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Sympathy for the diligent and the demand for workfare☆

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ABSTRACT

We study the role of fairness concerns in the demand for redistribution through workfare. In the first part of the paper, we present new evidence from a survey. We show that individuals are more generous towards poor people whom they perceive to be diligent workers relative to poor people whom they perceive to be non-diligent, a social preference that we label *sympathy for the diligent*. This preference is much stronger than preferences regarding other characteristics of the poor, such as race, nationality, and disability. More important, we show that subjects with higher sympathy for the diligent have a stronger preference for workfare programs. In the second part of the paper, we incorporate our empirical findings into a model of income redistribution. We consider the case of a benevolent government with fairness concerns that prioritizes the well-being of individuals who exert the most effort. We characterize the optimal conditions under which the government introduces work requirements. Even if wasteful, work requirements can be optimal, because they allow for a better distinction between individuals who exert great effort and individuals who do not. However, if the government lacks commitment power, the availability of screening through work requirements leads to a lower equilibrium effort and, possibly, a Pareto-dominated allocation.

1. Introduction

We study the role of fairness concerns in the demand for social assistance programs with work requirements (hereafter, referred to as workfare) relative to unconditional assistance programs (welfare). We argue that public support for work requirements responds to a type of social preference that we refer to as *sympathy for the diligent*, according to which individuals are more sympathetic towards poor people whom they perceive to exert high effort than they are towards poor people whom they perceive to exert low effort. This social preference translates into a higher demand for redistribution towards one group relative to the other. Consequently, this social preference generates a demand for work requirements in social programs, because these programs can act as screening devices that target social assistance towards the poor who exert high effort.

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A large body of work argues that fairness concerns are important for understanding income redistribution (Alesina and Angeletos, 2005). For example, survey data indicate that the percentage of the population that believes that poor people are lazy has a strong negative correlation with social spending across the set of OECD countries (Alesina and Glaeser, 2004). Within a given country, individuals who believe that the poor are poor because of lack of effort, rather than because of bad luck, tend to have a low demand for redistribution (Alesina and La Ferrara, 2005; Corneo and Grüner, 2002; Fong, 2001). Fairness concerns are also important drivers in a variety of laboratory experiments, such as the dictator, ultimatum, and gift exchange games (Fehr and Schmidt, 1999), and experiments that study the demand for redistribution of income (Durante et al., 2014). More precisely, the laboratory evidence supports the idea that individuals believe it is fair to give more resources to those who exert a higher effort. For example, Cappelen et al. (2013) studies fairness views in a game that consists of a risk-taking phase followed by a redistribution phase. The results show that, when deciding how to redistribute, most individuals distinguish between ex post inequality that reflects differences in luck and ex post inequality that reflects differences in choices. A similar distinction between differences in luck and differences in choices has been documented in a variety of other games, such as double auction (Ball et al., 2001), public good (Clark, 1998), and ultimatum games (Hoffman and Spitzer, 1985). In this paper, we argue that fairness concerns have important implications not only for the overall level of income redistribution, but also for the composition of the spending in different social programs, such as welfare vs. workfare.

In the first part of the paper, we present new evidence about the existence of sympathy for the diligent and its relationship with the demand for workfare. We conducted surveys to 1800 U.S. subjects recruited on Amazon Mechanical Turk. Subjects were asked to provide policy recommendations for the government in a hypothetical scenario. This scenario contained a description about a poor household to whom the government was considering providing social assistance. We randomly varied the characteristics of the household head who would benefit from the social program. Later, subjects were asked to recommend the amount for a cash transfer to be given to that specific household.

Consistent with our definition of sympathy for the diligent, subjects' recommendations were more generous when the description of the beneficiary included an indication that the individual was hard-working, less generous when this indication was omitted, and even less generous when the description included an indication that the individual was lazy. The magnitudes of these differences are large. For example, when the recipient was described as hard-working, subjects recommended a cash transfer that was almost twice as large as when the recipient was described as lazy. These differences are significant even within the sub-populations of Democrats, Independents, and Republicans, although they are larger in magnitude among Republicans. To obtain a benchmark for the quantitative importance of this social preference, we randomized other characteristics of the hypothetical beneficiary. The estimates suggest that subjects are more generous with African-American than White beneficiaries, more generous with U.S.-born than Mexican-born beneficiaries, and more generous with disabled than non-disabled beneficiaries. However, the gap in generosity between hard-working and lazy beneficiaries is between 4.3 and 8.4 times the magnitude of the gaps in generosity between African-Americans and Whites, U.S.-born and Mexican-born, and disabled and not disabled.

Additionally, we provide evidence that more sympathy for the diligent creates more demand for workfare. To do so, we conducted an additional survey that included a direct question about the respondent's degree of sympathy for the diligent, as well as multiple questions about the respondent's preferences regarding welfare and workfare policies. As expected, compared to those with low sympathy for the diligent, subjects with high sympathy for the diligent have a significantly stronger preference for workfare: they are more likely to demand work requirements in social assistance programs, they prefer a higher share of social spending to be allocated to the Earned Income Tax Credit (EITC), and they are more likely to agree with the statement that work requirements are effective at preventing the lazy poor from benefiting from social assistance programs. These differences are not only statistically significant but also large in magnitude.

In the second part of the paper, we incorporate the empirical findings into a model of income redistribution. We characterize the conditions under which it is optimal for a benevolent government to make income transfers that are contingent on effort requirements (i.e., workfare), as opposed to unconditional transfers (i.e., welfare). We use a framework adapted from Netzer and Scheuer (2010). Ex ante, a risk-averse agent can affect the probability distribution over output by choosing different levels of unobservable effort. For example, this effort choice can be interpreted as human capital investment, as in Boadway et al. (1996) and Konrad (2001). Once outcomes have been realized, a benevolent government chooses the income-redistribution policy. Following Netzer and Scheuer (2010) and others (Boadway et al., 1996; Konrad, 2001), we assume that the government cannot commit to a certain redistributive scheme before effort choices are made.[1]

We introduce a benevolent government with merit-based fairness concerns. The government cares more about the utility of individuals who exert the most effort, because they are believed to deserve higher utility. The government cannot directly verify who exerts effort and who does not, but it can take advantage of the fact that, on average, individuals with lower disutility from effort are more likely to have exerted great effort in the past. Because the work requirement is less costly for individuals with low disutility from effort, the government can use workfare to (imperfectly) screen for diligent individuals and direct more resources toward them. We first analyze the partial-equilibrium problem, in which effort and output are determined and the government must then choose a redistribution policy. The government has the option of

[1] This assumption differs from other studies of income redistribution such as Meltzer and Richard (1981) and Alesina and Angeletos (2005). Note that it makes no difference whether the redistribution scheme is decided before the uncertainty is resolved. What is truly important is whether the redistribution scheme can be modified after the outcomes are realized.

offering to the poor a choice between a workfare and a welfare program. For the sake of simplicity, we focus on the case where the workfare effort produces no output. We show that, if the government is not sympathetic towards the diligent, then the government does not use workfare and redistributes only via welfare. However, under fairness concerns, then the government's optimal redistribution policy involves a combination of workfare and welfare, provided there is a minimum share of the poor who exerted high effort.

Additionally, we analyze the equilibrium implications of the availability of work requirements as an additional redistributive tool. When the government has commitment power, the availability of an additional policy instrument, such as workfare, cannot be harmful (i.e., in the worst case scenario, the government commits to not using the instrument and therefore achieves the same social welfare as if the instrument is not available.) However, when the government lacks commitment power, the availability of an additional policy instrument can be harmful if it leads to a time-inconsistency problem. We compare the set of equilibria in which workfare is available with the set of equilibria in which workfare is not available. The availability of workfare can affect equilibrium effort through two channels, with opposite signs. On the one hand, the availability of workfare allows the government to transfer resources away from agents with high disutility of effort, so that agents with low disutility of effort anticipate that they will not have to share their earnings as much with the agents with high disutility of effort. Consequently, the agents with low disutility of effort face higher incentives to exert effort. On the other hand, agents with low disutility of effort anticipate access to generous workfare programs in the future, which gives them lower incentives to work. We show that, under fairly general conditions, the latter effect dominates, so that the availability of workfare reduces the aggregate level of equilibrium effort. Furthermore, the equilibrium allocation obtained when workfare is available can be Pareto-dominated by the allocation attained when workfare is not available. That is, even when the government is benevolent and rational, the availability of workfare can lead to a Pareto-dominated allocation.

Our study relates to various strands of research. In their seminal contribution, Besley and Coate (1992) introduced a model in which a government can use work requirements for screening purposes. Poor individuals have a choice between receiving a transfer from the government or working in the private market. From the perspective of efficiency, the government is interested in directing its help toward low-ability individuals who would not be able to sustain themselves without the government's help. The government can screen low-ability individuals through work requirements, because they have lower opportunity costs from working in the private sector.[2] Contrary to Besley and Coate (1992), our suggests that work requirements are used target social assistance towards individuals with low disutility of effort rather than towards individuals with low-ability.[3]

Similar to our paper, Cuff (2000) and Moffitt (2006) also stress the importance of a non-utilitarian social welfare function to understand the demand for workfare. Moffitt (2006) assumes that the government values the leisure time of families whose ability is low, but does not value the leisure time of families whose ability is high. That is, the government directly desires that high-ability individuals work and that low-ability individuals do not work. This assumption makes work requirements optimal, even if they do not screen individuals. On the other hand, Cuff (2000) assumes that the government cares more about individuals with certain ability. For instance, the government may care more about low-ability individuals if their low ability is the product of a disability. Even though Cuff (2000) and Moffitt (2006) show that work requirements can be optimal when the government cares differently about individuals of different types, they do not explain why such government preferences may arise in the first place. We show that fairness concerns, which is a central concept of behavioral economics and political economy, endogenously create a demand for workfare.[4] In our model, fairness concerns create a demand for screening individuals based on their past efforts. Since workfare provides screening based on the agent's type (e.g., high or low disutility from effort), the government finds workfare useful only to the extent that agents' types are correlated to their effort choices. Furthermore, we show that this endogeneity of government preferences has important equilibrium implications, because the agents' effort choices depend on their expectations about future government policies.

We find that, when the government lacks commitment power, the availability of workfare can lead to a Pareto-dominated equilibrium. In reality, commitment power is a degree issue mediated by a myriad of factors, such as reputation and institutions (e.g., Acemoglu et al., 2008; Fudenberg and Tirole, 1990). Nonetheless, our model serves as a cautionary tale. Indeed, a number of studies provide related examples of policies whose positive or normative implications are sensitive to the government's commitment power. For example, Konrad (2001) shows that, because the government lacks commitment power, better information about the agents' types can lead to a Pareto-dominated equilibrium in a model of income redistribution. Netzer and Scheuer (2010) shows that, because of the lack of commitment power, competitive insurance markets can implement allocations that Pareto-dominate those achieved by a benevolent government. And Farhi et al. (2012) shows that, even though a zero capital tax would be optimal under perfect commitment, a government without commitment chooses a positive capital tax.

[2] Several studies have elaborated on this screening principle (Besley and Coate, 1995; Cuff, 2000; Kreiner and Tranæs, 2005; Moffitt, 2006). In particular, Kreiner and Tranæs (2005) shows that this principle applies not only to poverty alleviation programs but also to unemployment insurance. In that case, unproductive work requirements can be used to target unemployment insurance towards the involuntarily unemployed (which happen to be low-income, low-disutility individuals).

[3] Besides differences in fairness concerns, our setting also differs in that we assume that agents decide whether to join a workfare or welfare program after their fates in the private market have been determined.

[4] Consistent with our interpretation, Falk et al. (2006) present evidence from laboratory experiments about the role of fairness concerns in creating demand for workfare.

Given the dramatic differences with respect to the predictions of Besley and Coate (1992), our model illustrates how social preferences can lead to redistributive policies that differ from those resulting from the prescriptions of a purely utilitarian government. In this sense, our paper belongs to a recent but growing literature that emphasizes the need for incorporating social preferences into public finance models and for studying optimal tax theory from a positive perspective. For instance, Auerbach and Hassett (2002) modifies the social welfare function to accommodate social preferences about horizontal equity. Roemer et al. (2003) apply an equal opportunity criterion to the social welfare function to study optimal income redistribution in a setting in which income differences might arise because of individual merit or family background. Other examples include fairness concerns related to the principles of responsibility and compensation (Fleurbaey and Maniquet, 2006) and to the principle of equal sacrifice (Weinzierl, 2014).[5] Our model suggests that fairness concerns can be useful not only to explain the overall extent of redistribution (Alesina and Angeletos, 2005), but also to explain the composition of redistributive programs (e.g., welfare vs. workfare).[6]

In this paper, work requirements should be understood in a broader sense rather than the specific social assistance programs that are often referred to as workfare. For example, some studies argue that governments use some forms of public employment as a tool for income redistribution, including evidence from the United States (Alesina et al., 2000) and other developed and developing countries (Alesina et al., 2001; Clark and Milcent, 2011; Mattos and França, 2011; among many others).[7] Thus, our model can provide an explanation for the demand for public employment as a redistributive tool. Additionally, as illustrated by our survey results, sympathy for the diligent may be relevant for understanding the public support for earning subsidy programs, such as the EITC in the United States. Indeed, even though the utilitarian welfare framework provides good reasons for using a program like the EITC (Saez, 2002), it is uncertain whether its growth can be attributed to those reasons (see Moffitt, 2006 and the references therein).[8]

The paper is organized as follows. Section 2 presents the empirical evidence. Section 3 presents the model. The last section concludes.

2. Empirical evidence

2.1. Overview and Subject Pool

In this section, we present new survey results that show the existence of sympathy for the diligent and its relationship with the demand for workfare. We conducted three surveys, labeled Survey 1, Survey 2 and Survey 3 hereon. Surveys 1 and 2 were designed to quantify the degree of sympathy for the diligent in the population. Survey 3 was designed to examine whether more sympathy for the diligent creates more demand for workfare.

We conducted the three surveys with U.S. subjects recruited on Amazon Mechanical Turk. We followed the recommended practices for using Amazon Mechanical Turk for surveys to ensure high-quality responses (e.g., see Crump et al., 2013). Potential recruits were asked to participate in a 5-min "public opinion survey".[9] Responses to Surveys 1 and 3 were collected in September 2014, and responses to Survey 2 were collected in October 2017. We restricted the sample of participants to U.S. residents only, and we included attention checks to ensure that participants read the instructions and the questions thoroughly.

After excluding a small minority (about 1%) of participants who did not satisfy our attention checks, the final sample comprised 1778 respondents in Survey 1; 808 respondents in Survey 2; and 502 respondents in Survey 3. The full questionnaire is available in the online Appendix. Subjects seemed confident that they understood the questions: when asked about how difficult it was to understand the survey questions, about 90% of respondents chose "Easy to understand", only 1% chose "Difficult to understand," and the remaining 9% chose "Neither easy nor difficult."

The first set of questions, which were identical across the three surveys, collected background information about the respondent such as gender, age and income. As has been extensively noted in other surveys using Amazon Mechanical Turk, the participants in our sample are not representative of the U.S. population – results reported in Appendix B.1. In summary, our sample is more male, younger, more Western, more educated and poorer than the U.S. average. Most of these differences in composition are modest in magnitude (e.g., our sample is 53.9% male, while the U.S. adult population is 49.2% male), while other differences less so (e.g., while 22.5% of the U.S. adult population has an yearly income over $90 K, only 12.67% of our respondents belong to that income bracket). In any case, and in line with other studies (Kuziemko et al., 2015), we find similar results if we re-weight the survey responses to match the average U.S. demographics.

[5] For further discussion and a survey of the literature, see Saez and Stantcheva (2016) and Chapter 7 of Piketty and Saez (2013).

[6] Moreover, our model suggests that the government's degree of commitment power can also affect the composition of redistributive programs.

[7] For example, Clark and Milcent (2011) shows that public hospitals in France employ significantly more workers than similar non-public hospitals, that this gap correlates with the unemployment rate, and that the correlation is stronger in left-wing areas.

[8] In line with Fleurbaey and Maniquet (2006), we emphasize the role of fairness concerns.

[9] We used this vague description on purpose, to avoid conditioning the participants. Participants were paid $0.50 for their participation, which was above-average for surveys of this length.

Table 1
Survey1's treatment assignment.

Treatment Group	Message	Probability
No-Info		$\frac{1}{9}$
Hard-Working	"He has worked very hard his entire life. However, he cannot find a full-time job because his line of work has been dramatically affected by the recent economic crisis."	$\frac{1}{9}$
Lazy	"He has been lazy for his entire life and as a result cannot find a full-time job."	$\frac{1}{9}$
African-American	"He is African American."	$\frac{1}{9}$
White	"He is White."	$\frac{1}{9}$
Mexican	"He was born in Mexico."	$\frac{1}{9}$
American	"He was born in the United States."	$\frac{1}{9}$
Disabled	"He has a disability."	$\frac{1}{9}$
Not-Disabled	"He does not have a disability."	$\frac{1}{9}$

Notes: The beginning of the question read: "Consider the case of a married individual with 2 small children. He has a part-time job. He earns $20,000 per year (net after taxes), and this is the sole source of income for his household." The treatment groups refer to the information displayed immediately after that baseline description.

2.2. Survey 1: Measuring sympathy for the diligent

2.2.1. Survey design

The existing evidence shows that individuals who believe that the poor are lazy also prefer lower redistribution (Alesina and La Ferrara, 2005; Corneo and Grüner, 2002; Fong, 2001). However, this evidence is subject to the usual concerns with omitted variable biases. For instance, it is possible that individuals who believe that the poor are lazy may differ in other beliefs and values that are relevant for redistribution, such as their political beliefs or inequity aversion. These differences can create a spurious correlation between beliefs about laziness of the poor and preferences for redistribution. In this subsection, we present results from Survey 1 that is specifically designed to measure the degree of sympathy for the diligent while addressing these identification challenges.[10]

We ask respondents to imagine that they were appointed by the U.S. government to recommend policies that would aid poor families. We provided the respondent with a description of the household that would benefit from the social program. The beginning of the description read: "Consider the case of a married individual with 2 small children. He has a part-time job. He earns $20,000 per year (net after taxes), and this is the sole source of income for his household." We added one sentence to this description, which was randomly chosen from a list of 9 possible messages discussed below. Immediately after the description, the respondent was asked to recommend a cash transfer amount for the government to make to this beneficiary.[11] The available options were cash amounts from $0 per week ($0 per year) to $200 per week ($10,400 per year), in increments of $20 per week ($1040 per year). Given the net income of the beneficiary of $20,000 per year, the options ranged from 0% to 50% of his disposable income.[12]

We randomized the information displayed immediately after that baseline description with the goal of measuring the effect of that extra piece of information on the respondent's generosity towards the beneficiary. We used a between-subject design, in which each respondent was randomly assigned to one of 9 possible sentences (with equal probability). Table 1 shows the list of 9 messages.[13]

The three main treatment arms were No-Info, Hard-Working and Lazy. The *No-Info* treatment arm received no additional information (i.e., they were shown the baseline description only). The *Hard-Working* treatment arm included the additional sentence: "He has worked very hard his entire life. However, he cannot find a full-time job because his line of work has been dramatically affected by the recent economic crisis." The *Lazy* treatment arm included the text: "He has been lazy for his entire life and as a result cannot find a full-time job."[14] The hypothesis of "sympathy for the diligent" implies that respondents should be the most generous in the Hard-Working treatment group, less generous in the No-Info group, and even less generous in the Lazy group.

The remaining 6 treatment groups are intended to provide a benchmark for the effect of the information about whether the individual was hard-working or lazy. These additional treatments consisted of sentences indicating the race of the ben-

[10] For other examples of survey experiments in the context of preferences for redistribution, see Fong and Luttmer (2011), Cruces et al. (2013), and Kuziemko et al. (2015).

[11] We specified that the respondent's decision applied to that particular beneficiary only by stating "Please remember that your choice applies to this individual only, because the government is making decisions on a case-by-case basis".

[12] The scale was not restrictive for most respondents, since only 22% of the respondents chose the highest option.

[13] In terms of the different ways surveys can be conducted, one advantage of the between-subject design is that it ameliorates the concerns with social desirability bias (Goffman, 1963). Subjects may have incentives to lie when asked directly about some issues, because they do not want to reveal their true preferences and because they may feel pressure to agree with the interviewer. If, for instance, a subject is asked whether a Mexican-born deserves help more than an American-born, the respondent may want to lie to "hide" his or her preferences towards the American-born. This survey design is less sensitive to this bias, because the respondent only reports the desired redistribution to the Mexican-born or the American-born recipient, and thus does not reveal whether she likes one group better than the other.

[14] The mean (median) time spent on the description was about 46 (40) s, which suggests that the average respondent paid significant attention to the task.

Table 2
Average generosity in cash transfers across treatment arms.

	1. By Effort		2. By Race
Hard-Working	121.95 (4.634)	African American	108.60 (4.819)
No-Info	111.76 (4.666)	No-Info	111.76 (4.666)
Lazy	65.98 (4.753)	White	100.00 (4.581)
Difference *p*-values:		Difference *p*-values:	
Hard-Working vs No-Info	0.12	African American vs No-Info	0.63
Lazy vs No-Info	<0.01	White vs No-Info	0.07
Hard-Working vs Lazy	<0.01	African American vs White	0.19
Observations	588	Observations	605
	3. By Origin		4. By Disability Status
American	103.42 (4.717)	Disabled	120.10 (4.467)
No-Info	111.76 (4.666)	No-Info	111.76 (4.666)
Mexican	96.73 (4.760)	Not- Disabled	106.91 (4.933)
Difference *p*-values:		Difference *p*-values:	
American vs No-Info	0.20	Disabled vs No-Info	0.19
Mexican vs No-Info	0.02	Not-Disabled vs No-Info	0.47
American vs Mexican	0.31	Disabled vs Not-Disabled	0.04
Observations	588	Observations	594

Notes: Data from Survey 1 ($N = 1778$). Respondents were put in the hypothetical position in which the United States government appoints them to choose policies that would aid poor families. We provided the respondent with a description of the household that would benefit from the social assistance, and we randomized some information in this description. The four panels show the additional information that was included in the description of the hypothetical scenario. No-Info corresponds to the baseline information (i.e., no further information added). After the description, respondents were asked to recommend to the government a cash transfer for this beneficiary. We present the mean of the amount of unconditional cash transfer that the subjects recommended in the hypothetical scenario (standard errors in parenthesis). We present the *p*-value for the standard two-sample, two-tailed t-tests for equality of the cash transfer means across each possible combination of the information provided.

eficiary (White or African-American), the country of birth of the beneficiary (American-born or Mexican-born), or the disability status of the beneficiary (Disabled or Not-Disabled).

It is important to note that previous literature (e.g., Cappelen et al., 2010; Erkal et al., 2011; Sutter and Weck-Hannemann, 2003) has analyzed the role effort plays in shaping income redistribution by conducting experiments in which subjects exert real effort. In this study, we conduct online surveys, which has the disadvantage of not capturing fairness concerns via revealed-preference. However, a survey design allows us to elicit objective views on the issues of interest and focus on situations that provide broader external validity.

2.2.2. Results

Table 2 shows the effects of the additional messages on the generosity in cash transfers. The first panel of Table 2 tests the main hypothesis, by comparing the recommended cash transfer between Lazy, No-Info and Hard-working treatments. As expected, respondents recommended a higher cash transfer the more hard-working the recipient: on average, subjects proposed a $66 cash transfer in the Lazy treatment, a $111 in the No-Info treatment and a $122 cash transfer in the Hard-Working treatment. The difference between the Lazy and No-Info treatment is significant (p-value $< .01$), as well as the difference between the Lazy and Hard-working treatments (p-value $< .01$), although the difference between the Hard-working and No-Info treatments is borderline statistically insignificant (p-value $= .12$).

It is worth noting that the recommended amounts from the No-Info and Hard-Working treatments were closer in value than those from the No-Info and Lazy treatments. One possible interpretation is that subjects in the No-Info group believed that the beneficiary was substantially more likely to be hard-working than lazy.

The fact that respondents were willing to redistribute an extra $56 (or equivalently, almost twice as much) to individuals who were described as hard-working compared to individuals who were described as lazy suggests that sympathy for the diligent is economically significant. The last three panels from Table 2 provide a benchmark for the economic significance of these effects. The second panel shows that subjects recommended a $8.6 higher transfer for African-Americans relative to White recipients, with this difference being statistically insignificant[15] (p-value $= .19$) and economically much smaller than the $56 gap between Hard-working and Lazy. The third panel shows that subjects want to redistribute $6.69 more to American-born recipients than to Mexican-born recipients – again, this difference is statistically insignificant (p-value $= .31$) and economically much smaller than the $56 gap between Hard-working and Lazy. The fourth panel shows that the gap of $13.2 between Disabled and Non-Disabled, although statistically significant (p-value $= .04$), is less than 24% of the magnitude of the gap between Hard-Working and Lazy.

To check the robustness of sympathy towards the diligent across ideological groups, Table 3 lists the recommended transfers in the Hard-Working, No-Info, and Lazy treatment arms by political identification, based on self-reported identification

[15] Assuming that a majority of subjects are White, this insignificant difference is consistent with the finding in Fong and Luttmer (2011) of no racial preferences in charitable giving.

Table 3
Average generosity in cash transfers across treatment arms, by political identification of the respondent.

	1. All Respondents	2. Republican Respondents
Hard-Working	121.95 (4.634)	92.26 (12.570)
No-Info	111.76 (4.666)	91.11 (11.225)
Lazy	65.98 (4.753)	29.19 (6.372)
Difference p-values		
Hard-Working vs No-Info	0.12	0.94
Lazy vs No-Info	< 0.01	< 0.01
Hard-Working vs Lazy	< 0.01	< 0.01
Observations	1778	104
	3. Independent Respondents	4. Democrat Respondents
Hard-Working	126.06 (7.903)	128.57 (6.195)
No-Info	114.88 (7.409)	117.78 (6.974)
Lazy	60.24 (7.387)	91.23 (7.704)
Difference *p*-values		
Hard-Working vs No-Info	0.30	0.24
Lazy vs No-Info	< 0.01	0.01
Hard-Working vs Lazy	< 0.01	< 0.01
Observations	232	252

Notes: Data from Survey 1. Respondents were put in the hypothetical position in which the United States government appoints them to choose policies that would aid poor families. We provided the respondent with a description of the household that would benefit from the social assistance, and we randomized some information in this description (Hard Working, No-Info and Lazy). No-Info corresponds to the baseline information (i.e., no further information added). We present the mean of the amount of unconditional cash transfer that the subjects recommended in the hypothetical scenario (standard errors in parenthesis). We present the *p*-value for the standard two-sample, two-tailed *t*-tests for equality of the cash transfer means across each possible combination of the information provided. The sample is grouped according to respondent's political identification, based on self-reported identification as Democrat, Independent or Republican. For more details see the Questionnaire in the online Appendix.

as Democrat, Independent, or Republican.[16] Table 3 allows for a comparison of the baseline transfers recommended in the No-Info treatment group. As expected, Republicans are less generous than Democrats ($91 vs. $118 of average redistribution), with the difference being statistically significant (p-value = .04). Interestingly, the magnitude of this partisan gap ($27) is smaller than the gap between Lazy and Hard-Working ($56).

Most important, in Table 3 we compare the sympathy for the diligent, measured as the difference between the Lazy and Hard-working treatments, within each of the partisan groups. The results for the full sample (first panel) is qualitatively similar for the sample of Republicans (second panel), Independents (third panel) and Democrats (fourth panel): in each of these groups, the desired cash transfer is lower for Lazy than Hard-working individuals, with each of these differences being statistically significant at the 1% level. In quantitative terms, nevertheless, the magnitude of the effect seem larger for Republicans than for Democrats. Among Republicans, the desired cash transfer is $63.07 larger for the Hard-working relative to the Lazy treatment; among Democrats, the desired cash transfer is $37.34 larger for the Hard-working relative to the Lazy treatment. The difference between the $63.07 and $37.34 effects is statistically borderline insignificant (p-value = .14). This is at least suggestive evidence that even though sympathy for the diligent is present among both Democrats and Republicans, it may be stronger among Republicans.

2.3. Survey 2: Robustness checks

2.3.1. Survey design

This survey was designed to test some potential confounding factors: maybe respondents are reacting to the information about the effort of the recipient not because of the information about effort per se, but because that effort signals some unobserved attribute of the recipient. For instance, it is possible that past effort signals differences in past income and/or taxes paid in the past. In other words, individuals may want to redistribute less to the lazy individual because this individual has produced less income in the past, and/or because this individual has paid fewer taxes in the past.

This survey is identical to Survey 1, in the sense that we randomized the information displayed immediately after the baseline description with the goal of measuring the effect of that extra piece of information on the respondent's generosity towards the beneficiary. However, we departed from Survey 1 in the content of the information experiments, aimed at addressing these potential confounding factors.

As summarized in Table 4, each respondent was randomly assigned to one of 8 possible treatments. In the main three treatment groups, we used a different recipient than in Survey 1: a young College graduate, who is joining the labor force for the first time. Since this recipient has not worked in the past, we created hard-working and lazy messages based on the job search effort of the recipient. Since this individual is joining the labor force for the first time, there are no differences

[16] The results are similar if, instead, we categorize the individuals based on their self-reported location in the liberal-conservative spectrum.

Table 4
Survey2's treatment assignment.

Treatment Group	Message	Probability
Married/old recipient:		
No-Info		$\frac{1}{8}$
Hard-Working (Baseline)	"He has worked very hard his entire life. However, he cannot find a full-time job because his line of work has been dramatically affected by the recent economic crisis."	$\frac{1}{8}$
Lazy (Baseline)	"He has been lazy for his entire life and as a result cannot find a full-time job."	$\frac{1}{8}$
Hard Working (Job Search)	"He recently tried to find a full-time job. However, he could not find it despite putting much effort in the job search because his line of work has been dramatically affected by the recent economic crisis."	$\frac{1}{8}$
Lazy (Job Search)	"He recently tried to find a full-time job. However, he did not find it because he did not put much effort in the job search."	$\frac{1}{8}$
Single/young recipient:		
No-Info		$\frac{1}{8}$
Hard-Working (Job Search)	"He recently tried to find a full-time job. However, he could not find it despite putting much effort in the job search because his line of work has been dramatically affected by the recent economic crisis."	$\frac{1}{8}$
Lazy (Job Search)	"He recently tried to find a full-time job. However, he did not find it because he did not put much effort in the job search."	$\frac{1}{8}$

Notes: The beginning of the question for the Married/old recipient always reads: "The government is considering giving cash transfers to low income households on a case-by-case basis. Consider the case of a married individual with 2 small children. He has a part-time job. He earns $20,000 per year (net after taxes), and this is the sole source of income for his household." Instead, the beginning for the single/young group reads: "The government is considering giving cash transfers to low income individuals on a case-by-case basis. Consider the case of a single individual that recently graduated from college at the age of 21. He has a part-time job. He earns $20,000 per year (net after taxes), and this is his sole source of income." The treatment groups refer to the information displayed immediately after that baseline description.

Table 5
Average generosity in cash transfers across treatment arms in Survey 2.

1. Baseline		2. Job Search	
Hard-Working	130.50 (6.378)	Hard-Working	117.20 (7.084)
No-Info	109.70 (7.424)	No-Info	109.70 (7.424)
Lazy	58.04 (6.364)	Lazy	79.60 (6.749)
Difference *p*-values:		Difference *p*-values:	
Hard-Working vs No-Info	0.03	Hard-Working vs No-Info	0.46
Lazy vs No-Info	< 0.01	Lazy vs No-Info	< 0.01
Hard-Working vs Lazy	< 0.01	Hard-Working vs Lazy	< 0.01
Observations	302	Observations	300
3. College			
Hard-Working	93.33 (6.623)		
No-Info	72.87 (6.740)		
Lazy	40.00 (5.089)		
Difference *p*-values:			
Hard-Working vs No-Info	0.03		
Lazy vs No-Info	< 0.01		
Hard-Working vs Lazy	< 0.01		
Observations	301		

Notes: Data from Survey 2 ($N = 808$). Respondents were put in the hypothetical position in which the United States government appoints them to choose policies that would aid poor families. We provided the respondent with a description of the household that would benefit from the social assistance, and we randomized some information in this description. The three panels show the additional information that was included in the description of the hypothetical scenario. No-Info corresponds to the baseline information (i.e., no further information added). After the description, respondents were asked to recommend to the government a cash transfer for this beneficiary. We present the mean of the amount of unconditional cash transfer that the subjects recommended in the hypothetical scenario (standard errors in parenthesis). We present the *p*-value for the standard two-sample, two-tailed *t*-tests for equality of the cash transfer means across each possible combination of the information provided.

in the income generated in the past and in the taxes paid in the past. Thus, if the results from Survey 1 were driven by differences in past income and past taxes, we should find no effect in this alternative experiment.

Three of the remaining treatment groups simply replicate the main experiment from Survey 1, to serve as a benchmark. Additionally, to provide a more direct benchmark to the new treatment groups, we also included two treatment groups with the original recipient (i.e., old and married), but conveying the hard-working and lazy characteristics through the job search messages, as we did for the college graduate recipient.

2.3.2. Results

Table 5 shows the results from Survey 2. Note from panel 1 that the results from the replication of the main treatment arm from Survey 1 look consistent in terms of magnitude and statistical significance. Indeed, if anything, the difference

between hard-working and no-info was borderline statistically insignificant (p-value = .12) in Survey 1, but in this replication is statistically significant (p-value = .03).

From the results reported in panel 2, it follows that conveying the message about the type of the recipient (lazy or hard working) through the job search effort has effects that are qualitatively consistent with the baseline design reported in panel 1. The effects are somewhat smaller in magnitude, but that is consistent with the sympathy for the diligent channel: "He has been lazy for his entire life" is a stronger signal about effort, and thus it should have a stronger effect on redistributive preferences.

Finally, comparing the results reported in panel 2 to those reported in panel 3 of Table 5, we can compare the corresponding effects of revealing information about an individual who is joining the labor force for the first time (panel 3) versus revealing information about an individual who has been in the labor force for a long time (panel 2). The difference between these two is that, for the college graduate, there are no differences in past earned income and past taxes. We find that the hard-working and lazy messages still have a strong effect on preferences for redistribution towards the college graduate, which rejects the hypothesis that the effects presented in Survey 1 were driven by differences in past earned income and past taxes paid. Indeed, if anything, the effects are much stronger in magnitude for the younger individual: the old hard-working recipient gets an additional $37.60 (or 47% more) than the old lazy (panel 2), while the young hard-working gets an additional $53.33 (or 133% more) than the young lazy.

2.4. Survey 3: Effect of sympathy for the diligent on the demand for workfare

2.4.1. Survey design

Survey 1 and 2 provided evidence that individuals are more sympathetic towards the diligent poor relative to the lazy poor. In Survey 3, we test the hypothesis that individuals with a stronger sympathy for the diligent have a stronger preference for workfare. To do this, we construct two sets of variables. The *explanatory* variable consists of a measure of the intensity of sympathy for the diligent. The *dependent* variables measure preferences for workfare over welfare. Thus, the test boils down to measuring whether higher values of the *explanatory* variable are associated with higher values of the *dependent* variables.

For the *explanatory* variable, we used a question that followed the structure proposed by Saez and Stantcheva (2016) to measure social preferences in a within-subject design.[17] We provided the respondent with a description of two individuals, corresponding to the Hard-Working and Lazy treatment arms in Survey 1:

- Individual A: a married individual with 2 small children. He has a part-time job. He earns $20,000 per year (net after taxes), and this is the sole source of income for his household. He has worked very hard his entire life. However, he cannot find a full-time job because his line of work has been dramatically affected by the recent economic crisis.
- Individual B: a married individual with 2 small children. He has a part-time job. He earns $20,000 per year (net after taxes), and this is the sole source of income for his household. He has been lazy for his entire life and as a result cannot find a full-time job.

Then, we asked the respondent to report which of these two individuals was more deserving of a cash transfer of $5000 per year. The possible answers ranged from "Individual A is much more deserving" (1) to "They are both equally deserving" (3) to "Individual B is much more deserving" (5). We consider an individual to have a stronger sympathy for the diligent if he or she prefers to redistribute to Individual A.

After eliciting the *explanatory* variable, we included a series of questions corresponding to the *dependent* variables. These three questions are intended to measure preferences for workfare over welfare. The first question measured the respondent's agreement with the following statement: "Beneficiaries of social programs should be required to do some work in exchange for government aid. For example, they could perform a few hours of work per week for their local governments." The second question measured the degree of agreement with the following statement: "If beneficiaries of social programs were required to do some work in exchange for government aid (for example, perform a few hours of work per week for their local governments), that would prevent lazy people from participating in social programs." This statement most closely represents the mechanism discussed in the model section. The last question asks the respondent to allocate a fixed social assistance budget between the EITC and an unconditional cash transfer program (i.e., to assign amounts to both that add up to 100%). Given that some subjects may be unfamiliar with the EITC, we provided a brief explanation about how the EITC works in comparison to an unconditional cash transfer. The explanation included a numerical example in which the EITC provides a higher transfer to a low-income household head who works (and earns) more, relative to a low-income household head who works (and earns) less.

Last, we considered an additional question to be used as a benchmark to the other *dependent* variables. This question measures the raw willingness to redistribute, with no mention to whether workfare or welfare would be used for the redistribution: we ask whether the U.S. government should decrease, maintain, or increase its spending on aid to poor families.

[17] Due to social desirability and other biases, it is possible that the responses to this question under-estimate or over-estimate the degree of sympathy for the diligent. On the one hand, subjects may want to conceal their degree of sympathy for the diligent if they think that such preferences are socially unacceptable. On the other hand, subjects may exaggerate their sympathy for the diligent if they think those preferences are seen with good eyes.

Table 6
Summary statistics for Survey 3.

	Rep.	Indep.	Dem.	Total
Which of these two individuals is more deserving of a cash transfer of $5000 per year?				
Individual A is much more deserving	78.9	62.7	69.5	69.1
Individual A is slightly more deserving	15.8	22.7	19.7	19.9
They are both equally deserving	4.4	13.0	10.8	10.2
Individual B is slightly more deserving	0.9	0.0	0.0	0.2
Individual B is much more deserving	0.0	1.6	0.0	0.6
Should beneficiaries of social programs be required to do some work?				
Strongly agree	45.6	21.1	20.7	26.5
Agree	42.1	47.0	36.9	41.8
Neither agree nor disagree	4.4	18.9	20.2	16.1
Disagree	5.3	11.4	20.2	13.5
Strongly disagree	2.6	1.6	2.0	2.0
Would work requirements prevent lazy people from participating in social programs?				
Strongly agree	22.8	8.1	10.3	12.4
Agree	45.6	42.7	36.5	40.8
Neither agree nor disagree	12.3	25.4	20.7	20.5
Disagree	16.7	18.9	27.1	21.7
Strongly disagree	2.6	4.9	5.4	4.6
What percentage would you assign to each program?				
% Unconditional cash transfer	30.9	34.0	41.2	36.2
% EITC	69.1	66.0	58.8	63.8

Notes: Data from Survey 3 ($N = 502$). Distribution of responses for the main multiple-choice questions. Each figure corresponds to the share of respondents that chose the corresponding option. In the first question we provided the respondent with a description of two individuals of similar characteristics, corresponding to the Hard-Working (Individual A) and Lazy (Individual B) treatment arms in Survey 1 and we asked them to report which of these two individuals was more deserving of a cash transfer of $5,000 per year. The second group of results elicit the degree of agreement with the statement "Beneficiaries of social programs should be required to do some work in exchange for government aid. For example, they could perform a few hours of work per week for their local governments.". The third set of results elicit the degree of agreement with the statement "If beneficiaries of social programs were required to do some work in exchange for government aid (for example, perform a few hours of work per week for their local governments), that would prevent lazy people from participating in social programs.". Finally, the last set of results shows the percentage of a hypothetical government budget that respondents assigned to the EITC program as opposed to an unconditional cash transfer program. The results are broken down according to respondent's political identification, based on self-reported identification as Democrat, Independent or Republican. The last column reports the results for the entire population. For more details see the Questionnaire in the online Appendix.

2.4.2. Results

Before testing the main hypothesis, Table 6 shows a full tabulation of the responses for the main questions in Survey 3. Consistent with the findings from Survey 1, most individuals displayed a strong sympathy for the diligent poor: when asked which individual is more deserving of the $5000, 69.1% of respondents chose "Individual A is much more deserving," while less than 1% chose either "Individual B is much more deserving" or "Individual B is slightly more deserving."

Table 6 also shows the tabulation corresponding to the other questions from Survey 3. A 53.2% of respondents agreed that work requirements can prevent lazy people from benefiting from social programs, while only 26.3% disagreed with that statement. A vast majority of respondents (68.3%) preferred the general use of work requirements in social assistance programs. Last, respondents assigned almost twice as much funding to the EITC, compared to an unconditional cash transfer program.

Table 7 shows the correlation between sympathy for the diligent and the demand for workfare. We divided the subjects into two levels of sympathy for the diligent: high-sympathy respondents (the 69.1% who responded that "Individual A is much more deserving") and low-sympathy respondents (the remaining 30.9%). Table 7 reports the average of a given *dependent* variable in each of those two sympathy groups, along with the p-value of the mean difference test. To allow for a more direct comparison across *dependent* variables, all of them were standardized to take values between 0 and 1.

As a benchmark, the first panel from Table 7 shows the relationship between sympathy for the diligent and the raw willingness to redistribute, without any references to workfare or welfare. Relative to low-sympathy respondents, high-sympathy respondents had 13.8% (i.e., $13.8\% = \frac{0.56-0.65}{0.65} \times 100$) lower willingness to redistribute (p-value $< .01$). That is, if anything, higher sympathy for the diligent reduces preferences for redistribution.

The last three panels from Table 7 correspond to the preferences for work requirements. Relative to low-sympathy respondents, high-sympathy respondents had a 25.4% higher preference for work requirements (p-value $< .01$). Relative to low-sympathy respondents, high-sympathy respondents have 36.2% higher belief that work requirements are effective at preventing lazy people from benefiting from social programs (p-value $< .01$). And, relative to low-sympathy respondents, high-sympathy respondents preferred a 17.5% higher share of the social spending budget to be spent on the EITC

Table 7
Preferences for redistribution across individuals with low and high sympathy for the diligent.

	1. Raw Willingness to Redistribute	2. Supports Workfare
Low Sympathy	0.65 (0.021)	0.59 (0.022)
High Sympathy	0.56 (0.012)	0.74 (0.013)
Difference *p*-value	< .01	< .01
	3. Believes Workfare Screens Lazy	4. Share assigned to EITC
Low Sympathy	0.47 (0.022)	0.57 (0.019)
High Sympathy	0.64 (0.014)	0.67 (0.012)
Difference *p*-value	< .01	< .01

Notes: Data from Survey 3 ($N = 502$). Respondents were divided into high- and low- sympathy individuals according to their answer to a question about whether a hard-working individual deserved an income transfer more than a lazy individual. The set of results labeled *Raw Willingness to Redistribute* correspond to the question "Should government spending on aid to poor families increase, decrease, or stay the same?", where the answers go from "Increase by 50%" (1) to "Decrease by 50%" (0). The second set of results labeled *Supports Workfare* elicit the degree of agreement with the statement "Beneficiaries of social programs should be required to do some work in exchange for government aid. For example, they could perform a few hours of work per week for their local governments." and the answers go from "Strongly Agree" (1) to "Strongly Disagree" (0). The third set of results labeled *Believes Workfare Screens Lazy* elicit the degree of agreement with the statement "If beneficiaries of social programs were required to do some work in exchange for government aid (for example, perform a few hours of work per week for their local governments), that would prevent lazy people from participating in social programs." and the possible answers are the same as in the previous case. Finally, the column labeled *Share assigned to EITC* shows the percentage of a hypothetical government budget that respondents assigned to the EITC program as opposed to an unconditional cash transfer program. We present the mean value and standard errors in parenthesis. We present the *p*-value for the standard two-sample, two-tailed *t*-tests for equality of means across Low and High Sympathy individuals.

(p-value $< .01$).[18] The results from these three outcomes suggest that the demand for workfare does increase with stronger sympathy for the diligent.

3. The model

The previous empirical section showed two important results: individuals want to redistribute more towards the diligent poor relative to the lazy poor and these social preferences are correlated with preferences for workfare over welfare programs. In this section, we incorporate sympathy for the diligent in the preferences of a benevolent government that decides the level of income redistribution once individuals' stochastic incomes are realized. We show under which conditions it is optimal for the government to implement workfare programs and the equilibrium consequences of the availability of workfare as a redistributive tool.

3.1. Timing of the agent's decisions and outcomes

The model analyzed in this paper is an adapted version of the model from Netzer and Scheuer (2010). There is a continuum of risk-averse agents of measure one indexed by the set [0,1]. Agents are expected utility maximizers with a Bernoulli utility function $U(c)$, where c denotes consumption. We assume that $U(c)$ is twice continuously differentiable with $U' > 0$ and $U'' < 0$. Also, consumption is restricted to be non-negative and the range of U is given by $\mathbb{R}$. The Inada conditions $\lim_{c\to 0} U'(c) = \infty$ and $\lim_{c\to\infty} U'(c) = 0$ are assumed to hold. Let $\Phi(U)$ be the inverse function of U, which satisfies $\Phi' > 0$, $\Phi'' > 0$, $\lim_{U\to-\infty} \Phi(U) = 0$, $\lim_{U\to\infty} \Phi(U) = \infty$ and $\lim_{U\to\infty} \Phi'(U) = \infty$.

Each agent faces idiosyncratic risk with respect to the level of output he/she can produce. There are two possible levels of output: high (y_h) or low (y_l), with $y_l < y_h$. In order to generate this output, agents have to decide between two effort levels $e \in \{\underline{e}, \bar{e}\}$, with $\underline{e} < \bar{e}$. The assumption that there are only two possible levels of effort is not problematic. Despite the fact that each agent can only choose between two levels of effort, aggregate effort (and also aggregate output) can be a continuous variable – because what matters in the aggregate is the proportion of individuals exerting high effort.[19] If $e = \bar{e}$, then the agent is an ex post good type (g), and if $e = \underline{e}$, then the agent is an ex post bad type (b). Good types produce the high output y_h with probability p_g and bad types produce the high output y_h with probability p_b, where the restrictions $0 < p_b < p_g < 1$ hold. Agent's preferences are represented by an utility function that is separable between consumption utility and effort cost, $U(c) - H(e)$, where $H(e)$ represents the effort cost. We normalize the low level of effort $\underline{e}$ and the corresponding effort cost $H(\underline{e})$ to zero, which does not affect our results. Agents differ in their disutility of high effort $H(\bar{e}) = d$, which can take the values $d \in \{d_l, d_h\}$, with $d_h > d_l$.[20] A proportion q $(1 - q)$ of the population has a low (high) effort cost d_l (d_h). We assume

[18] For a discussion of additional evidence, see Appendix B.

[19] This resembles the necessity of randomization between effort levels in Fudenberg and Tirole (1990). In our model, for a given type, we can think of the proportion of agents exerting high effort as the individual probability of choosing high effort for each individual agent.

[20] The assumption of two ex ante types of agents is a deviation from the original setup from Netzer and Scheuer (2010), who assume a continuum of ex ante types. The primary goal of this assumption is to reduce the complexity of the government's problem. One important implication of this assumption is

that neither effort costs nor effort choices are observable. The fraction q of agents with low disutility from effort and the probabilities of producing a high level of income are assumed to be known by the government.

Differences in agents' effort costs must be interpreted as differences in agents' preferences for leisure (as in Cuff, 2000; Fleurbaey and Maniquet, 2006; Moffitt, 2006), as opposed to differences originated from disabilities or opportunities. It must be noted that our model is not intended to approximate what the fairness ideal should be. Instead, we want to approximate the fairness ideals that regular individuals seem to have (in our survey, a sample of Americans). Also, in reality, individuals can differ in other important dimensions, most notably in ability. Indeed, since Mirrlees (1971) heterogeneity in ability has played a central role in optimal taxation analysis, and there is a long tradition in the literature of combining heterogeneity in ability with heterogeneity in disutility from effort (Fleurbaey and Maniquet, 2006; Lockwood and Weinzierl, 2015; Sandmo, 1993). We focus on differences in just one dimension (disutility from effort) to make the model tractable. One reason why the distinction between disutility from effort and ability may be relevant is because of fairness ideals. It is possible that the average individual believes that exerting low effort because one is lazy is wrong but exerting low effort because one has low ability is not so wrong. Indeed, it is quite possible that these fairness ideals differ markedly across individuals from different countries. For instance, Steve Jobs' genius may have justified his wealth for the average American, but maybe the average individual from France believes that Jobs got his genius from the lottery of birth and therefore his wealth is not justified. Indeed, it would be straightforward to extend our survey to provide direct evidence about these distinctions.

We analyze a two-period model of income redistribution in which effort choices are endogenous. In the first stage, agents who exert high effort are individuals who actively try to discover their comparative advantage by working longer hours and investing in human capital. Those who perform a low effort represent people who work the bare minimum and do not invest in human capital. In the second stage, the greater the effort exerted in the first stage the more likely that the agent will end up with a better outcome. However, some of those who put in little effort can end up with a high income, and some of those who worked hard can end up with a low income (e.g., the hard-working athlete who got injured).

3.2. The government

Once efforts were chosen, the government chooses how to redistribute income. Following Boadway et al. (1996), Konrad (2001) and Netzer and Scheuer (2010), we assume that the government cannot commit to a certain redistributive scheme before effort choices are made.[21] This assumption differs from other studies in the literature (Alesina and Angeletos, 2005; Meltzer and Richard, 1981). Note that it makes no difference whether the redistribution scheme is decided before the uncertainty is resolved. What is truly important is whether the redistribution scheme can be modified after the outcomes are realized. The assumption about the government's lack of commitment is based on the fact that the time period represents a long horizon. Exerting high effort in this model does not mean working longer hours during a given year, but rather the accumulation of human capital over decades (Boadway et al., 1996).

The objective of the government is to maximize a weighted average of the *ex post* utilities of all agents, where the weights may depend on the agents' *ex post* types. In particular, we examine the case in which the government would like to redistribute more toward agents that exerted high effort earlier in their lives. This fairness concern from the government's side can be the result of the underlying preferences of the voters. An alternative interpretation for the fairness concerns is that they represent the government's political constraints: that is, the government wants to redistribute as much as possible but redistribution is politically viable only if it is perceived as helping the unlucky rather than coddling the lazy. As in many papers in the positive optimal tax literature (Auerbach and Hassett, 2002; Cuff, 2000; Fleurbaey and Maniquet, 2006; Moffitt, 2006; Roemer et al., 2003; Weinzierl, 2014, among many others), we do not explicitly model the way individuals' preferences shape the government's objective function. Since in reality different groups of individuals have different social preferences and fairness concerns, understanding how these heterogeneous social preferences end up affecting the choices made by politicians is important but beyond the scope of this paper.

Following Netzer and Scheuer (2010), we carry out the analysis in the utility space. A contract offered by the government is a vector of consumption utilities that agents obtain when producing the high and low levels of output, respectively. The optimal tax rate for each agent can be easily recovered from the level of consumption offered by the government and the level of output produced by the agent.

3.3. Redistributive policies

In this subsection, we characterize the set of equilibria that arise with two different redistributive mechanisms: welfare and workfare. In the following subsection, we compare the outcomes that are attainable in these two sets of equilibria.

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that, in equilibrium, different agents with low disutility from effort will choose different levels of effort. As a result, there will be no one-to-one mapping between agents' types and effort choices. Therefore, the government will not be able to use work requirements to perfectly screen diligent individuals. This implication would also be attained in a model with a continuum of types if we also assumed, for example, that an agent observes an imperfect signal of his/her own return from effort (i.e., so that the relationship between effort levels and types is not one-to-one).

[21] An important difference with respect to Netzer and Scheuer (2010) is that we assume that the redistributive policy is decided after the agent's income is realized, while they assume that the policy is decided after effort choices are made but before incomes are realized. Therefore, in their model, an agent must choose between different contracts offered by the government. In our model, an agent gets a single contract that depends only on his or her realized income.

3.3.1. Welfare

Welfare represents a redistributive scheme in which the government can screen agents based on income only. This restriction implies that all the rich agents receive the same level of utility and all the poor agents also must receive the same level of utility. The timing of events is the following:

Stage 1: Agents simultaneously choose their effort levels.

Stage 2: Agents' incomes are realized.

Stage 3: The government chooses a redistributive policy ($u_{b,h}$, $u_{b,l}$, $u_{g,h}$, $u_{g,l}$), where $u_{i,j}$ represents the consumption utility for agents of ex-post type $i \in \{b, g\}$ that produced the output level y_j (with $j \in \{l, h\}$). The fact that we focus on the case of a government without commitment is clearly observed in the timing of the model: choices about income redistribution are made after effort and output are realized. The model could have an additional Stage 0, in which the government makes an initial policy announcement. Then, agents make effort choices based on expectations of future actual policies, which in principle could be different to the announced policy. If the government lacks commitment power, it will able to change the policy after effort choices are made. Thus, the initial announcement becomes irrelevant.

The objective is to find the set of Subgame Perfect Equilibria (SPE). For the sake of simplicity, we will focus on SPE in which only a fraction x of agents with low disutility from effort exert high effort (and therefore all the high-cost types shirk). We find the set of Subgame Perfect Equilibria by backward induction. For a given level of x chosen at Stage 1, we derive the government's optimal policy at Stage 3. We assume that the government cannot differentiate between ex post good low-income agents and ex post bad low-income agents. The idea is to reflect the fact that effort is unobservable and most welfare programs base their eligibility criteria on observable factors only, such as income.

Once incomes are realized, the government is able to form precise inference about the proportion of agents that exerted high effort during the first stage, x. Let α denote the relative weight the benevolent government places in its ex post welfare function on individuals who exerted high effort (regardless of whether they have high or low income). And let $(1-\alpha)$ denote the relative weight the benevolent government places in its ex post welfare function on individuals who exerted low effort (again, regardless of income level). Here, α measures the degree of *sympathy for the diligent*. The objective of the government is to maximize a weighted average of the agents' *ex post* utilities, taking into account the constraints imposed by the budget constraint and the redistributive mechanism. Whenever $x \in (0, 1]$, so that both ex post types exist, the benevolent government solves the following problem[22]

$$\max_{(u^{we}_{b,h}, u^{we}_{b,l}, u^{we}_{g,h}, u^{we}_{g,l}) \in \mathbb{R}^4} \alpha\left[qx\left(p_g u^{we}_{g,h} + (1-p_g)u^{we}_{g,l}\right)\right] + (1-\alpha)\left[(1-qx)\left(p_b u^{we}_{b,h} + (1-p_b)u^{we}_{b,l}\right)\right]$$

subject to the constraints

$$u^{we}_{g,l} = u^{we}_{b,l} \equiv u_l, \tag{1}$$

$$u^{we}_{g,h} = u^{we}_{b,h} \equiv u_h, \tag{2}$$

and

$$qx[p_g \Phi(u^{we}_{g,h}) + (1-p_g)\Phi(u^{we}_{g,l})] + (1-qx)[p_b \Phi(u^{we}_{b,h}) + (1-p_b)\Phi(u^{we}_{b,l})] \leq R(x), \tag{3}$$

where $u^{we}_{i,j}$ represents the consumption utility agents obtain when only welfare is available and $R(x)$ represents the per capita (total) resources available in the economy and is given by

$$R(x) = qx[p_g y_h + (1-p_g)y_l] + (1-qx)[p_b y_h + (1-p_b)y_l].$$

Eqs. (1) and (2) impose the restriction that the utility of agents that produced low and high output can only depend on their realized income, which is the only information observable to the government. The following Lemma characterizes the solution to the government's ex-post problem.

Lemma 1. *Fix any $x \in (0, 1]$. (i) The government's problem has a unique solution $V(x) = (u^{we}_h(x), u^{we}_l(x))$. (ii) If $\alpha \geq (>) 1/2$, then $u^{we}_h(x) \geq (>) u^{we}_l(x)$. (iii) If $\alpha \leq (<) 1/2$, then $u^{we}_h(x) \leq (<) u^{we}_l(x)$.*

Proof. See the Appendix. □

Lemma 1 characterizes the direction of the ex post optimal redistribution as a function of the Pareto weight α. When the Pareto weights are tilted towards ex post good agents ($\alpha \geq 1/2$), the government chooses to reward effort by giving the rich a higher utility relative to the utility that bad-type agents receive. The reason for this is that the assumption $p_g > p_b$ implies that the majority of rich agents are going to be ex post good types. If on the other hand, the Pareto weight of ex post bad type agents is higher ($\alpha \leq 1/2$), then redistribution goes in the opposite direction since the poor are more likely to be bad-type agents. The final case involves $\alpha = 1/2$ (i.e., the government has no preference for any particular group of ex

[22] Since at the time the government decides the optimal redistributive policy agents already decided a level of effort and because agent's utility function is separable between consumption utility and effort costs, we can exclude effort costs from the government's objective function for presentation purposes. This would just affect the level of the objective function without affecting the optimal policy.

post agents). Then the government decides to fully insure agents by choosing $u_h^{we}(x) = u_l^{we}(x)$ (by setting the consumption level of both types of agents equal to per capita resources $R(x)$).

In the case of $x = 0$ (i.e., no agent with low disutility from effort exerts high effort), the benevolent government's problem simplifies substantially. It reduces to the maximization of the utility of the unique ex post type subject to the resource constraint. Then, convexity of Φ will require that the solution satisfies $u_l^{we} = u_h^{we}$.

We define an equilibrium of the game between agents and a benevolent government without commitment as follows.

Definition 1. A welfare equilibrium is a pair (x^{we}, V^{we}), where $V^{we} = V(x^{we})$ and one of the following conditions holds

(i) $x^{we} = 0$ and

$$p_g u_{g,h}^{we}(x^{we}) + (1-p_g)u_{g,l}^{we}(x^{we}) - d_l < p_b u_{b,h}^{we}(x^{we}) + (1-p_b)u_{b,l}^{we}(x^{we})$$

(ii) $x^{we} \in [0, 1]$ and

$$p_g u_{g,h}^{we}(x^{we}) + (1-p_g)u_{g,l}^{we}(x^{we}) - d_l = p_b u_{b,h}^{we}(x^{we}) + (1-p_b)u_{b,l}^{we}(x^{we})$$

(iii) $x^{we} = 1$,

$$p_g u_{g,h}^{we}(x^{we}) + (1-p_g)u_{g,l}^{we}(x^{we}) - d_l > p_b u_{b,h}^{we}(x^{we}) + (1-p_b)u_{b,l}^{we}(x^{we})$$

and

$$p_g u_{g,h}^{we}(x^{we}) + (1-p_g)u_{g,l}^{we}(x^{we}) - d_h < p_b u_{b,h}^{we}(x^{we}) + (1-p_b)u_{b,l}^{we}(x^{we})$$

The definition of equilibrium is based on the agents' ex ante incentives to exert high effort at Stage 1 taking the government's response function as given. Agents form expectations about future redistributive policies and compare the expected utility of working and shirking. There are three types of subgame perfect equilibria that could arise. Two extreme equilibria ($x \in \{0, 1\}$) occur when the agent with low disutility from effort strictly prefers to exert/not to exert high effort, given the anticipated future redistributive policies. There is also an intermediate type of equilibrium, in which agents with low disutility from effort are indifferent between exerting high effort or not. Thus, x could be interpreted as the proportion of agents with low disutility from effort choosing to exert high effort at Stage 1. This can be interpreted as the result of each individual agent choosing a mixed strategy to exert high effort with probability x.[23]

For simplicity, we will focus on equilibria in which only agents with low disutility from effort may choose to exert high effort at Stage 1 (the reason for doing this will become more clear when we analyze the benefits of workfare). Notice that the definition of equilibrium imposes restrictions on the indifference conditions of agents with high disutility from effort for the case in which $x^{we} = 1$ only. For the other two types of equilibrium ($x^{we} = 0$ and $x^{we} \in [0, 1]$), these restrictions become redundant because of the fact that agents with low disutility from effort are indifferent or strictly prefer to shirk at Stage 1 implies that agents with high disutility from effort would strictly prefer to shirk at Stage 1 (due to $d_h > d_l$). Therefore, the indifference conditions of agents with low disutility from effort are enough to characterize equilibria in which no agent with high disutility from effort exerts high effort. The following proposition describes the set of equilibria as a function of the Pareto weights.

Proposition 1. *For any parameter values of the model, $(x^{we}, V^{we}) = (0, V(0))$ is a welfare equilibrium. If $\alpha \leq 1/2$, $(x^{we}, V^{we}) = (0, V(0))$ is the unique equilibrium. For any value of $\alpha > 1/2$, there exists a value $\hat{d}_l(\alpha)$ such that there exists at least one additional equilibrium with $x^{we} > 0$ for $d_l \leq \hat{d}_l(\alpha)$.*

If the government's Pareto weights are such that the government wants to ex post redistribute from ex post good to bad agents (i.e., $\alpha \leq 1/2$), the set of welfare equilibria becomes a singleton. We showed in the previous lemma that when $\alpha \leq 1/2$, the government will ex post choose $u_h^{we}(x) \leq u_l^{we}(x)$. This clearly eliminates any incentives to exert high effort from an ex ante perspective. From our previous result, it is easy to see that this allocation still belongs to the set of welfare equilibria when $\alpha > 1/2$. However, if the government's Pareto weights are tilted towards the ex post good types other equilibria might arise, in particular when d_l is below a certain threshold. The reason is that agents' effort costs do not affect the government's ex post choice of the redistributive policy (i.e., $u_h^{we}(x)$ and $u_l^{we}(x)$ are independent of d_l and d_h). Therefore, as long as $u_h^{we}(x) > u_l^{we}(x)$, other equilibria might emerge if $d_l < \left(p_g - p_b\right)\left(u_h^{we}(x) - u_l^{we}(x)\right)$ (i.e., if the effort cost is smaller than the expected net utility gain of exerting high effort).

3.3.2. Workfare

In this subsection we allow the government to implement a redistributive mechanism that relies on self-selection. We define workfare as a transfer of utility whose delivery is conditional on the realization of a certain task. Low-income agents can choose whether to participate in the workfare program or not, and participation in the program is perfectly observable by the government. Taking part in the program requires exerting an effort e_w, which will be chosen by the government simultaneously with the decision of u_w^{wo}, the consumption utility received by low-income agents who participate in the workfare program, and u_l^{wo}, the consumption utility received by low-income agents who decide not to participate. The

[23] In this case, our definition of equilibrium can be viewed as the standard indifference condition used to characterize a mixed-strategy equilibria.

superscript *wo* is used to differentiate the solution obtained when workfare is available from the solution found with welfare (*we*).

Since even among the high-income individuals there are individuals who exerted high effort and individuals who did not, in principle the government could also try to use work-requirements among the rich. We assume that the government can only use work requirements with low-income individuals, which is a typical assumption in the literature.[24]

We assume that the cost of exerting the effort e_w is proportional to the parameter d: i.e., $H(e_w) = e_w \cdot d$. For now, we also assume that the effort required in the workfare program is completely unproductive. That is, the only benefit produced by workfare is the screening mechanism. In the last part of the paper we present numerical results for an alternative scenario in which effort exerted in the workfare program produces output. We will show that by making workfare productive, the main results are even stronger. The timing of events is now:

Stage 1: Agents simultaneously choose their effort levels.

Stage 2: Agents' incomes are realized.

Stage 3: The government chooses a (welfare/workfare) redistributive policy.

Stage 4: If the government chooses $e_w > 0$, low income agents simultaneously choose whether they want to participate in the workfare program or not.

Intuitively, the government may desire to implement a workfare program, because it allows identification of individuals who had more likely exerted high effort among the low-income agents and assignment to them of a different level of utility relative to those who do not participate in workfare (i.e., agents with high disutility from effort). Since welfare does not provide this type of screening, if the government's Pareto weights are tilted towards the good types the utility that ex post good low-income agents receive is lower than what they would receive in the full-information case (in which effort is observable). In this scenario, workfare becomes a useful policy instrument since it allows the government to screen both ex ante types of agents and give a higher utility to ex post good low-income agents.

We find the set of Subgame Perfect Equilibria by backward induction. The effort level e_w is chosen in a way such that low-income agents with high disutility from effort are indifferent between participating in workfare and not (we assume that in equilibrium they do not participate):

$$u_l^{wo} = u_w^{wo} - e_w d_h, \tag{4}$$

Since $d_l < d_h$, Eq. (4) implies that poor agents with low disutility from effort will strictly prefer to participate in the workfare program. There are many levels of e_w that would allow the government to screen the ex ante type of agents, but there are reasons for choosing this particular level. The restriction imposed by Eq. (4) requires the minimum workfare effort level that makes the agents with high disutility from effort indifferent between participating and not, and thus minimizes the effort cost of those agents who actually decide to participate. It is possible to make the agents with high disutility from effort strictly prefer not to participate in workfare by slightly increasing e_w, but this would simply hurt workfare participants without adding any benefit. Because of this, this level of workfare effort can be justified as the level of effort that the benevolent government would choose, if it could decide the type of task that participants need to perform in workfare.[25]

Given that the government is able to precisely infer the percentage of agents with low disutility from effort that exerted high effort in Stage 1 and to screen agents with high disutility from effort from agents with low disutility from effort, the benevolent government's problem can be represented by the following maximization problem

$$\max_{(u_{b,h}^{wo}, u_l^{wo}, u_{g,h}^{wo}, u_w^{wo}) \in \mathbb{R}^4, e_w} \alpha[qx(p_g u_{g,h}^{wo} + (1-p_g)(u_w^{wo} - e_w d_l))]$$

$$+(1-\alpha)[q(1-x)(p_b u_{b,h}^{wo} + (1-p_b)(u_w^{wo} - e_w d_l))] + (1-\alpha)\left[(1-q)\left(p_b u_{b,h}^{wo} + (1-p_b)u_l^{wo}\right)\right]$$

subject to the constraints

$$u_l^{wo} = u_w^{wo} - e_w d_h, \tag{5}$$

$$u_{g,h}^{wo} = u_{b,h}^{wo} \equiv u_h^{wo}, \tag{6}$$

and

$$qx[p_g \Phi(u_{g,h}^{wo}) + (1-p_g)\Phi(u_w^{wo})] + q(1-x)[p_b \Phi(u_{b,h}^{wo}) + (1-p_b)\Phi(u_w^{wo})]$$
$$+ (1-q)[p_b \Phi(u_{b,h}^{wo}) + (1-p_b)\Phi(u_l^{wo})] \leq R(x),$$

where $R(x)$ represents per capita resources and is defined in the same way as before.[26]

[24] Intuitively, we can think the high-income outcome corresponds to an individual with a high-paying full-time job, while the low-income outcome corresponds to unemployment or under-employment. In that case, the assumption that the government can only use work requirements with low-income individuals would be equal to the assumption that full-time individuals cannot comply with work-requirements (Besley and Coate, 1995).

[25] This restriction is in line with the assumption of lack of commitment from the government's side.

[26] In this model we let the degree of sympathy for the diligent (denoted by α) to depend on the level of effort agents made in the first stage but not on the level of effort that workfare participants exert in the last stage. An interesting extension would be to allow α to depend on the level of workfare effort e_w, which would generate extra demand for workfare, in addition to the screening mechanism. We focused on the screening mechanisms because we think it is the first order issue.

Notice that this maximization problem contains the maximization problem with welfare as a special case when $e_w = 0$. The only benefit of workfare over welfare is that workfare allows the introduction of a wedge between u_w^{wo} and u_l^{wo}. Thus, it is possible that the maximization problem yields two types of solutions. For some subset of the parameter space and for some values of x, the solution to the government's ex-post problem may require setting $e_w = 0$. This case can be interpreted as the government optimally choosing *not* to implement a workfare program (i.e., simply redistribute via a welfare program). The second case involves $e_w > 0$, in which case we say that the government *wants* to implement a workfare program. Next, we characterize the solution to this problem.

Lemma 2. *Fix any $x \in (0, 1]$. (i) The government's problem has a unique solution $V(x) = (u_h^{wo}(x), u_w^{wo}(x), u_l^{wo}(x))$. (ii) If $e_w(x) > 0$, then $u_h^{wo}(x) > u_l^{wo}(x)$ and $u_w^{wo}(x) - e_w d_l > u_l^{wo}(x)$.*

The characterization of the solution omits the case in which $e_w(x) = 0$, because this implies that the government is choosing to redistribute through a welfare program (whose solution was previously characterized by Lemma 1). If the government ex post optimally decides to implement a workfare program, then it must be the case that the government redistributes utility towards agents that produced the high level of output and towards agents that decided to participate in workfare. The following two lemmas characterize the government's optimal decision to implement workfare as a function of the Pareto weights and the proportion of agents with low disutility from effort that exerted high effort at Stage 1.

Lemma 3. *If $\alpha < 1/2$, the government chooses $e_w(x) = 0$ for all values of x.*

If the government decided to implement workfare, it must have been the case that the Pareto weights assigned to ex post good agents are higher than the weights assigned to ex post bad agents. In our setting this means that the government needs to have particular fairness concerns towards those who exerted high effort at Stage 1 (as opposed to those who shirked) in order to prefer a workfare over a welfare redistributive mechanism. If this was not the case, there would be no reason to hurt low-income ex post bad types by creating a utility wedge between workfare participants and non-participants. The following lemma complements the intuition behind the usefulness of workfare programs.

Lemma 4. *If the government uses workfare for some $x \in [0, 1]$, then there exists a value $\tilde{x} \in [0, 1]$ such that the government will choose $e_w(x) > 0$ for all $x > \tilde{x}$ and $e_w(x) = 0$ for all $x \leq \tilde{x}$.*

Lemma 4 demonstrates that a benevolent government will choose not to implement workfare when x is below a certain threshold. The intuition of this result is straightforward. When a small proportion of agents with low disutility from effort exerted high effort in Stage 1, the government infers that the majority of low-income agents are not going to be ex post good types, making the screening benefits of workfare unappealing. Furthermore, in the appendix we show that the government is more likely to choose $e_w(x) > 0$ when d_h is high compared to d_l. The higher the wedge between effort costs, the lower the effort requirement the government needs to impose in the workfare program in order to screen workers' ex ante type and the larger the desirability to redistribute via workfare.

Analogously to the case of welfare, we define a workfare equilibrium as a fixed point between agents' effort choices and the government's optimal redistributive policy.

Definition 2. A workfare equilibrium is a pair (x^{wo}, V^{wo}), where $V^{wo} = V(x^{wo})$ and one of the following conditions holds

(i) $x^{wo} = 0$ and

$$p_g u_h^{wo}(x^{wo}) + (1 - p_g)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l) - d_l < p_b u_h^{wo}(x^{wo}) + (1 - p_b)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l)$$

(ii) $x^{wo} \in [0, 1]$ and

$$p_g u_h^{wo}(x^{wo}) + (1 - p_g)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l) - d_l = p_b u_h^{wo}(x^{wo}) + (1 - p_b)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l)$$

(iii) $x^{wo} = 1$,

$$p_g u_h^{wo}(x^{wo}) + (1 - p_g)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l) - d_l > p_b u_h^{wo}(x^{wo}) + (1 - p_b)(u_w^{wo}(x^{wo}) - e_w(x^{wo})d_l)$$

and

$$p_g u_h^{wo}(x^{wo}) + (1 - p_g)u_l^{wo}(x^{wo}) - d_h < p_b u_h^{wo}(x^{wo}) + (1 - p_b)u_l^{wo}(x^{wo}).$$

The definition of a workfare equilibrium differs slightly from the definition of a welfare equilibrium. The indifference condition of agents with low disutility from effort is now modified to take into account the fact that they will optimally choose to participate in workfare if they end up producing a low level of output. For agents with high cost of effort, the indifference condition also has the (no) participation choice embedded in it. Given this definition, we now proceed to characterize the set of workfare equilibria.

Proposition 2. *For any parameter values of the model, $(x^{wo}, V^{wo}) = (0, V(0))$ is a workfare equilibrium. If $\alpha \leq 1/2$, $(x^{wo}, V^{wo}) = (0, V(0))$ is the unique equilibrium. There exists a set of values (α, d_l, d_h) such that if α and d_h are high and d_l is low enough, then there exists at least one additional equilibrium with $x^{wo} > 0$ and $e_w(x^{wo}) > 0$.*

We find again that when $\alpha \leq 1/2$, $(x^{wo}, V^{wo}) = (0, V(0))$ is the unique equilibrium. This is simply due to the fact that when $\alpha \leq 1/2$ the government optimally chooses $e_w = 0$. The proof to the second part of the Proposition is straightforward.

The proof of Lemma 3 shows that the optimality condition for $e_w > 0$ is more likely to be satisfied for high values of d_h. The result holds because higher values of d_h lead to lower levels of effort that need to be made by workfare participants, which means that workfare becomes "cheaper" to implement in terms of effort cost. Similar to the case of welfare, the effort cost paid at Stage 1 does not enter the government's maximization problem. Therefore, for each level of α, one can find a threshold value for d_l such that additional equilibria with $x^{wo} > 0$ and $e_w(x^{wo}) > 0$ emerge.

3.4. Comparison between welfare and workfare

3.4.1. Equilibrium effort

Having characterized the set of welfare and workfare equilibria, we now proceed to compare both sets focusing on the aggregate level of effort that can be sustained in equilibrium. Given the possibility of multiple equilibria with both redistributive schemes, we focus on the highest level of effort that can be sustained in each scheme. In order to prove our main Theorem, we need to make an additional assumption regarding the utility function:

Assumption 1. The utility function $U(\cdot)$ satisfies the following condition

$$\frac{\partial}{\partial u}\frac{\Phi''(u)}{\Phi'(u)} \leq 0 \tag{7}$$

A similar version of this condition has been imposed in the literature (Fudenberg and Tirole, 1990; Netzer and Scheuer, 2010).[27] This condition is sufficient but not necessary for the result of the Theorem to hold, and it is meant to simplify the proof of the Theorem. With this condition in hand, we now present the main result of the paper:

Theorem 1. *If condition (7) is satisfied and if d_h is high enough, then the highest effort level that can be sustained in a welfare equilibrium $\hat{x}^{we}$ is at least as large as any effort level sustained in a workfare equilibrium x^{wo} (i.e., $\hat{x}^{we} \geq x^{wo}$). Furthermore, if $\hat{x}^{we} < 1$, then $\hat{x}^{we} > x^{wo}$.*

Theorem 1 states that, for high values of d_h[28] and whenever condition (7) is satisfied,[29] the largest level of effort that can be sustained in a welfare equilibrium is always as high as the largest level of effort that can be sustained with workfare. Furthermore, if the largest level of effort that can be sustained in a welfare equilibrium is interior, then it must be strictly higher than *any* effort level that can be sustained in a workfare equilibrium.

Intuitively, Theorem 1 means that with workfare agents with low disutility from effort will have a weaker ex ante incentive to exert high effort. This lower incentive can be decomposed into two channels. The first channel has to do with how agents with low disutility from effort expect to benefit from workfare in case they end up poor. In the proof of Theorem 1 we show that, for a given x, $u_w^{wo}(x) - e_w(x)d_l > u_l^{we}(x)$. From an ex ante perspective, workfare increases the utility of agents with low disutility from effort, but the corresponding increase in expected utility will be higher for agents who do not exert high effort at Stage 1, since in the future they will become workfare participants with a higher probability (due to $p_g > p_b$). The second channel has to do with how agents with low disutility from effort expect to loose with workfare. In the proof we show that, for a given x, the government chooses $u_h^{we}(x) \geq u_h^{wo}(x)$. This means that the government gives a lower utility to the rich with workfare than with welfare, which decreases expected utility relatively more for agents who exert higher effort, because in the future they will have high income with a higher probability.

3.4.2. Implications for social welfare

So far we showed that, provided some fairly general conditions hold, the availability of workfare leads to an equilibrium with lower incentives to exert high level of effort. In this subsection, we use a numerical example to illustrate the potential implications in terms of social welfare. Additionally, we use this numerical example to discuss the introduction of "productive" workfare.

Define surplus as the ex-ante expected utility: S_h for an agent with high disutility from effort, S_l for an agent with low disutility from effort. If a first equilibrium had higher S_h and S_l than a second equilibrium, it would imply that the first equilibrium Pareto-dominates the second equilibrium. Introducing the availability of workfare has the following effect on

[27] For example, this condition is satisfied by utility functions with constant relative risk aversion of one or below one (Fudenberg and Tirole, 1990, Lemma 3.2).

[28] This condition is introduced for two reasons. In the first place, as we previously mentioned, the government is more likely to choose $e_w > 0$ for high values of d_h. The second reason is more relevant. Because workfare programs give a higher utility to workfare participants than what they would get in welfare (for a given value of x), it might be that $u_l^{we}(x) > u_l^{wo}(x)$. If ex post agents with high disutility from effort receive a very low utility when the government chooses $e_w > 0$ (because the government wants to redistribute away from these agents), then it might become optimal for some of these agents to decide to exert high effort at Stage 1. In order to avoid this type of unrealistic equilibria, we focus on cases in which d_h is high enough, so that agents with high disutility from effort would never want to exert high effort at Stage 1.

[29] The condition we impose is a sufficient but not a necessary condition for the main result to hold. We numerically experimented with other utility functions (CARA, CRRA with coefficient greater than 1) and the results of the Theorem still apply. However, the assumption we impose allows us to prove the Theorem analytically.

the surplus of a given type j:

$$\Delta^j = S_j^{wo}(x_{wo}^*) - S_j^{we}(x_{we}^*) = \underbrace{S_j^{we}(x_{wo}^*) - S_j^{we}(x_{we}^*)}_{\equiv \Delta_1^j} + \underbrace{S_j^{wo}(x_{wo}^*) - S_j^{we}(x_{wo}^*)}_{\equiv \Delta_2^j}$$

The first term, Δ_1^j, is the change in surplus from reducing equilibrium effort in a welfare setting, which corresponds to an efficiency channel. Due to the moral hazard problem brought by the government's lack of commitment, effort in welfare equilibria is below the social optimum. As a result, decreasing equilibrium effort due to the introduction of workfare is expected to make matters even worse. This channel reduces the aggregate amount of resources produced in the second stage, and therefore harms both types of individuals (i.e., $\Delta_1^j < 0$ for every j).

The second term, Δ_2^j, is a distributional channel. Conditional on a given effort level – and thus a given total output – the workfare contract will distribute that given output differently among the two types of agents than the welfare contract. Since workfare is used to redistribute resources from agents with high disutility from effort to agents with low disutility from effort, this means that $\Delta_2^l > 0$ and $\Delta_2^h < 0$. Agents with high disutility from effort are expected to loose from workfare in net terms, since both the efficiency and distributional channels are negative for them. The net effect on the surplus of agents with low disutility from effort will depend upon the relative magnitude of the efficiency and distributional channels. It is then possible that the availability of workfare will lead to a Pareto-dominated equilibrium. In order to illustrate this possibility, we present numerical results for the sets of welfare and workfare equilibria, including their corresponding levels of ex-ante expected utility for both types of agents.

Fig. 1(a) and (c) show the equilibrium effort levels and the surpluses for different values of α. The solid black lines correspond to the case in which workfare is not available, and the dashed black lines denote the scenario in which workfare becomes available. When $\alpha \leq 0.67$, outcomes are identical for the two cases.[30] Intuitively, if sympathy for the diligent is too low, the incentives to screen low-type individuals are low as well and thus the government does not want to use the option of workfare in equilibrium. When $\alpha > 0.67$, then equilibria are different depending on the availability of workfare. As predicted by Theorem 1, the largest effort level that can be sustained in equilibrium with workfare is lower than the largest effort level that can be achieved with welfare. Fig. 1(c) shows the comparison of surpluses between workfare and welfare. When workfare is not available, the surpluses are equal between the two types because the equilibria are interior (and therefore, agents with low disutility from effort are indifferent between exerting high effort or not). The introduction of workfare introduces a gap between the surpluses of agents with low and high disutility from effort. More importantly, the availability of workfare reduces the surpluses of both types of agents, therefore leading to a Pareto-dominated outcome.

We can use this numerical example to illustrate the sensitivity of the results to the assumption that workfare programs do not generate any output. Here we assume that the effort exerted in workfare programs produces some output $e_w \cdot y_w$, where $y_w > 0$ is a constant representing the productivity of workfare. The model with productive workfare cannot be compared to the original model in an straightforward way. Intuitively, when y_w is low enough, the only reason for using workfare would be for screening purposes. But when y_w is high enough, a government would like to use workfare even if it was not interested in screening agents' types. For instance, in the extreme case in which workfare is more productive than the effort exerted at Stage 1, the social optimum would involve exerting no effort in the first stage and mandatory participation in workfare at stage two. Fig. 1(b) and (d) reproduce Fig. 1(a) and (c), but allowing for productive workfare. The figures with $y_w > 0$ look like a simple translation to the left of the figures with $y_w = 0$. Intuitively, $y_w > 0$ is equivalent to a subsidy for screening. When such a subsidy was absent, the government was not interested in using workfare for α slightly below 0.67. When the subsidy is introduced, the government becomes interested in using workfare. For a given value of α, the introduction of $y_w > 0$ exacerbates the differences between the workfare and welfare equilibria, either by introducing a gap where there was none (as in $\alpha = 0.67$), or by exacerbating the gap (as in $\alpha > 0.67$).

4. Conclusion

We discussed the role of fairness concerns in the demand for redistribution through workfare. First, we presented survey evidence showing that individuals are more sympathetic toward the diligent poor than they are toward the lazy poor and, moreover, that such preferences generate a demand for workfare. Second, we incorporated our empirical findings into a model of income redistribution. Our model consists of a benevolent government with fairness concerns that prioritizes the well-being of those individuals who exert high effort. A purely utilitarian government would never find it optimal to use work requirements if the effort was entirely wasteful. However, a government with fairness concerns would find it optimal to introduce such work requirements, because of their capability to discriminate between poor individuals who exerted high effort and poor individuals who did not. Second, we showed that the availability of workfare, under lack of commitment power, can lead to a lower equilibrium effort and, possibly, to a Pareto-dominated allocation.

[30] Even though the figure only shows $\alpha \geq 0.65$, the solid and dashed curves are identical for values of $\alpha < 0.65$.

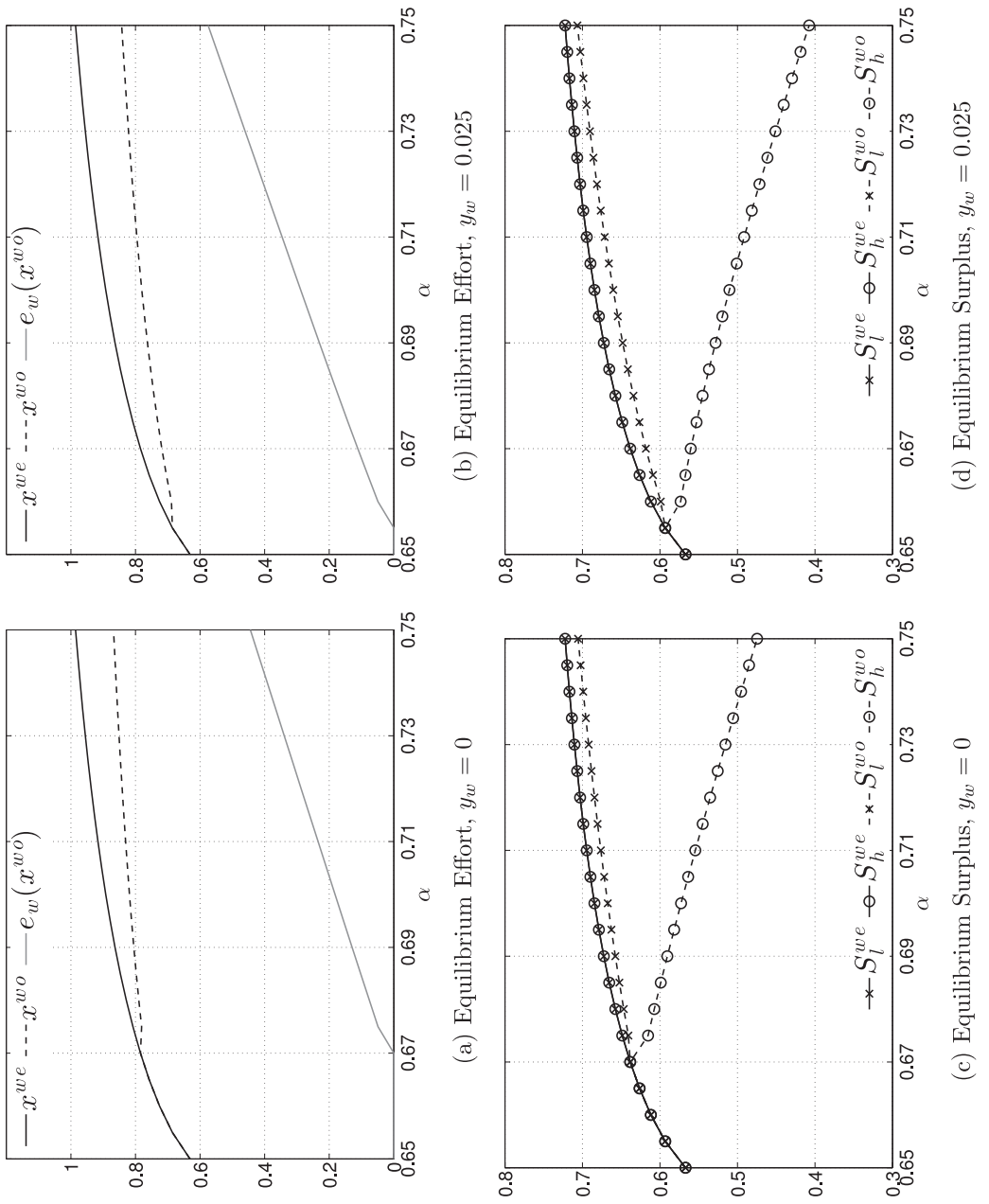

Fig. 1. Comparison of welfare and workfare equilibria *Notes*: The figures characterize the equilibrium outcomes of welfare and workfare programs that produce the highest level of effort in equilibrium. The utility function is $U(c) = ln(c)$ and the parameters were fixed at the following levels: $d_l = 0.1$, $d_h = 0.75$, $q = 0.75$, $y_l = 0.5$, $y_h = 4$, $p_b = 0.2$ and $p_g = 0.6$.

Appendix A

A1. Proof of Lemma 1

In order to prove the lemma we will make use of the following claim.

Claim 1. *The solution* $V = (u_{b,h}^{we}, u_{b,l}^{we}, u_{g,h}^{we}, u_{g,l}^{we})$ *to the government's problem must satisfy constraint (3) with strict equality.*

Proof. Suppose that $V = (u_{b,h}^{we}, u_{b,l}^{we}, u_{g,h}^{we}, u_{g,l}^{we})$ is a solution, but that constraint (3) is satisfied with strict inequality. Consider the alternative allocation $\tilde{V} = (u_{b,h}^{we} + \epsilon, u_{b,l}^{we} + \epsilon, u_{g,h}^{we} + \epsilon, u_{g,l}^{we} + \epsilon)$, with $\epsilon > 0$ small enough so that constraint (3) evaluated at

$\tilde{V}$ is still satisfied with strict inequality (such an ϵ exists by the continuity Φ). Then, the allocation $\tilde{V}$ still satisfies constraints (1) and (2), and gives a strictly higher value of (1). Then, V cannot be a solution to the government's problem. □

With this result we can reformulate the benevolent government's problem as

$$\max_{(u_h^{we},u_l^{we})} \alpha\left[qx\left(p_g u_h^{we} + (1-p_g)u_l^{we}\right)\right] + (1-\alpha)\left[(1-qx)\left(p_b u_h^{we} + (1-p_b)u_l^{we}\right)\right]$$

subject to the constraints

$$(qxp_g + (1-qx)p_b)\Phi(u_h^{we}) + (qx(1-p_g) + (1-qx)(1-p_b))\Phi(u_l^{we}) = R(x). \tag{A.1}$$

Eq. (A.1) implicitly defines u_h^{we} as a bijective function of u_l^{we}. Lets denote this relationship by $u_h^{we} \equiv \Gamma(u_l^{we})$ with

$$u_h^{we} \equiv \Gamma(u_l^{we}) = U\left(\frac{R(x) - [qx(1-p_g) + (1-qx)(1-p_b)]\Phi(u_l^{we})}{qxp_g + (1-qx)p_b}\right). \tag{A.2}$$

It can be easily shown that $\Gamma'(u_l^{we}) < 0$ and $\Gamma''(u_l^{we}) < 0$. Thus, we can re-express the original problem as

$$\max_{u_l^{we}\in[-\infty,u(R)]} \alpha\left[qx\left(p_g\Gamma(u_l^{we}) + (1-p_g)u_l\right)\right] + (1-\alpha)\left[(1-qx)\left(p_b\Gamma(u_l^{we}) + (1-p_b)u_l\right)\right], \tag{A.3}$$

which is a strictly concave problem in u_l^{we}. Thus, there exists a solution to the government's problem and it is unique. We rewrite the benevolent government's problem as the following Lagrangian

$$\begin{aligned}\mathcal{L} &= \alpha\left[qx\left(p_g u_h^{we} + (1-p_g)u_l^{we}\right)\right] + (1-\alpha)\left[(1-qx)\left(p_b u_h^{we} + (1-p_b)u_l^{we}\right)\right]\\ &+\lambda\left(R(x) - \Phi\left(u_h^{we}\right)(qxp_g + (1-qx)p_b) - \Phi\left(u_l^{we}\right)(qx(1-p_g) + (1-qx)(1-p_b))\right).\end{aligned}$$

The solution to this problem is characterized by the first order conditions

$$\frac{\partial\mathcal{L}}{\partial u_h^{we}} = \alpha qxp_g + (1-\alpha)(1-qx)p_b - \lambda\Phi'(u_h^{we})(qxp_g + (1-qx)p_b) = 0, \tag{A.4}$$

$$\frac{\partial\mathcal{L}}{\partial u_l^{we}} = \alpha qx(1-p_g) + (1-\alpha)(1-qx)(1-p_b) - \lambda\Phi'(u_l^{we})(qx(1-p_g) + (1-qx)(1-p_b)) = 0, \tag{A.5}$$

and the budget constraint. Eqs. (A.4) and (A.5) can be combined into the following expression

$$\frac{\Phi'(u_h^{we})}{\Phi'(u_l^{we})} = \frac{(\alpha qxp_g + (1-\alpha)(1-qx)p_b)(qx(1-p_g) + (1-qx)(1-p_b))}{(\alpha qx(1-p_g) + (1-\alpha)(1-qx)(1-p_b))(qxp_g + (1-qx)p_b)}.$$

Given that $p_g > p_b$, it can be easily checked that $\frac{\Phi'(u_h^{we})}{\Phi'(u_l^{we})} > (<)1$ if $\alpha > (<)1/2$. This completes our proof.

A2. Proof of Lemma 2

Following the steps of Claim 1, one can easily show that the solution of the government's problem with workfare must satisfy the budget constraint with strict equality. After imposing restrictions (5) and (6), we can state the following problem

$$\max_{(u_h^{wo},u_l^{wo}),e_w} \alpha[qx(p_g u_h^{wo} + (1-p_g)(u_l^{wo} + e_w(d_h - d_l)))]$$

$$+(1-\alpha)[q(1-x)(p_b u_h^{wo} + (1-p_b)(u_l^{wo} + e_w(d_h - d_l))] + (1-\alpha)\left[(1-q)\left(p_b u_h^{wo} + (1-p_b)u_l^{wo}\right)\right]$$

subject to the budget constraint

$$qx[p_g\Phi(u_h^{wo})+(1-p_g)\Phi(u_l^{wo}+e_w(d_h-d_l))]+q(1-x)[p_b\Phi(u_h^{wo})+(1-p_b)\Phi(u_l^{wo}+e_w(d_h-d_l))]$$
$$+(1-q)[p_b\Phi(u_h^{wo})+(1-p_b)\Phi(u_l^{wo})]=R(x). \tag{A.6}$$

Eq. (A.6) implicitly defines u_h^{wo} as a bijective function of u_l^{wo} and e_w. Lets denote this relationship by $u_h^{wo}\equiv\Omega(u_l^{wo},\ e_w)$ with

$$u_h^{wo}\equiv\Omega\left(u_l^{wo},\ e_w\right)$$
$$=\ U\left(\frac{R(x)-[qx(1-p_g)+q(1-x)(1-p_b)]\Phi\left(u_l^{wo}+e_w(d_h-d_l)\right)-(1-q)(1-p_b)\Phi\left(u_l^{wo}\right)}{qxp_g+(1-qx)p_b}\right).$$

It is easy to verify that $\frac{\partial\Omega(u_l^{wo},\ e_w)}{\partial u_l^{wo}}<0$, $\frac{\partial\Omega(u_l^{wo},\ e_w)}{\partial e_w}<0$, $\frac{\partial^2\Omega(u_l^{wo},\ e_w)}{\partial^2 u_l^{wo}}<0$ and $\frac{\partial^2\Omega(u_l^{wo},\ e_w)}{\partial^2 e_w}<0$. Since $U(\cdot)$ is strictly increasing and strictly concave, in order to prove that $\Omega(u_l^{wo},\ e_w)$ is strictly concave we only need to show that the following function is strictly concave:

$$g(u_l^{wo},\ e_w)=-[qx(1-p_g)+q(1-x)(1-p_b)]\Phi(u_l^{wo}+e_w(d_h-d_l))-(1-q)(1-p_b)\Phi(u_l^{wo}).$$

Since $\Phi''(\cdot)>$, it is easy to see that $\frac{\partial^2 g(u_l^{wo},\ e_w)}{\partial^2 u_l^{wo}}<0$ and $\frac{\partial^2 g(u_l^{wo},\ e_w)}{\partial^2 e_w<0}$. The last step consists on determining the sign of the determinant of the Hessian:

$$\frac{\partial^2 g(u_l^{wo},\ e_w)}{\partial^2 u_l^{wo}}\frac{\partial^2 g(u_l^{wo},\ e_w)}{\partial^2 e_w}-\left(\frac{\partial^2 g(u_l^{wo},\ e_w)}{\partial e_w\partial u_l^{wo}}\right)^2$$
$$=[qx(1-p_g)+q(1-x)(1-p_b)]\Phi''(u_l^{wo}+e_w(d_h-d_l))(d_h-d_l)^2(1-q)(1-p_b)\Phi''(u_l^{wo})>0.$$

Then, the function $\Omega(u_l^{wo},\ e_w)$ is strictly concave. We can now reduce the previous problem to the following two-dimensional maximization problem

$$\max_{(u_l^{wo})\in[-\infty,u(R)],e_w}\alpha[qx(p_g\Omega(u_l^{wo},\ e_w)+(1-p_g)(u_l^{wo}+e_w(d_h-d_l)))]$$
$$+(1-\alpha)[q(1-x)(p_b\Omega(u_l^{wo},\ e_w)+(1-p_b)(u_l^{wo}+e_w(d_h-d_l))]$$
$$+(1-\alpha)\left[(1-q)\left(p_b\Omega(u_l^{wo},\ e_w)+(1-p_b)u_l^{wo}\right)\right],$$

which is a strictly concave problem in u_l^{wo} and e_w. Thus, there exists a solution to the government's workfare problem and it is unique. In order to derive the remaining results we rewrite the benevolent government's problem as the following Lagrangian

$$\mathcal{L}=\alpha\left[qx\left(p_gu_h^{wo}+(1-p_g)(u_w^{wo}-e_wd_l)\right)\right]+(1-\alpha)\left[q(1-x)\left(p_bu_h^{wo}+(1-p_b)(u_w^{wo}-e_wd_l)\right)\right]$$
$$+(1-\alpha)\left[(1-q)\left(p_bu_h^{wo}+(1-p_b)u_l^{wo}\right)\right]+\eta\left(u_w^{wo}-e_wd_h-u_l^{wo}\right)$$
$$+\mu\left(R(x)-\Phi\left(u_h^{wo}\right)[qxp_g+(1-qx)p_b]-\Phi(u_w^{wo})[qx(1-p_g)+q(1-x)(1-p_b)]\right)$$
$$-\mu\left(\Phi\left(u_l^{wo}\right)(1-q)(1-p_b)\right)$$

where the restriction $u_w^{wo}-e_wd_h=u_l^{wo}$ has not been replaced and the government chooses e_w as well. The solution to this problem is characterized by the first order conditions

$$\frac{\partial\mathcal{L}}{\partial u_h^{wo}}=\alpha qxp_g+(1-\alpha)(1-qx)p_b-\mu\Phi'(u_h^{wo})(qxp_g+(1-qx)p_b)=0 \tag{A.7}$$

$$\frac{\partial\mathcal{L}}{\partial u_w^{wo}}=\alpha qx(1-p_g)+(1-\alpha)q(1-x)(1-p_b)+\eta-\mu\Phi'(u_w^{wo})(qx(1-p_g)+q(1-x)(1-p_b))=0 \tag{A.8}$$

$$\frac{\partial\mathcal{L}}{\partial u_l^{wo}}=(1-\alpha)(1-q)(1-p_b)-\eta-\mu\Phi'(u_l^{wo})(1-q)(1-p_b)=0 \tag{A.9}$$

$$\frac{\partial\mathcal{L}}{\partial e_w}=-\alpha qx(1-p_g)d_l-(1-\alpha)q(1-x)(1-p_b)d_l-\eta d_h=0 \tag{A.10}$$

and the budget constraint. Eqs. (A.7), (A.9) and (A.10) can be combined into the following expression

$$\frac{\Phi'(u_h^{wo})}{\Phi'(u_l^{wo})}=\frac{(\alpha qxp_g+(1-\alpha)(1-qx)p_b)((1-q)(1-p_b))}{\left((1-\alpha)(1-q)(1-p_b)+(\alpha qx(1-p_g)+(1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}\right)(qxp_g+(1-qx)p_b)}. \tag{A.11}$$

We want to show that if $e_w(x) > 0$ then $u_h^{wo}(x) > u_l^{wo}(x)$, which is equivalent to showing that

$$\frac{(\alpha qxp_g + (1-\alpha)(1-qx)p_b)((1-q)(1-p_b))}{\left((1-\alpha)(1-q)(1-p_b) + (\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}\right)(qxp_g + (1-qx)p_b)} > 1.$$

The previous inequality can be rewritten as

$$(1-q)(1-p_b)qx(1-p_g)(2\alpha-1) >$$
$$\frac{(1-p_g)}{p_g}(\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}(qxp_g + (1-qx)p_b). \tag{A.12}$$

Below we show that when the government strictly prefers to use workfare (i.e., $e_w > 0$) the following condition must hold

$$(1-q)(1-p_b)qx(1-p_g)(2\alpha-1) >$$
$$(\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}(qx(1-p_g) + (1-p_b)(1-qx)).$$

Therefore, inequality (A.12) holds if

$$(\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}(qx(1-p_g) + (1-p_b)(1-qx)) >$$
$$\frac{(1-p_g)}{p_g}(\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b))\frac{d_l}{d_h}(qxp_g + (1-qx)p_b).$$

After rearranging and canceling terms out, the previous inequality is simplified to $p_g > p_b$, which is our maintained assumption. Then, since inequality (A.12) holds when $e_w(x) > 0$, we have that $\frac{\Phi'(u_h^{wo})}{\Phi'(u_l^{wo})} > 1$, which implies that $u_h^{wo}(x) > u_l^{wo}(x)$ when the government implements a workfare program.

A3. Proof of Lemma 3

From the previous characterization we can find the set of parameters for which the government would strictly prefer to implement workfare (i.e., when $e_w > 0$). In order to do this, we find the set of parameters for which $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0} > 0$. The steps are as follows. First, solve for η from $\frac{\partial \mathcal{L}}{\partial u_l^{wo}}$:

$$\eta = (1-\alpha)(1-q)(1-p_b) - \mu\Phi'(u_l^{wo})(1-q)(1-p_b).$$

Replace this expression in $\frac{\partial \mathcal{L}}{\partial u_w^{wo}}$, set $u_w^{wo} = u_l^{wo}$ (which is equivalent to setting $e_w = 0$) and solve for μ:

$$\mu|_{e_w=0} = \frac{\alpha qx(1-p_g) + (1-\alpha)(1-p_b)(1-qx)}{\Phi'(u_l^{wo})(qx(1-p_g) + (1-p_b)(1-qx))}.$$

Next, replace this expression in the expression previously derived for η:

$$\eta|_{e_w=0} = \frac{(1-q)(1-p_b)qx(1-p_g)(1-2\alpha)}{qx(1-p_g) + (1-p_b)(1-qx)}.$$

Finally, put this expression in $\frac{\partial \mathcal{L}}{\partial e_w}$:

$$\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0} = -d_l(\alpha qx(1-p_g) + (1-\alpha)q(1-x)(1-p_b)) + d_h\frac{(1-q)(1-p_b)qx(1-p_g)(2\alpha-1)}{qx(1-p_g) + (1-p_b)(1-qx)}.$$

The previous derivative will be positive only if $\alpha > 1/2$, otherwise $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0} < 0$ for all parameter values.

A4. Proof of Lemma 4

Here we show that if there exists a value of $x \in (0, 1)$ such that $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,x} > 0$ (which implies $\alpha > 1/2$), then there also exists a value $\tilde{x} \in (0, 1)$ such that for all $x > \tilde{x}$ we have $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,x} > 0$ and for all $x \leq \tilde{x}$ we have $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,x} \leq 0$. This result has the implication that $e_w = 0$ for all $x \leq \tilde{x}$ and that $e_w > 0$ for all $x > \tilde{x}$. For this purpose, we compute the second derivative of $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0}$ with respect to x

$$\frac{\partial^2\left(\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0}\right)}{\partial^2 x} = 2d_h\frac{(1-q)(1-p_b)^2q^2(1-p_g)(2\alpha-1)(p_g-p_b)}{(qx(1-p_g) + (1-p_b)(1-qx))^3} > 0.$$

Thus, the desired result follows from $\frac{\partial^2\left(\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0}\right)}{\partial^2 x} > 0$ and the fact that $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,x=0} < 0$. These two results imply that there exists a single value $\tilde{x}$ such that $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,\tilde{x}} = 0$ and that $\frac{\partial \mathcal{L}}{\partial e_w}|_{e_w=0,x} > 0$ only if $x > \tilde{x}$.

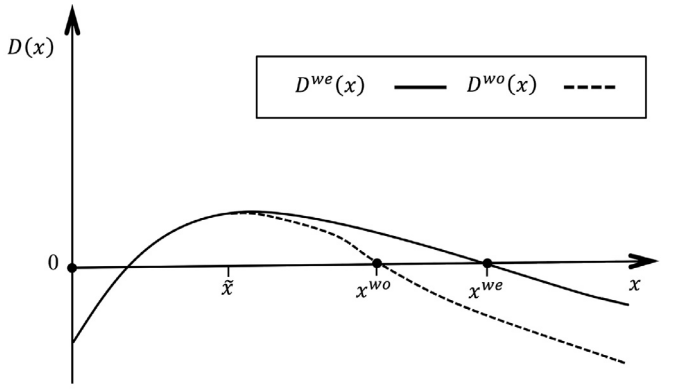

Fig. 2. Comparison of Welfare and Workfare Equilibria.

A5. Proof of Theorem 1

We want to show that the highest equilibrium level of effort that can be attained in welfare, denoted by $\hat{x}^{we}$, is higher than any equilibrium level of effort attainable in workfare, denoted by x^{wo}. The proof focuses in cases in which there exist workfare equilibria in which the government optimally uses workfare, i.e. $e_w(x^{wo}) > 0$ (otherwise the comparison is trivial and not interesting). Let

$$D^{we}(x) = (p_g - p_b)\left(u_h^{we}(x) - u_l^{we}(x)\right) - d_l$$

and

$$D^{wo}(x) = (p_g - p_b)\left(u_h^{wo}(x) - (u_w^{wo}(x) - e_w^{wo}(x)d_l)\right) - d_l$$

be the indifference conditions of the agent with low disutility from effort described in the definitions of welfare and workfare equilibria, respectively. By definition, interior welfare and workfare equilibria have to satisfy the conditions $D^{we}(x) = 0$ and $D^{wo}(x) = 0$, respectively. Similarly, welfare and workfare equilibria with $x = 1$ must satisfy $D^{we}(x) > 0$ and $D^{wo}(x) > 0$, respectively. Fig. 2 illustrates the general idea of the proof.[31]

To prove that $x^{wo} \leq \hat{x}^{we}$, we need to show that $D^{we}(x) \geq D^{wo}(x)$ for all x, both with strict inequality if the government uses workfare (i.e., when $e_w(x) > 0$). To see why this is the case let us consider two scenarios. If $\hat{x}^{we} = 1$, the result that $x^{wo} \leq \hat{x}^{we}$ trivially holds. In the case in which the highest level of effort attainable in a welfare equilibrium is interior ($\hat{x}^{we} < 1$), by continuity of $D^{we}(x)$ (shown below), the condition $D^{we}(x) \geq D^{wo}(x)$ implies that $D^{wo}(x) < 0$ for all $x \geq \hat{x}^{we}$ when $e_w(x) > 0$ (as shown in Fig. 2). Therefore, if there exists any workfare equilibria it must satisfy $x^{wo} < \hat{x}^{we}$. The condition $D^{we}(x) \geq D^{wo}(x)$ can be expressed as

$$(p_g - p_b)\left(u_h^{we}(x) - u_h^{wo}(x) - u_l^{we}(x) + (u_w^{wo}(x) - e_w^{wo}(x)d_l)\right) \geq 0.$$

This inequality will be satisfied if the following conditions hold

(1) $u_w^{wo}(x) - e_w^{wo}(x)d_l \geq u_l^{we}(x)$
and
(2) $u_h^{we}(x) \geq u_h^{wo}(x)$.

The proof that both conditions hold follows from a series of claims.

Claim 2. *Fix any $x \in (0, 1)$. If the government uses workfare, the solution to the government's problem must satisfy $u_l^{we}(x) < u_w^{wo}(x)$.*

Proof. The proof goes by contradiction. Suppose that $u_l^{we}(x) \geq u_w^{wo}(x)$. Eqs. (A.4)–(A.9) can be arranged in a way to obtain the following inequality

$$\frac{\Phi'(u_l^{we}(x))}{\Phi'(u_w^{wo}(x))} < \frac{\Phi'(u_h^{we}(x))}{\Phi'(u_h^{wo}(x))}.$$

Given that $u_l^{we}(x) \geq u_w^{wo}(x)$ and that $\Phi''(\cdot) > 0$, this condition implies $u_h^{we}(x) > u_h^{wo}(x)$. We also know that when the government uses workfare $u_w^{wo}(x) > u_l^{wo}(x)$. Thus, $u_l^{we}(x) \geq u_w^{wo}(x) > u_l^{wo}(x)$ and $u_h^{we}(x) > u_h^{wo}(x)$. This means that ex post

[31] Notice that, by the definition of $\tilde{x}$, the government only uses workfare when $x > \tilde{x}$. This means that for $x \leq \tilde{x}$ the welfare and workfare optimization problems are identical. Thus $D^{we}(x) = D^{wo}(x)$ for $x \leq \tilde{x}$.

all agents are weakly worse off with the workfare scheme and some are strictly worse off. This is a contradiction because $V^{wo}(x) \geq V^{we}(x)$ for all x (with strict inequality when $e_w(x) > 0$). Then it must be that $u_l^{we}(x) < u_w^{wo}(x)$. □

Claim 3. *Fix any $x \in (0, 1)$. If the government uses workfare, the solution to the government's problem must satisfy $u_h^{we}(x) \geq u_h^{wo}(x)$.*

Proof. The proof goes by contradiction. Suppose that $u_h^{we}(x) < u_h^{wo}(x)$. From our previous claim we know that $u_l^{we}(x) < u_w^{wo}(x)$. This inequality and the equality of resources across redistributive models (for a given x) imply that $u_l^{we}(x) > u_l^{wo}(x)$. From the budget constraint we get the following inequality

$$\Phi\left(u_l^{we}\right)(qx(1-p_g) + (1-qx)(1-p_b)) > \Phi(u_w^{wo})(qx(1-p_g) + q(1-x)(1-p_b)) + \Phi\left(u_l^{wo}\right)(1-q)(1-p_b),$$

which can be rewritten as

$$\Phi(u_l^{we}) > \frac{\Phi(u_w^{wo})(qx(1-p_g) + q(1-x)(1-p_b)) + \Phi(u_l^{wo})(1-q)(1-p_b)}{(qx(1-p_g) + (1-qx)(1-p_b))}.$$

Note that the right hand side is a weighted average between $\Phi(u_w^{wo})$ and $\Phi(u_l^{wo})$, where the weights sum up to one. Let $CE(\Phi)$ represent the certainty equivalent of the above random variable when the *utility* function is $\Phi(\cdot)$. Then, $\Phi'(\cdot) > 0$ implies $u_l^{we} > CE(\Phi)$. On the other hand, the condition $u_h^{we}(x) < u_h^{wo}(x)$ implies $\lambda > \mu$ (see Eqs. (A.4) and (A.7)). Then, combining Eqs. (A.5), (A.8) and (A.9) we obtain the following inequality

$$\Phi'(u_l^{we}(x))(qx(1-p_g) + (1-qx)(1-p_b)) < \Phi'(u_l^{wo}(x))(1-q)(1-p_b) + \Phi'(u_w^{wo}(x))(qx(1-p_g) + (1-x)(1-p_b)q),$$

which can also be rewritten as

$$\Phi'(u_l^{we}(x)) < \frac{\Phi'(u_l^{wo}(x))(1-q)(1-p_b) + \Phi'(u_w^{wo}(x))(qx(1-p_g) + (1-x)(1-p_b)q)}{(qx(1-p_g) + (1-qx)(1-p_b))}.$$

Let $CE(\Phi')$ represent the certainty equivalent of the above random variable when the *utility* function is $\Phi'(\cdot)$. Since $\Phi''(\cdot) > 0$, the previous inequality implies that $u_l^{we} < CE(\Phi')$. This is a contradiction. The condition

$$\frac{\partial}{\partial u}\frac{\Phi''(u)}{\Phi'(u)} \leq 0$$

implies that

$$-\frac{\Phi'''(u)}{\Phi''(u)} \geq -\frac{\Phi''(u)}{\Phi'(u)},$$

which states that the Arrow–Pratt coefficient of absolute risk aversion is higher with *utility* $\Phi'(\cdot)$ than with *utility* $\Phi(\cdot)$. This, in turn implies that $CE(\Phi) \geq CE(\Phi')$. Combining all the inequalities we get the contradiction $u_l^{we} > u_l^{we}$. □

Claim 4. *Fix any $x \in (0, 1)$. If the government uses workfare, the solution to the government's problem must satisfy $u_w^{wo}(x) - e_w^{wo}(x)d_l > u_l^{we}(x)$.*

Proof. The proof goes by contradiction. Assume $u_w^{wo}(x) - e_w^{wo}(x)d_l \leq u_l^{we}(x)$. From our previous claim we know that$u_h^{we}(x) \geq u_h^{wo}(x)$. From the condition that makes agents with high disutility from effort indifferent between participating in workfare or not we also know that $u_w^{work}(x) - e_w^{wo}(x)d_l > u_l^{wo}(x)$. Therefore all ex post types of agents are weakly worse off with workfare and the bad-poor agents are strictly worse off. This is a contradiction since $V^{wo}(x) \geq V^{we}(x)$ for all x (with strict inequality when $e_w^{wo}(x) > 0$). □

Claim 5. *The function $D^{we}(x)$ is continuous on [0,1].*

Proof. We apply Berge's Maximum Theorem to show that the function $D^{we}(x)$ is continuous for $x \in (0, 1)$. This amounts to showing that $u_h^{we}(x)$ and $u_l^{we}(x)$ are continuous functions of x, for $x \in (0, 1)$. First, notice that the government's objective function (A.3) is continuous in x and in u_l (because the function $\Gamma(x, u_l^{we})$[32] in (A.2) is continuous in both arguments). Second, the domain $u_l^{we} \in [-\infty, u(R(x))]$ is not compact. However, the Inada condition $\lim_{c\to 0} U'(c) = \infty$ implies that there always exists a constant k small enough such that the constraint $u_l^{we} \in [k, u(R(x))]$ does not affect the result of the maximization program (A.3). Thus, the constraint $u_l^{we} \in [k, u(R(x))]$ becomes compact-valued for each $x \in (0, 1)$ and continuous (the level of aggregate resources $R(x)$ is also a continuous function of x). Then, by Berge's Maximum Theorem, the argument that maximizes the problem (A.3) $u_l^{we}(x)$ is upper semi-continuous. Furthermore, since the government's problem has a

[32] The dependency of $\Gamma(x, u_l^{we})$ on x has been suppressed in earlier proofs.

unique solution (Lemma 1), the solution $u_l^{we}(x)$ must be continuous in x. Then, $u_h^{we}(x) = \Gamma(x, u_l^{we})$ and $D^{we}(x)$ are continuous as well. Continuity of the $D^{we}(x)$ function at $x \in \{0, 1\}$ is given by: (i) $lim_{x\to 0} u_h^{we}(x) = lim_{x\to 0} u_l^{we}(x) = u_h^{we}(0) = u_l^{we}(0)$ and (ii) $lim_{x\to 1} u_h^{we}(x) = u_h^{we}(1)$ and $lim_{x\to 1} u_l^{we}(x) = u_l^{we}(1)$, which are easy to obtain from Eqs. (A.1), (A.4) and (A.5). □

Combining the results from the previous claims we can conclude that $D^{we}(x) \geq D^{wo}(x)$, with strict inequality if $e_w^{wo}(x) > 0$. Let $\hat{x}^{we}$ be the highest effort level that can be sustained in a welfare equilibrium. If $\hat{x}^{we} = 1$ ($D^{we}(\hat{x}^{we}) > 0$), the result $D^{we}(x) \geq D^{wo}(x)$ implies that any workfare equilibria x^{wo} must satisfy $x^{wo} \leq 1$. On the other hand if $\hat{x}^{we} < 1$, by definition of $\hat{x}^{we}$ being the highest effort level that can be sustained in a welfare equilibrium and by continuity of $D^{we}(x)$, we know that $D^{we}(\hat{x}^{we}) = 0$ and that $D^{we}(x) < 0$ for all $x > \hat{x}^{we}$, which implies that $D^{wo}(x) < 0$ for all $x > \hat{x}^{we}$. If $e_w^{wo}(\hat{x}^{we}) > 0$ (i.e., the government uses workfare when $x = \hat{x}^{we}$), then $D^{wo}(\hat{x}^{we}) < 0$. Therefore, if there exist a workfare equilibrium it must satisfy $x^{wo} < \hat{x}^{we}$. The last step of the proof consists on verifying that agents with high disutility from effort do not want to exert high effort in the first period. This is equivalent to showing that

$$\begin{aligned} D^{wo}(x) &= p_g u_h^{wo}(x) + (1 - p_g) u_l^{wo}(x) - d_h - \left(p_b u_h^{wo}(x) + (1 - p_b) u_l^{wo}(x)\right) \\ &= (p_g - p_b)\left(u_h^{wo}(x) - u_l^{wo}(x)\right) - d_h < 0. \end{aligned}$$

The last inequality can be rearranged as

$$\frac{u_h^{wo}(x) - u_l^{wo}(x)}{d_h} < \frac{1}{p_g - p_b}.$$

If the numerator is a bounded function of d_h, then the condition will hold for high values of d_h. It is easy to verify from Eq. (A.11) that $\lim_{d_h\to\infty} \frac{x\Phi'(u_h^{wo}(x))}{\Phi'(u_l^{wo}(x))} = \bar{k}$, where $\bar{k}$ is a positive and bounded constant. Since $\Phi'(\cdot) > 0$ and $\Phi''(\cdot) > 0$, $u_h^{wo}(x)$ and $u_l^{wo}(x)$ are bounded functions of d_h. This completes our proof.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2018.06.015.

References

Acemoglu, D., Golosov, M., Tsyvinski, A., 2008. Political economy of mechanisms. Econometrica 76 (3), 619–641.
Alesina, A., Angeletos, G.-M., 2005. Fairness and redistribution. Am. Econ. Rev. 95 (4), 960–980.
Alesina, A., Baqir, R., Easterly, W., 2000. Redistributive public employment. J. Urban Econ. 48 (2), 219–241.
Alesina, A., Danninger, S., Rostagno, M., 2001. Redistribution through public employment: the case of Italy. IMF Staff Pap. 48 (3), 447–473.
Alesina, A., Glaeser, E.L., 2004. Fighting Poverty in the US and Europe: A World of Difference, vol. 26. Oxford University Press Oxford.
Alesina, A., La Ferrara, E., 2005. Preferences for redistribution in the land of opportunities. J. Public Econ. 89 (5), 897–931.
Auerbach, A.J., Hassett, K.A., 2002. A new measure of horizontal equity. Am. Econ. Rev. 92 (4), 1116–1125.
Ball, S., Eckel, C., Grossman, P.J., Zame, W., 2001. Status in markets. Q. J. Econ. 116 (1), 161–188.
Besley, T., Coate, S., 1992. Workfare versus welfare: incentive arguments for work requirements in poverty-alleviation programs. Am. Econ. Rev. 82 (1), 249–261.
Besley, T., Coate, S., 1995. The design of income maintenance programmes. Rev. Econ. Stud. 62 (2), 187–221.
Boadway, R., Marceau, N., Marchand, M., 1996. Investment in education and the time inconsistency of redistributive tax policy. Economica 63 (250), 171–189.
Cappelen, A.W., Konow, J., Sørensen, E.Ø., Tungodden, B., 2013. Just luck: an experimental study of risk-taking and fairness. Am. Econ. Rev. 103 (4), 1398–1413.
Cappelen, A.W., Sørensen, E.Ø., Tungodden, B., 2010. Responsibility for what? Fairness and individual responsibility. Eur. Econ. Rev. 54 (3), 429–441.
Clark, A.E., Milcent, C., 2011. Public employment and political pressure: the case of French hospitals. J. Health Econ. 30 (5), 1103–1112.
Clark, J., 1998. Fairness in public good provision: an investigation of preferences for equality and proportionality. Can. J. Econ. 31 (3), 708–729.
Corneo, G., Grüner, H.P., 2002. Individual preferences for political redistribution. J. Public Econ. 83 (1), 83–107.
Cruces, G., Perez-Truglia, R., Tetaz, M., 2013. Biased perceptions of income distribution and preferences for redistribution: evidence from a survey experiment. J. Public Econ. 98, 100–112.
Crump, M.J., McDonnell, J.V., Gureckis, T.M., 2013. Evaluating Amazon's Mechanical Turk as a tool for experimental behavioral research. PLoS ONE 8 (3).
Cuff, K., 2000. Optimality of workfare with heterogeneous preferences. Can. J. Econ./Revue Canadienne d'Economique 33 (1), 149–174.
Durante, R., Putterman, L., Weele, J., 2014. Preferences for redistribution and perception of fairness: an experimental study. J. Eur. Econ. Assoc. 12 (4), 1059–1086.
Erkal, N., Gangadharan, L., Nikiforakis, N., 2011. Relative earnings and giving in a real-Effort experiment. Am. Econ. Rev. 101 (7), 3330–3348.
Falk, A., Huffman, D., Mierendorff, K., 2006. Incentive Effects and Political Acceptability of Workfare. Institute for the Study of Labour (IZA). Working Paper
Farhi, E., Sleet, C., Werning, I., Yeltekin, S., 2012. Non-linear capital taxation without commitment. Rev. Econ. Stud. 79 (4), 1469–1493.
Fehr, E., Schmidt, K.M., 1999. A theory of fairness, competition, and cooperation. Q. J. Econ. 114 (3), 817–868.
Fleurbaey, M., Maniquet, F., 2006. Fair income tax. Rev. Econ. Stud. 73 (1), 55–83.
Fong, C., 2001. Social preferences, self-interest, and the demand for redistribution. J. Public Econ. 82 (2), 225–246.
Fong, C.M., Luttmer, E.F., 2011. Do fairness and race matter in generosity? Evidence from a nationally representative charity experiment. J. Public Econ. 95 (5), 372–394.
Fudenberg, D., Tirole, J., 1990. Moral hazard and renegotiation in agency contracts. Econometrica 58 (6), 1279–1319.
Goffman, E., 1963. Stigma: Notes on the Management of Spoiled Identity. Englewood Cliffs, N.J.: Prentice-Hall.
Hoffman, E., Spitzer, M.L., 1985. Entitlements, rights, and fairness: an experimental examination of subjects' concepts of distributive justice. J. Legal Stud. 14 (2), 259–297.
Konrad, K.A., 2001. Privacy and time-consistent optimal labor income taxation. J. Public Econ. 79 (3), 503–519.
Kreiner, C.T., Tranæs, T., 2005. Optimal workfare with voluntary and involuntary unemployment*. Scand. J. Econ. 107 (3), 459–474.
Kuziemko, I., Norton, M.I., Saez, E., Stantcheva, S., 2015. How elastic are preferences for redistribution? Evidence from randomized survey experiments. Am. Econ. Rev. 105 (4), 1478–1508.
Lockwood, B.B., Weinzierl, M., 2015. De gustibus non est taxandum: heterogeneity in preferences and optimal redistribution. J. Public Econ.

Mattos, E., França, V., 2011. Public employment and income redistribution: causal evidence for Brazilian municipalities. Public Choice 146 (1–2), 43–73.
Meltzer, A.H., Richard, S.F., 1981. A rational theory of the size of government. J. Polit. Econ. 89 (5), 914–927.
Mirrlees, J.A., 1971. An exploration in the theory of optimum income taxation. Rev. Econ. Stud. 38 (2), 175–208.
Moffitt, R., 2006. Welfare work requirements with paternalistic government preferences. Econ. J. 116 (515), F441–F458.
Netzer, N., Scheuer, F., 2010. Competitive markets without commitment. J. Polit. Econ. 118 (6), 1079–1109.
Piketty, T., Saez, E., 2013. Optimal labor income taxation. Handbook of Public Economics, 5. (Amsterdam: North Holland).
Roemer, J.E., Aaberge, R., Colombino, U., Fritzell, J., Jenkins, S.P., Lefranc, A., Marx, I., Page, M., Pommer, E., Ruiz-Castillo, J., Segundo, M.J.S., Tranaes, T., Trannoy, A., Wagner, G.G., Zubiri, I., 2003. To what extent do fiscal regimes equalize opportunities for income acquisition among citizens? J. Public Econ. 87 (3), 539–565.
Saez, E., 2002. Optimal income transfer programs: intensive versus extensive labor supply responses. Q. J. Econ. 117 (3), 1039–1073.
Saez, E., Stantcheva, S., 2016. Generalized social marginal welfare weights for optimal tax theory. Am. Econ. Rev. 106 (1), 24–45.
Sandmo, A., 1993. Optimal redistribution when tastes differ. FinanzArchiv / Public Finance Anal. 50 (2), 149–163.
Sutter, M., Weck-Hannemann, H., 2003. Taxation and the veil of ignorance – a real effort experiment on the Laffer curve. Public Choice 115 (1–2), 217–240.
Weinzierl, M., 2014. The promise of positive optimal taxation: normative diversity and a role for equal sacrifice. J. Public Econ. 118 (C), 128–142.