be:

$$Y_D(w) = \begin{cases} \bar{R}^S & \text{if unemployed} \\ w - T\left(w\right) + B\left(w\right) + (\bar{R}^S - w - B(w)) = \bar{R}^S - T(w) & \text{if } w + B(w) \leq \bar{R}^S \\ w - T\left(w\right) + B\left(w\right) & \text{otherwise,} \end{cases}$$

where R^S is the relevant threshold for a single individual.

Since gross income below the RdC threshold is included in the no tax area, the PTR linked to the single's decision to in the presence of RdC will be:

$$PTR^S_{RdC}(w) \quad = \begin{cases} 1 & \text{if } w + B\left(w\right) \leq \bar{R}^S \\ \frac{\bar{R}^S}{w} + \frac{T(w) - B(w)}{w} = \frac{\bar{R}^S}{w} + PTR^S(w) & \text{otherwise.} \end{cases} \tag{10}$$

Comparing equations (8) and (10), we find that the RdC transfer substantially increases the PTR (Figure 2, panel a), up to 100% for single workers with low job opportunities, such that $w + B(w) < \bar{R}^s$. In these cases, labour supply is strongly discouraged: for each euro of earnings, the benefit is reduced by the same amount and the household's disposable income does not change with employment. Thus, once workers are eligible for RdC, the gains from working in terms of current disposable income are zero. The

financial disincentive remains positive and slowly declines with gross earnings w.

The work disincentive created by the RdC scheme for married individuals is more complex since taxation depends on the combined decisions of all members. As shown in Section 3, the Italian personal tax system is primarily based on the individual; however, some components — such as tax deductions, child benefits and now, to a greater extent, the RdC — depend on the total household income. Household disposable income for a couple can be written as:

$$Y_D(w_j, w_k) = \begin{cases} \bar{R}^M & \text{if } w_j + w_k + B\left(w_j, w_k\right) \leq \bar{R}^M \\ w_j - T\left(w_j\right) + w_k - T\left(w_k\right) + B\left(w_j, w_k\right) & \text{otherwise,} \end{cases}$$

where w_i is the wage of partner $i = j, k$ and the maximum RdC subsidy for couples is denoted by $\bar{R}^M$.

Let's first consider the case of an individual j whose partner k is non-employed ($w_k = 0$). Partner j is the first earner — the only working spouse in a one-earner couple. The introduction of RdC would increase the relevant PTR from:

$$PTR_j^M(w_j)|(w_k = 0) = \frac{T(w_j) - B(w_j, 0)}{w_j} \tag{11}$$

to

$$PTR_{j,RdC}^M(w_j)|(w_k = 0) = \begin{cases} 1 & \text{if } w_j + B\left(w_j, 0\right) \leq \bar{R}^M \\ \frac{\bar{R}^M}{w_j} + \frac{T(w_j) - B(w_j, 0)}{w_j} = & \\ = \frac{\bar{R}^M}{w_j} + PTR_j^M(w_j)|(w_k = 0) & \text{otherwise.} \end{cases} \tag{12}$$

As observed for singles, the introduction of RdC increases the PTR: for first earners this effect is even greater since the maximum amount of the subsidy is higher for couples ($\bar{R}^M > \bar{R}^S$; panel b in Figure 2). This means that, given the same distribution of wage offers — under the RdC scheme the labour supply of married individuals with a non-working partner is more discouraged than that of singles.

Finally, consider the case of an individual k whose partner j works; k is the second earner in a dual-earner couple. The relevant PTR for partner k in the absence of RdC is:

$$PTR_k^M(w_k)|w_j = \frac{T(w_k) + (B(w_j, 0) - B(w_j, w_k))}{w_k}. \tag{13}$$

The contribution of partner k employment to household disposable income is reduced by the standard income tax $T(w_k)$ and a possible reduction in other transfers ($B(w_j, 0) - B(w_j, w_k)$, see Section 3).

The PTR for the second earner in the presence of the RdC scheme will be:

$$PTR^{M}_{k,RdC}(w_k)|w_j = \begin{cases} 1 & \text{if } w_j + w_k + B\left(w_j, w_k\right) \leq \bar{R}^M \\ \frac{\bar{R}^M - w_j - B(w_j,0)}{w_k} + PTR^{M}_{k}(w_k)|w_j & \text{if } w_j + B\left(w_j, 0\right) < \bar{R}^M \leq w_j + w_k + B\left(w_j, w_k\right) \\ PTR^{M}_{k}|w_j & \text{if } w_j + B\left(w_j, 0\right) > \bar{R}^M. \end{cases} \quad (14)$$

Second earners, as both single and first earners, face unitary PTRs if they are offered job opportunities that are so poor that the household in which they live is eligible for RdC (first case of equation 14). However, this is less likely to be the case for second earners, as RdC eligibility takes into account total household income (Panel c in Figure 2). For second earners without very bad job offers (the second case of equation 14), the impact of RdC on the PTR is lower than for first earners ($\frac{\bar{R}^M - w_j - B(w_j,0)}{w_k} \leq \frac{\bar{R}^M}{w_k}$). Finally, the PTR doesn't change if the first earner's income alone is high enough to exclude the household from the RdC programme (third case).

Overall, given the same distribution of wage offers, RdC worsens the incentives to work, especially for married individuals without a working partner. Given the same distribution of wage offers, the disincentive effect of the RdC scheme is smaller for second earners.

4 Empirical model

To assess the impact of the RdC subsidy on labour supply, we develop a microeconometric static model to estimate the work decisions of individuals and couples based on their expected net earnings. We then simulate the impact of the RdC on disposable income and assess how it would change households' work decisions.

Our model extends the framework developed in Colonna and Marcassa (2015) to include features of the Italian labour market that are relevant for studying the labour supply effects of RdC. First, we assume that individuals are always offered a temporary contract and, with some probability, an open-ended contract. This allows agents to evaluate the discounted value of employment contracts differently, based on the same expected monthly earnings but different durations. Households are assumed to equate the RdC benefit with the monthly earnings from a temporary job, despite its potentially indefinite duration, since the political debate often focuses on the possibility of abolishing the transfer.[15] Second, since potential RdC beneficiaries are typically individuals with scarce job opportunities and limited previous work experience, we include the labour

[15] Under this assumption, we may underestimate the real impact of the RdC on labour supply. We then perform a supplementary estimation, where we equate the RdC income flows with those coming from a permanent job; the results can be considered as an upper bound on the labour supply effects of RdC. They are available on request. In the main analysis, we have preferred to show the most conservative results.

market status observed in the previous period as an independent variable. This variable affects both the current cost of working and the wage that can be earned on the market.

We construct a two-stage model of labour supply. In the first stage, agents decide whether to enter the labour market and actively search for a job. If they decide to participate, in the second stage they receive a job offer for a temporary job and, with some probability, another offer for a permanent job.[16] The problem is discretized because the choice of employment (e) is restricted to finite alternatives: unemployment ($e = 0$), temporary contract ($e = t$), or permanent contract ($e = p$). We do not explicitly consider the choice of the intensive margin — workers cannot choose how many hours to work. However, hours worked are implicitly considered in the exogenous distribution of annual earnings associated with the job offers.[17]

Household disposable income can be derived from individual net labour income ($w - T(w)$) from either a temporary or permanent job, from family non-labour income (y), or from government transfers ($B(\cdot)$) other than RdC, such as unemployment benefits.[18] The complicated nature of the tax-transfer system means that eligibility for RdC results in the programme absorbing other government transfers. This is because these transfers are included in the calculation of family income that determines the amount of RdC.

Extensively, the RdC subsidy for an eligible household i is:

$$\begin{aligned} R^i(w, y) = &\quad \max(\bar{R}^i - (w + y + B(w)), 0) \qquad \text{for singles} \\ R^i(w_m, w_f, y) = &\quad \max(\bar{R}^i - (w_m + B_m(w_m, w_f) + \\ &\quad + w_f + B_f(w_m, w_f)) + y; 0) \qquad \text{for couples} \end{aligned}$$

where $\bar{R}_i$ is the RdC reference threshold for a given household i, depending on its composition; m refers to the male partner and f refers to the female partner.

Household preferences are described by a linear stochastic utility function $\mathcal{U}(\cdot)$, which

[16] RdC could incentivize individuals to engage in informal employment by combining earnings from informal jobs with the subsidy. This phenomenon is recognized as a side effect in the empirical literature Bergolo and Cruces, 2021. Although our model does not explicitly address it, the parameter α, which represents the value of leisure or home production, could also reflect the value of being non-employed and working in the informal sector. We do not have microdata on informal work to explicitly estimate the choice to work in irregular jobs, so adding this variable to the model would not improve our estimates. On the one hand, having such data and including the choice of informal work would likely lead to larger employment effects than those estimated by our model. On the other hand, working in the informal economy while receiving the subsidy may be less optimal than simply receiving the subsidy and not working, as individuals may prefer to avoid irregular employment and the risk of fines in case of inspection.

[17] We believe that modeling this choice is not particularly relevant in the context of RdC. Since the RdC subsidy declines with earnings at a marginal tax rate of 100%, individuals eligible for RdC have an incentive to work zero hours. Thus, they face a binary choice of whether to work or not, rather than a choice of how many hours to work. Given these labour supply disincentives within the scheme, allowing for a choice of working hours would not significantly change our results.

[18] Eligibility for unemployment benefits does not exclude eligibility for RdC; unemployment benefits contribute to the income relevant for RdC eligibility.

depends on the employment status of the family members ($e_k = 0, t, p$, for $k = f, m$), the household disposable income and a set of exogenous socio-demographic characteristics X that account for observed heterogeneity across households:

$$\mathcal{U}^i = \begin{cases} \alpha(e, X) + (\beta_t \mathbb{1}_{e=t} + \beta_p \mathbb{1}_{e=p})(w - T(w)) + \beta_p y + \beta_t (B(w) + R^i(w, y)) + u & \text{singles} \\ \\ \alpha(e_m, e_f, X_m, X_f) + \sum_{k=m,f} (\beta_t \mathbb{1}_{e_k=t} + \beta_p \mathbb{1}_{e_k=p})(w_k - T(w_k)) + \\ + \beta_p y + \beta_t \left(\sum_{k=m,f} B_k(w_m, w_f) + R^i(w_m, w_f, y) \right) + u & \text{couples.} \end{cases}$$

As explained above, net labour income enters the utility function differently depending on the type of job contract; non-labour income and government transfers are treated as flows from permanent and temporary jobs, respectively.

The parameters α identify the costs of working; $\alpha(0, X)$ and $\alpha(0, 0, X_m, X_f)$ are the parameters for non-working singles and couples and are normalized to 0. The costs of working depend on observable characteristics and do not change with the type of employment — temporary or permanent. In the set of observable characteristics, we consider the employment status observed in the previous year, as we assume that the costs of working while already employed are different from those associated with starting a job after a spell of unemployment.

For couples, the cost of partners' work is not necessarily additive, allowing for complementarities between partners. For example, households may derive higher utility from one partner's leisure time if the other partner works ($\alpha(e_m, 0, \cdot, \cdot) + \alpha(0, e_f, \cdot, \cdot) > \alpha(e_m, e_f, \cdot, \cdot)$). Conversely if $\alpha(e_m, e_f, \cdot, \cdot) > \alpha(e_m, 0, \cdot, \cdot) + \alpha(0, e_f, \cdot, \cdot)$, the couple will enjoy working more if they are both employed. Finally, u is a stochastic error component that captures unobserved characteristics that affect preferences.

When receiving job offers, a single will maximize:

$$\begin{aligned} V^i(w, y, X) = & q(X) \max_{e \in (0,t,p)} \mathcal{U}^i(e \mid w, y, X) + \\ & + (1 - q(X)) \max_{e \in (0,t)} \mathcal{U}^i(e \mid w, y, X) + v \end{aligned}$$

where $q(X)$ is the probability of receiving a permanent contract offer and v is a stochastic error component that captures unobserved characteristics that affect preferences beyond X.

In stage 1, individuals decide whether or not to enter the labour market. To make their choice, they compare the utility of not participating and the expected utility of entering the labour market. Let c be the cost of entering the labour market and $E[V^i(\cdot)]$ be the expected utility generated by the maximization problem in stage 2. A single

person has to choose whether to incur the search cost $c^i(X)$ and enter the labour market or remain inactive:

$$\max\left(\mathcal{U}^i\left(0,y,X\right),E\left[V^i(w,y,X)\right]-c^i(X)\right).$$

Assuming that u and v are i.i.d. according to a type I extreme value distribution, the probability of observing an individual in the labour market who chooses the option $e = 0, t, p$, is

$$P\left(e \mid w,y,X\right)=\frac{exp\left(\mathcal{U}^i(e \mid \cdot)\right)}{\sum_{e=0,t,p} exp\left(\mathcal{U}^i(e \mid \cdot)\right)}.$$

Finally, the probability of entering the labour market ($s = 1$ if participating, 0 otherwise) can be calculated as:

$$Q\left(s=1 \mid y,X\right)=\frac{exp\left(E[V^i(w,y,X)]-c^i(X)\right)}{exp\left(\mathcal{U}^i(0,y,X)\right)+exp\left(E[V^i(w,y,X)]-c^i(X)\right)}. \tag{15}$$

Similar equations apply to couples. In this case, we compare four possible scenarios: *i)* neither partner participates in the labour market; *ii)-iii)* only one partner participates; *iv)* both partners enter the labour market. Given the search costs ($c_m(X_m, X_f), c_f(X_m, X_f)$, $c_{m,f}(X_m, X_f)$), the couple's choice is the maximum of the following four solutions:

$$\begin{aligned}
&\mathcal{U}^i\left(0,0,X_m,X_f\right) && \text{(no one searches);}\\
&E(V_m^i(w_m,y,X_m,X_f)-c_m(X_m,X_f)) && \text{(only the husband searches);}\\
&E(V_f^i(w_f,y,X_m,X_f))-c_f(X_m,X_f)) && \text{(only the wife searches);}\\
&E(V_{m,f}^i(w_m,w_f,y,X_m,X_f))-c_{m,f}(X_m,X_f)) && \text{(both husband and wife search).}
\end{aligned}$$

5 Data

We use microdata for Italy from the EU-SILC, the Community Statistics on Income and Living Conditions. The survey collects information on a wide range of issues related to income and living conditions. SILC is carried out annually by the statistical offices of the European countries participating in the project in order to monitor changes in income and living conditions over time. Every person aged 16 or over in a household is required to participate in the survey. Two different types of questions are asked in the household survey: household and personal questions. The household questions cover details of housing and regular household expenditure (mortgage repayments, etc.). This information is provided by the head of the household. The personal questions cover details on variables such as work, income, and health and are completed by each household

member aged 16 and over. We combine the household and personal information to construct a data set that contains information on the potential RdC eligibility of the household and on the characteristics of the spouse of the household member interviewed.[19]

We focus on the longitudinal component of the SILC data because, as mentioned above, we want to take into account the labour market status in the previous period. We use four waves, from 2016 to 2019, which contain information related to the period 2015-2018, before the introduction of the programme.

We simulate the potential RdC eligibility of the household based on the criteria described in Section 3. In these simulations, labour income is the only variable that changes according to the employment status. In the short run, only labour income can be easily changed. Therefore, we take household wealth as given and allow for the possibility that labour income and the ISEE parameter change with the employment decision.

We restrict the sample to individuals aged 25-55 to avoid modeling schooling and retirement decisions. We also exclude the self-employed and individuals who are coded as disabled or unable to work.

The dataset provides information on the gross earnings of all household members and on total income. The difference can be used to calculate non-labour income y. For non-working individuals for whom no labour income is observed, it is necessary to compute the potential annual earnings for all possible labour supply choices $j = t, p$. In order to correct for selection bias, a two-stage non-linear procedure is used, which differs from the standard Heckman correction in a few respects.

5.1 Wage imputation

We consider a model in which individuals are classified into three categories based on a two-stage probit selection rule:

$$k_i^* = \gamma^k t_i + u_i^k \tag{16}$$

$$z_i^* = \gamma^z t_i + u_i^z \tag{17}$$

$$z_i = \begin{cases} 0 \ \textit{non participant} & \text{if } k_i^* < 0, \\ 1 \ \textit{unemployed} & \text{if } k_i^* \geq 0; z_i* \leq 0 \\ 2 \ \textit{employed} & \text{if } k_i^* \geq 0; z_i* > 0, \end{cases}$$

[19] Some of the criteria defining the RdC eligibility refer to wealth information that is not available in the SILC. To overcome this limitation, we impute wealth information on the basis of available income flows from different assets, combined with wealth data taken from the Bank of Italy's Survey on Household Income and Wealth. In this way, we construct the values for households' real estate and financial assets. Unfortunately, we do not have information on car ownership. Then, having all the basic information to reconstruct the eligibility for the RdC, we simulate the means-tested income (ISEE) to check whether a given household could be a potential recipient. Roberta Zizza and Maria Rosaria Marino kindly provide programs to simulate wealth and ISEE parameters in the SILC data.

where γ^k and γ^z are unknown vectors of parameters, while u_i^k and u_i^z are the normalized unobserved shocks affecting participation and work decisions, with covariance σ_{kz}. We assume that the independent variables t_i, vectors of demographic characteristics of agent i and her spouse, and the categorical variable z_i are observed, but the latent selection variables k_i^* and z_i^* are not observed.

The wage w_i is a linear function of some observed demographic characteristics of agent i and her spouse, x_i, but the coefficients of x_i depend on the type of contract j offered to agent i:

$$w_i = \begin{cases} \beta_t' x_i + \nu_{it} & \text{if } j_i = t \\ \beta_p' x_i + \nu_{ip} & \text{if } j_i = p, \end{cases} \tag{18}$$

where for each observed $j = t, p$, ν_{ij}, u_i^k and u_i^z, are normally, independently and identically distributed across observations with variance-covariance matrix Σ. Our goal is to estimate the parameter vectors β_t, β_p.

We proceed with a two-step estimation procedure, which is a generalization of the Heckman (1979) estimator for the binary case. In the first step, estimating equations (16) and (17) yields consistent estimates of $\hat{\gamma^k}$, $\hat{\gamma^z}$ and the joint distribution of u_i^k and u_i^z. Finally, we plug our results into the wage equation (18): $E\left[w_i | z_i, t_i, x_i\right] = \beta_j' x_i + E(\nu_{ij} | z_i^* > 0) = \beta_j' x_i + \lambda_z E(z | z_i^* > 0)$ to consistently estimate β_j with OLS regressions of w on x.

6 Results

6.1 Estimated parameters

Table 4 shows the estimated parameters of the model for singles (separately for men and women) and couples. The ratio $\frac{\beta_t}{\beta_p}$ defines the wedge between temporary and permanent contracts. The estimated ratio is one third for singles and almost one half for couples: this implies that workers would be willing to accept permanent contracts with annual wages much lower than temporary contracts (or RdC subsidies). The ratio is slightly higher for couples: this is due to the second earner — typically the wife — being willing to accept fixed-term contracts even for lower wages than men.

The disutility cost of working, α, and the cost of searching, c, differ significantly by gender and marital status. Among singles, the disutility of working is about the same for men and women. However, among couples where only one partner works, men are instead more willing to work than women. Moreover, married men are more willing to work than single men, while the opposite is true for wives.[20]

[20] This result comes from comparing α_k, $k = m, f$, for singles and couples. When estimated for couples, the parameter α_m is the disutility of work when only the husband works; α_f when only the wife works. When both partners work, there is a unique cost of work $\alpha_{m,f}$ defined at the couple level. Since $|\alpha_{m,f}| < |\alpha_f| + |\alpha_m|$ — the latter two calculated for couples —, and since $|\alpha_m|$ is lower for couples

Finally, the results show strategic complementarities between husbands and wives when they both work: households face lower costs when both partners work ($|\alpha_{m,f}| < |\alpha_f| + |\alpha_m|$) or when both partners participate in the labour market ($|c_{m,f}| < |c_f| + |c_m|$).

6.2 Estimation results

To assess the properties of the model, we first examine its ability to reproduce the basic features of labour force participation and employment observed in our sample, by comparing model simulations with observed data.

Table 5 shows the results of estimating the participation and employment rates (temporary and permanent), the unemployment share,[21] for men and women according to their marital status and the presence of children. The model reproduces the percentage of men and women in the labour force and the percentage of those employed with either a fixed-term contract (FTC) or an open-ended contract (OEC) for both sexes and marital status.

Table 6 shows the distribution of couples according to the employment status of the partners, both in the observed data and in the simulated model. The model fits well with the distribution of couples according to the different combinations of employment status of the partners observed in the data.

6.3 The impact of RdC on labour supply

Table 7 shows the model predictions of how the introduction of RdC would change employment and participation rates for different groups of households. Overall, the availability of the RdC scheme would reduce employment more for men than for women (by 1.4 and 0.9 percentage points, respectively). This average effect masks important differences by marital status. Among singles, the effect would be larger for women (-1.8 p.p, -1.0 p.p. for men), in line with the fact that the former typically receive lower wage offers. Most singles, regardless of gender, would exit the labour market directly, while a much smaller proportion would remain unemployed. Among married individuals, RdC would mainly reduce the employment rate of husbands (-1.4 and -2.3 p.p., respectively, in couples without and with children, respectively), while the impact on wives is estimated to be much smaller, especially in households with children. As we will see in more detail below, this is due to the fact that the reduction in employment is concentrated in single-earner households, where women typically do not work. We observe that the labour market participation of married individuals is less affected, i.e. they leave employment but remain unemployed looking for a better job opportunity.

than for singles, we infer that married men are more likely to work than single men. A similar reasoning applies to obtain the opposite result for women.

[21] The unemployment share is defined as the ratio of the number of unemployed to the reference population.

The results in Table 8 illustrate how RdC changes the distribution of married couples according to the employment status of partners. RdC increases the share of households where both partners are non-employed by 2.1 p.p. compared to the benchmark scenario: this increase is fuelled by the 1.8. p.p. decrease in the share of households where only the husband works. This is in line with the results presented earlier, according to which male labour supply in couples is discouraged by the availability of the RdC scheme, mainly because it involves married men earning low wages with non-working partners. At the margin, two-earner households are not affected by the introduction of RdC.

Based on the stylized model outlined in Section 2, we provide an analysis of the estimated effects associated with an individual-based income transfer as an alternative to the RdC. The eligibility criteria for the individual-based income transfer are the same as those for the RdC, which are based on family wealth. However, the taxable income requirement for the individual-based transfer only takes into account individual earnings. The amount of the subsidy is set at half of the RdC amount for which the household qualifies, with the aim of keeping the total disposable income of the family at the same level when no partner is working. For single persons, the amount of the subsidy remains the same as the RdC.

Comparing RdC with the individual-based transfer, we observe a reduction in coordination between partners in the latter. Specifically, the proportion of households in which both partners are employed decreases by 2.8 percentage points, while the number of families in which both partners are employed increases only marginally. Conversely, an individual-based transfer would increase the likelihood of situations where only one partner is employed, as predicted by the theory.

We include the employment status observed one year earlier in the set of observables X because we expect it to affect both the current cost of working (represented by the parameter α) and the wage that can be earned once employed. Thus, we can predict employment at t as a function of the employment status at $t-1$. Since those who leave employment voluntarily, unless they have a temporary contract, cannot participate in the programme the following year, looking at employment at t under the RdC on the basis of employment at $t-1$ gives a sense of the long- and short-term effects of the programme. Effects on the transitions from employment to non-employment suggest long-term effects. In Table 9 we see that the availability of RdC has a strong impact on the labour market flows of married men, whose probability of remaining in employment and of moving from non-employment to employment falls dramatically (by 1.3 and 9.4 p.p., respectively). To a lesser extent, RdC reduces the labour market flows into employment of single women, in line with Table 7, while leaving the labour market flows of married women almost unchanged. Since most of the impact comes from married men leaving employment, as the group of married men in employment is quantitatively more relevant than married men not in employment, we conclude that the short-term effects are much more limited

and concentrated on single women. This is confirmed in Table 10, which focuses only on the currently unemployed to provide estimates of the short-term effects. However, these estimates represent a lower bound for the short-term effect, as they focus only on individuals who are currently unemployed and do not include workers who may be laid off or whose contract is about to expire. The short-term effect would be somewhat larger for women, especially single women. For men, the effect is much smaller as most of them, especially if married, are currently employed.

Finally, Table 11 reproduces Table 7, focusing only on individuals who are potentially eligible for RdC, i.e. those who only meet the wealth criteria. Their labour supply decision will determine their eligibility. The results for this subgroup are in line with those for the total population, but stronger.

6.3.1 Suggestive (ex-post) empirical evidence

We provide some rough suggestive evidence of the model predictions using data from the Italian Labour Force Survey (ILFS), taking into account the first year of RdC implementation, 2019. The previous analysis suggests that the RdC scheme: *i)* for singles, the disincentive effect is greater for low-wage workers, more often women as they face lower wage offers, on average ; *ii)* for couples, the disincentive effect is greater for households with only one earner, more often the husband. This means that the gender employment gap, defined as the ratio between the employment rates of women and men, should have widened for single people and narrowed for married people after the introduction of RdC in those regions where the incidence of RdC is higher.[22] Figure 3 shows the correlations, by marital status, between the population share of RdC recipients in Italian regions and the percentage change in the gender employment gap in 2019 compared to 2018.[23] A positive change in the ratio between 2019 and 2018 means that the gender employment gap has narrowed. We report correlations differentiated by educational attainment, as individuals with low educational attainment are more likely to benefit from RdC income. Panel a in Figure 3 shows that for low-educated single people, the correlation between the share of RdC recipients (number of recipients as a proportion of the resident population by region) and the gender employment gap is negative, meaning that in regions with a higher share of RdC recipients, the gender employment gap increased after the introduction of RdC. Panel b shows that the evidence

[22] We examine the evolution of the gender employment gap, rather than the change in the employment rates of men and women separately, to take into account that underlying cyclical conditions/trends may drive the correlation. Looking at the ratio of female to male employment partially offsets cyclical conditions/trends that affect women's and men's employment rates equally.

[23] Data on RdC recipients are provided by the Italian National Social Security Institute; employment rates are calculated in the Italian Labour Force Survey (ILFS) data. In the ILFS, we select only 2019 as the year of RdC implementation, as 2020 data are strongly affected by the pandemic, which could lead to correlations that exceed those determined by RdC. Following our main analysis, we select individuals aged 25-55 who are potentially able to work (see Section 5).

is the opposite for married low-educated individuals. In regions characterized by a higher share of RdC recipients, the gender employment gap decreased (or increased less). Note that the correlations are close to zero for highly educated individuals, consistent with the fact that they are less likely to be RdC recipients.

6.4 The effects of RdC on inequality

Finally, we estimate the impact of the RdC and of an equivalent individual-based transfer on disposable income inequality. The RdC would reduce the Gini index by about 4 p.p.; a similar effect would be produced by an individual-based income programme. The two schemes, by definition, have the same effect for singles (Figure 4, Panels a and b), increasing the disposable income of a significant number of individuals at the bottom of the income distribution. However, there are differences for couples: in particular, as discussed above, an individual-based subsidy would crowd out a large proportion of women in dual-earner couples, who could experience a net loss of disposable income (the green line — in Figure 4 Panel c — shifts inwards for average incomes around 40.000 euros).

Our results on the impact of RdC on the Gini index are somewhat larger than those of Curci et al. (2020). They estimate that RdC (including PdC, which is targeted at households with adults aged over 66) reduces the Gini index of equivalised disposable income by 1.5 p.p. under the assumption of full take-up. They look at the whole population, including the elderly, while we focus on the subsample of persons aged 25-55. Since PdC benefits are less generous than RdC benefits (Italian Social Security Institute, 2023), the overall effect of the GMI programme on inequality is smaller.

6.5 Reforms of RdC

The previous analysis has shown that the structure of the incentives embedded in a GMI scheme (Section 2) and the relatively low generosity of RdC towards larger families together explain why the introduction of RdC does not affect the labour supply of married women.

One policy that has been strongly advocated on equity grounds is to increase the generosity of RdC for larger families and eventually reducing it for singles to avoid large increases in the cost of the programme. Such a reform would have important implications for labour supply. We aim to evaluate a similar policy reform and how to better design incentives to work in the face of a more generous income transfer for larger families.

We consider a reform that implements in Italy the features of the German GMI, which pays 39% of the poverty line for singles, 59% for couples with two children under 14, as already described in Section 2. We start with the income threshold for singles, which is 39% of the Italian poverty line in 2019, EUR 4,041. The German GMI does not explicitly

have an equivalence scale.[24] We obtain the weight assigned to each additional member of the household by taking the ratio between the additional amount paid for each additional member of the family and the monthly benefit amount for a single adult (or parent). We assign a weight of 0.85 to each additional person over 14, and 0.67 to each person under 14. We apply the obtained equivalence scale to the income threshold defined for singles (EUR 4041) to obtain the reference income thresholds for households with more than one component. We call this scheme as "RdC new". Note that for a couple with two children under 14, the retrieved parameter of the equivalence scale is 3.2, a value which, multiplied by the maximum amount paid to a single person (EUR 4041), gives a benefit of EUR 12,932, corresponding to 59% of the poverty line for the reference household.

We then consider a second scheme that shares the income thresholds of the RdC new, but takes into account 80% of earnings in defining the family income relevant for eligibility and in determining the amount of the transfer. This means that for every EUR 100 of earnings, the benefit is reduced by EUR 80. This deduction was embedded in the GMI scheme in place in Italy before the introduction of RdC.[25] The German GMI works in a similar way. We call this scheme "RdC gamma" and it allows to save 20% of earnings while receiving the transfer, thus reducing distortions in labour supply.

The employment effects of the two schemes are relevant. Looking at singles, the employment rates of men and women are slightly higher under RdC new compared to the scenario with the original RdC scheme. Employment rates are even higher under RdC gamma. Overall, the effects are relatively stronger for women. Focusing on couples, the introduction of RdC new further increases the share of households with non-working partners compared to the original RdC scenario, mainly due to the reduction of the share of single-earner households where only the husband works; the share of couples where both partners are employed decreases slightly. Overall, the employment of married men is still more penalized than that of married women, even when the generosity of the system is increased for larger families, in line with the structure of incentives described in Section 2. Under RdC gamma, the employment effects go in the same direction, but are smaller in absolute terms. The discount on earnings under RdC gamma allows the negative employment effects associated with the scheme to be significantly reduced.

[24] In the German GMI scheme, the benefits to secure the subsistence level of single people or single parents — the so-called standard requirement — are EUR 446 per month from 1 January 2022. If several persons live in a community of needs, the standard needs are granted as follows: *i)* EUR 404 per month for spouses, life partners and other partnerships living together; *ii)* EUR 360 per month for other persons fit for work living in a community of needs if they are over 18 years of age, or for adults entitled to benefits under 25 years of age who move without the permission of the employment office; *iii)* EUR 376 per month for young people over 14 until they reach 19; *iv)* EUR 311 per month for children between 7 and 14; and *v)* EUR 285 per month for children under 6 (European Commission, 2023). We construct an equivalence scale by assigning different values to family members above and below 14 years of age. Thus, we take the average of the above amounts according to the age of the relative.

[25] We refer to *reddito di inclusione* (ReI), a GMI scheme implemented in Italy between January 2018 and March 2019.

Figure 5 shows the distribution of family income under RdC, RdC new and RdC gamma. For singles, we observe that the two policy reforms considered have, as expected, a lower impact on reducing poverty and increasing family disposable income compared to RdC. The RdC gamma scheme performs better than the RdC new, as it allows 20% of earnings to be added to the benefit. For couples, the two policy reforms are more effective in reducing the share of low-income families and in increasing family disposable income overall. The difference in the distributive impact between the two schemes (RdC new and RdC gamma) is less striking, but is in the same direction as before.

7 Conclusion

Guaranteed minimum income (GMI) schemes work incentives differently according to marital status and gender. Eligibility for GMIs and the amount of the transfer depend on total family income. This feature creates a jointness in the tax-transfer function of couples, so that the participation and marginal tax rates on labour supply of a spouse depend not only on their own income — as is instead the case for singles — but also on their partner's income. As a result, such schemes affect the labour supply of first and second earners — typically the husband and the wife — differently.

This paper investigates the incentives of partners to work under GMI schemes. We show theoretically that the jointness in the tax-transfer function created by GMI does not penalize second earners more than first earners. The presence of a working partner prevents the family from entering the scheme without any negative consequences for the second earner's labour supply. On the contrary, the non-employment condition of the spouse may induce low-paid first earners not to work, allowing the household to benefit from the GMI. Overall, GMIs promote the coordination of partners with the same employment decision and mainly affect the labour supply of first earners living in single-earner households before the introduction of a GMI scheme. Individual-based schemes (such as unemployment benefits or GMI for singles) are neutral with respect to the marital status and the magnitude of the labour supply response is larger for individuals facing lower wage offers — typically women.

We then focus on the labour supply effects by marital status and gender of a recently introduced GMI programme in Italy (*reddito di cittadinanza*, RdC), a country characterized by a low female employment rate and a relatively high share of single-earner couples. We first show that the RdC significantly increases the fiscal cost of accepting a job, measured by the participation tax rate, especially for singles and first earners. We then use a structural microeconometric model to quantify the size of the labour supply effects. Consistent with the theoretical predictions, the availability of RdC reduces the employment rate of single women more than that of single men. The labour supply of married women, on the other hand, is largely unaffected, while the employment rate of

married men falls significantly. The share of households in which neither partner works increases dramatically, while the share of single-earner households — those in which the husband works — decreases. The share of households in which both partners work is not affected by the RdC. An individual-based scheme would instead have sharply reduced female labour supply and boosted male breadwinner households.

Our analysis suggests that, in terms of labour supply effects, there is a trade-off between family-based and individual-based minimum income schemes. On the one hand, the labour supply of second earners is less discouraged under a family-based GMI scheme than under an individual-based scheme. On the other hand, a family-based scheme encourages both low-paid partners to stay out of employment, thereby increasing the share of households where both partners are non-employed and dependent on income support programmes in the long run.

There are a number of caveats to the interpretation of our estimates. First, we provide estimates under the assumption of full take-up of the measure. Although the take-up of RdC was higher than that observed for other similar programmes, it was well below 100% (around 80%, a relatively high value compared to similar programmes in other European countries). Thus, we may be overestimating the labour supply effects. On the contrary, we proxy RdC benefits with the income stream from a temporary job. This assumption would instead have introduced a downward bias in the estimation. Second, our ex-ante evaluation of the labour supply effects of RdC neglects the role of active labour market policies associated with the subsidy. If any, these policies would have mitigated the negative labour supply effects. However, the evidence on the effectiveness of such policies is rather limited. Finally, we focus on the effects on the formal labour market. We do not rule out the possibility that participation in the RdC programme may encourage labour supply in the informal sector. An ex-post causal evaluation of the labour supply effects of RdC in the short and long run will then be highly informative.

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Tables

Table 1: Partners' optimal employment status — individual-based subsidy

$w_m \leq \frac{\bar{R}}{2} + \alpha$ $w_f \leq \frac{\bar{R}}{2} + \alpha$	$w_m > \frac{\bar{R}}{2} + \alpha$ $w_f > \frac{\bar{R}}{2} + \alpha$	$w_i > \frac{\bar{R}}{2} + \alpha$ $w_k \leq \frac{\bar{R}}{2} + \alpha$
$U_m U_f$	$E_m E_f$	$E_i U_k$

Table 2: Partners' optimal employment status — GMI

$w_m \leq \bar{R} + \alpha$ $w_f \leq \bar{R} + \alpha$ $w_m + w_f < \bar{R} + 2\alpha$	$w_m > \alpha$ $w_f > \alpha$ $w_m + w_f > \bar{R} + 2\alpha$	$w_i > \bar{R} + \alpha$ $w_k \leq \alpha$
$U_m U_f$	$E_m E_f$	$E_i U_k$

Table 3: RdC economic eligibility criteria

ISEE	< EUR 9,360
Household taxable income	< EUR 6,000*EQ
Household wealth	Real estate (excluding the main home) < EUR 30,000; financial assets < EUR 10,000
Vehicle ownership	No household member owning or having at full disposal automobiles registered over the previous six months, nor owning or having at full disposal high-powered automobiles registered over the previous two years, nor owning or having at full disposal ships or boats

Notes: Economic eligibility criteria for the RdC scheme. ISEE is the means-tested parameter which conveys relevant information about the family income and wealth. The Equivalence Scale (EQ) is 1 for the first component, 0.4 for each other adult, 0.2 for each component aged less than 18 years. The EQ cannot be higher than 2.1 (2.2 for household with a heavy disabled person). The threshold for financial assets is EUR 6,000; this is is increased of EUR 2,000 for each household member after the first one, up to a maximum of euro 10,000. The EUR 10000 threshold is increased of EUR 1,000 for each child after the second. The 6,000 and 10,000 thresholds are increased of EUR 5,000 if there is a household member with disability.

Table 4: Estimated parameters

	Single		Couples
	Men	Women	
$\frac{\beta_t}{\beta_p}$	0.37	0.35	0.48
α_m	-1.00	-	-0.89
α_f	-	-0.97	-1.21
$\alpha_{m,f}$	-	-	-1.99
c_m	-1.61	-	-1.19
c_f	-	-0.96	- 1.94
$c_{m,f}$	-	-	-2.84

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work. For couples a unique α is estimated. When estimated for couples, the parameter α_m (α_f) is the disutility from labour when only the husband (wife) works; $\alpha_{m,f}$ is the disutility from labour when both spouses work. The search cost for couples is analoguously defined.

Table 5: Model fit — Individuals, participation and employment rates (%)

	Total			Single		Couples			
						no children		with children	
	Total	Men	Women	Men	Women	Men	Women	Men	Women
Participation rate									
Data	87.7	97.4	77.9	94.6	92.9	98.0	85.3	99.0	66.5
Model	87.5	97.2	78.1	94.6	92.9	97.9	85.4	98.7	66.7
Unemployment share									
Data	7.9	7.2	8.6	10.7	8.5	3.9	12.1	6.0	7.8
Model	8.0	7.3	8.6	10.7	8.5	3.8	12.2	5.9	8.1
Employment rate - FTC									
Data	11.2	10.9	11.4	17.2	15.1	8.7	13.8	7.3	8.6
Model	11.1	10.8	11.4	17.2	15.1	8.6	13.8	7.2	8.5
Employment rate - OEC									
Data	68.4	79.1	57.9	66.7	69.2	85.3	59.3	85.7	50.1
Model	68.4	79.1	57.9	66.7	69.2	85.4	59.3	85.6	50.1

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work. The unemployment share is the ratio between the number of unemployed individuals and the benchmark population. FTC stands for "fixed-term contract" and refers to temporary employment. OEC stands for "open-ended contract" and refers to permanent employment.

Table 6: Model fit — Couples (%)

	Men	
Women	**Non-Employed**	**Employed**
Non-Employed		
Data	3.9	35.2
Model	3.9	35.2
Employed		
Data	3.3	58.0
Model	3.4	57.9

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work.

Table 7: Model results — Impact of RdC on participation and employment rates

	Total			Single		Couples			
						no children		with children	
	Total	Men	Women	Men	Women	Men	Women	Men	Women
Employment rate									
Model	79.5	89.9	69.4	83.9	84.3	94.0	73.1	92.8	58.6
impact of RdC	-1.2	-1.4	-0.9	-1.0	-1.8	-1.4	-0.3	-2.3	-0.3
Share OEC									
Model	68.4	79.1	57.9	66.7	69.2	85.4	59.3	85.7	50.1
impact of RdC	-0.8	-0.9	-0.6	-0.6	-1.2	-1.0	-0.2	-1.3	-0.2
Share FTC									
Model	11.1	10.8	11.4	17.2	15.1	8.6	13.8	7.2	8.5
impact of RdC	-0.4	-0.5	-0.3	-0.4	-0.6	-0.4	-0.1	-1.0	-0.2
Participation rate									
Model	87.5	97.2	78.1	94.6	92.9	97.9	85.4	98.7	66.7
impact of RdC	-0.7	-0.7	-0.7	-0.7	-1.5	-0.7	-0.1	-0.5	-0.1
Unemployment share									
Model	8.0	7.3	8.6	10.7	8.5	3.8	12.2	5.9	8.1
impact of RdC	0.5	0.7	0.2	0.3	0.3	0.7	0.2	1.8	0.2

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work. The unemployment share is the ratio between the number of unemployed individuals and the benchmark population. FTC stands for "fixed-term contract" and refers to temporary employment. OEC stands for "open-ended contract" and refers to permanent employment.

Table 8: Model results — Changes in the distribution of couples across different working status (%)

	Men	
Women	**Non-Employed**	**Employed**
Non-Employed		
Model	3.8	35.0
impact of RdC	2.1	-1.8
impact of IB	1.6	1.1
Employed		
Model	3.0	58.2
impact of RdC	0.0	-0.3
impact of IB	0.1	-2.8

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work. IB stands for the scenario in which an individual-based transfer equivalent to RdC is implemented.

Table 9: Model results — Individual labour market flows into employment by previous working status (%)

	Single		Married	
	Men	Women	Men	Women
	Pr(Employed at t)			
Non-Employed at (*t-1*)				
Model	37.8	36.4	42.7	18.1
impact of RdC	-2.0	-3.2	-9.4	-0.6
Employed at (*t-1*)				
Model	95.0	95.0	97.3	92.3
impact of RdC	-0.6	-1.2	-1.3	-0.2

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work.

Table 10: Model results — Impact of RdC on currently non-employed

	Total			Single		Couples			
						no children		with children	
	Total	Men	Women	Men	Women	Men	Women	Men	Women
Employment rate									
impact of RdC	-1.2	-1.4	-0.9	-1.0	-1.8	-1.4	-0.3	-2.3	-0.3
only currently non-employed	-0.2	-0.1	-0.3	-0.4	-0.6	-0.1	-0.1	-0.2	-0.1

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work.

Table 11: Model results — Potential RdC recipients, impact of RdC on participation and employment rates

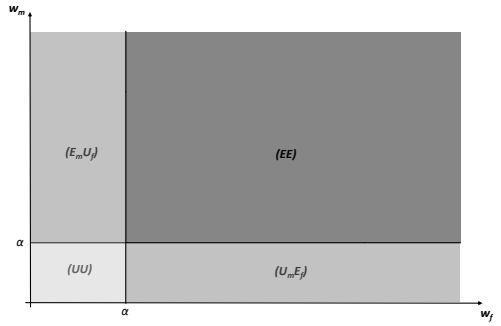
	Total			Single		Couples			
						no children		with children	
	Total	Men	Women	Men	Women	Men	Women	Men	Women
Employment rate									
Model	61.6	66.9	57.2	67.3	69.3	67.7	37.0	66.3	40.0
impact of RdC	-2.4	-3.0	-1.8	-3.1	-3.5	-2.8	-0.6	-3.0	-0.5
Share OEC									
Model	43.5	48.1	39.7	37.2	45.5	59.6	28.4	59.6	31.6
impact of RdC	-1.3	-1.8	-1.0	-1.4	-1.5	-2.0	-0.3	-2.3	-0.2
Share FTC									
Model	18.1	18.8	17.5	30.1	23.9	8.1	8.6	6.7	8.4
impact of RdC	-1.1	-1.2	-0.8	-1.4	-2.0	-0.8	-0.3	-0.7	-0.3
Participation rate									
Model	81.2	90.8	73.1	87.7	85.9	92.2	51.6	94.3	55.1
impact of RdC	-1.4	-1.9	-0.9	-1.7	-1.8	-2.0	-0.6	-2.1	-0.1
Unemployment share									
Model	19.6	24.0	16.0	20.5	16.5	24.5	14.6	28.0	15.1
impact of RdC	1.0	1.1	0.9	1.4	1.7	0.8	0.0	0.9	0.4

Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work. The unemployment share is the ratio between the number of unemployed individuals and the benchmark population. FTC stands for "fixed-term contract" and refers to temporary employment. OEC stands for "open-ended contract" and refers to permanent employment.

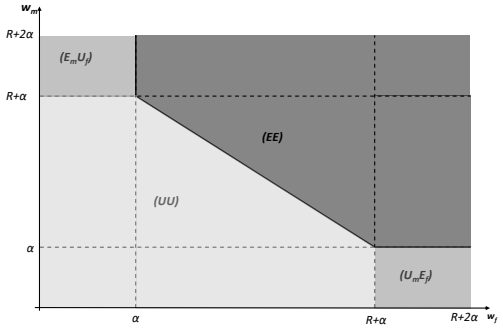
Figures

Figure 1: Partners' employment status

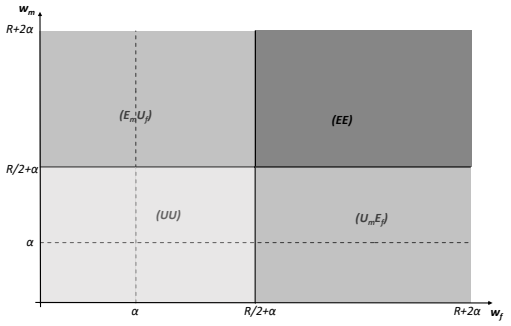
(a) No income transfer



(b) GMI



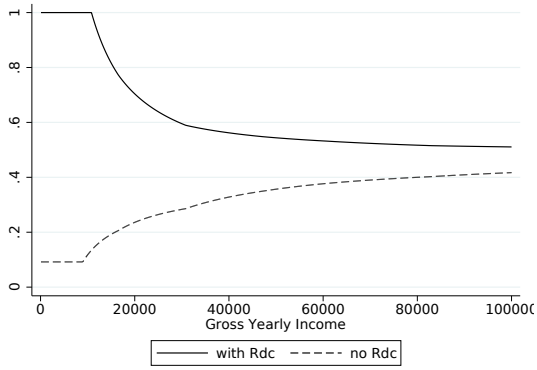
(c) Individual-based (IB) scheme



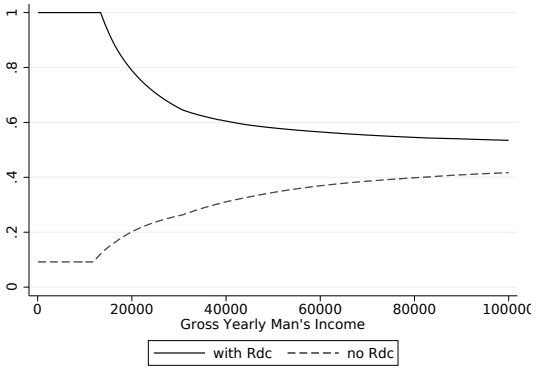
Notes: Authors' calculations. The figures represent the optimal employment statuses of the partners according different scenarios: a) in the absence of any income transfer; b) under a family-based GMI scheme; C) under an individual-based income scheme. Moving from scenario a) to b) increases the share of households where neither partner works (UU, light grey area), mainly at the expense of the share of single-earner households (EU, grey area). Conversely, moving from a) to c), we observe a larger decrease in the share of dual-earner households (EE, dark grey area).

Figure 2: Participation tax rates with or without the RdC scheme

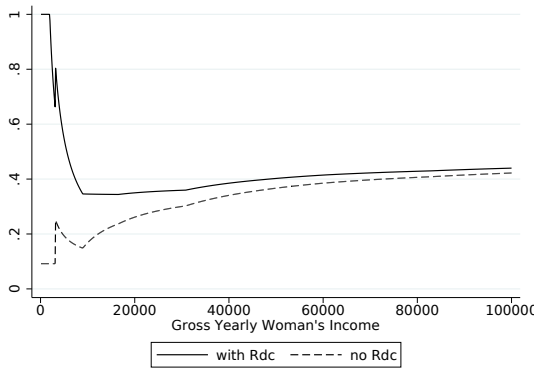
(a) Single



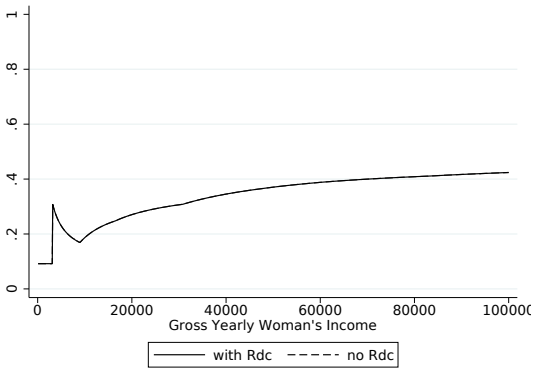
(b) First earner — a non-working partner



(c) Second earner with a low-wage partner



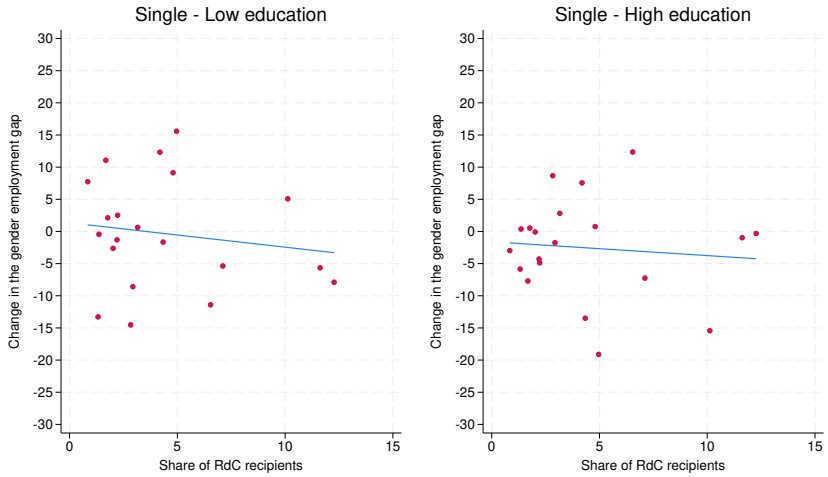
(d) Second earner with a high-wage partner



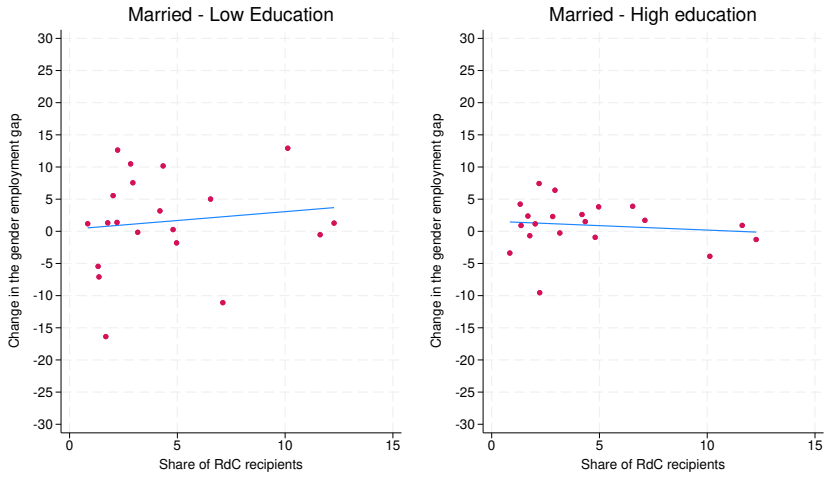
Notes: Authors' simulations on SILC data. We simulate participation tax rates taking into account RdC thresholds for homeowners. To simplify the graph in panel a, we consider the same amount of the RdC relevant threshold for singles and married individuals.

Figure 3: Correlations between changes in the gender employment gap and the share of RdC recipients across Italian regions

(a) Singles

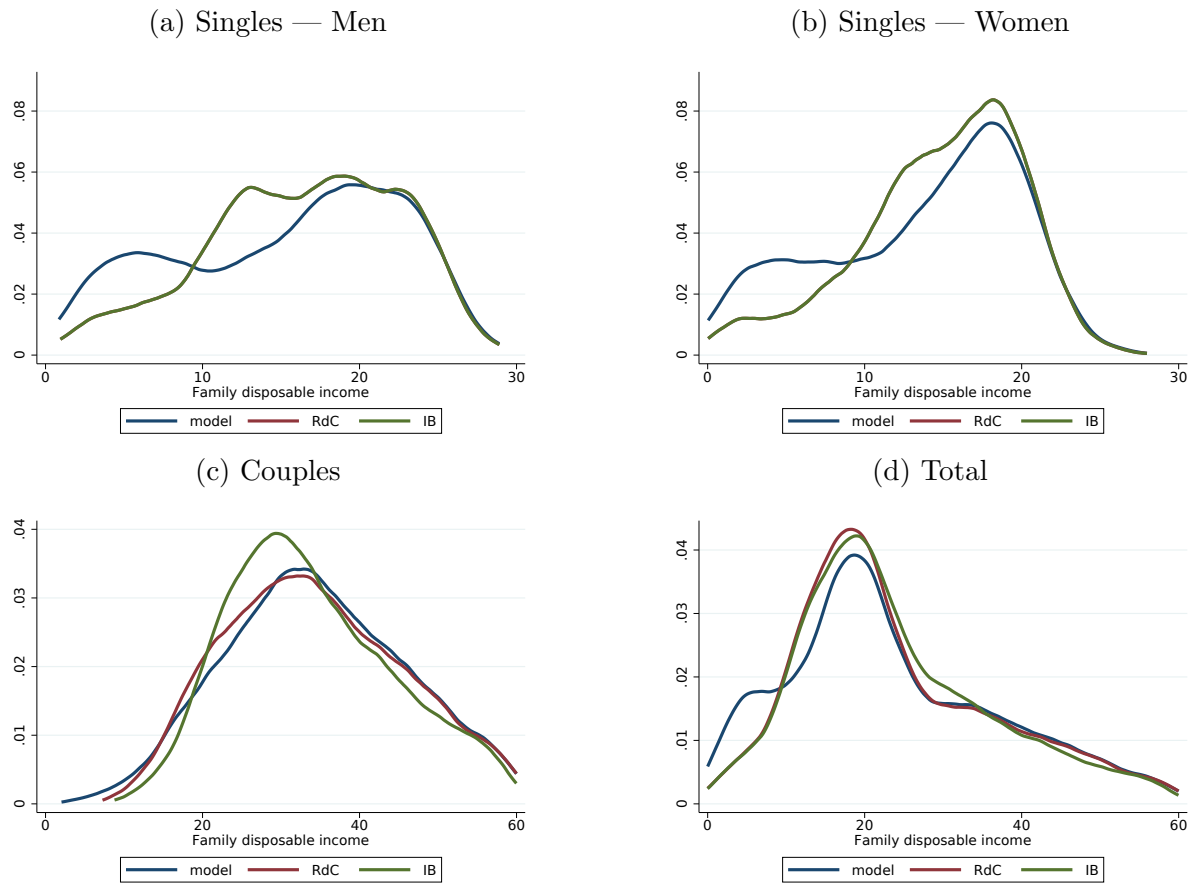


(b) Married individuals



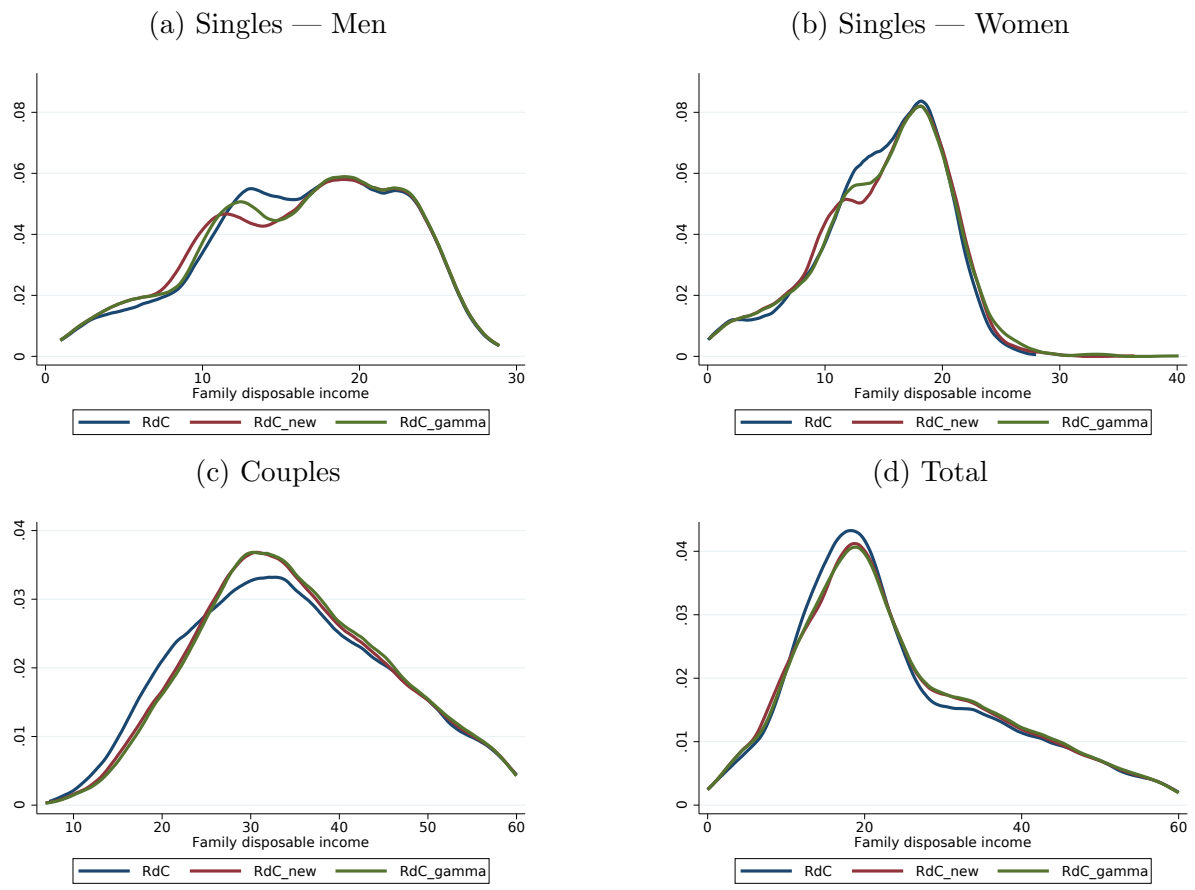
Notes: Authors' elaborations on the Italian Labour Force Survey data for employment rates, and data on RdC recipients from the National Social Security Institute. The change in the gender employment gap is the percentage variation in the ratio between women and men's employment rate in 2019 with respect to 2018. A positive change in the ratio means that the gender employment gap reduces. Low educated individuals are those most likely to get RdC. Panel a shows that among singles, the correlation between the share of RdC recipients (number of recipients over the resident population by region) and the gender employment gap is negative, meaning that in regions characterized by a higher share of RdC recipients the gender employment gap increased or reduced less after the RdC introduction. Panel b shows that the evidence is opposite for married individuals. In regions characterized by a higher share of RdC recipients the gender employment gap reduced or increased less. Correlations are much weaker for high educated individuals, less likely to be RdC recipients.

Figure 4: Effects on the distribution of family disposable income



Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work.

Figure 5: Effects on the distribution of family disposable income - reforms to the RdC programme



Notes: Authors' computations from EU-SILC longitudinal data (2016-2019). Sample of individuals between 25 and 55 years old; no self-employed and individuals coded as disabled or unfitted to work.

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