# Some Theoretical Aspects of a Universal Basic Income Proposal*

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**Abstract**

In this paper, we review the possible theoretical justifications of introducing a universal basic income (UBI) and examine the determinants of its feasibility and scope. We begin by contrasting the unconditionality of UBI with the many conditions that typically accompany welfare policies. Possible justifications for an unconditional UBI range from pure normative reasons to practical reasons due to the problem of screening beneficiaries and imperfections of the public agencies. We also explore theoretically the conditions that determine the feasibility and size of a UBI. The broad picture that emerges from our review is that both normative and practical considerations make UBI easier to defend as a tool of poverty alleviation in poor economies than a tool to achieve social justice in rich ones.

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## 1 Introduction

A Universal Basic Income (UBI) has three key features: it is a cash transfer scheme, it is not contingent on the recipient satisfying any compliance criteria to receive the assistance, and it is universal and not targeted to any specific group based on socioeconomic or demographic criteria. The concept of a UBI has a distinguished intellectual tradition starting from radical thinkers, liberals, and utopian socialists in the eighteenth and nineteenth century, Thomas Paine, Thomas Spence, Charles Fourier, Joseph Charlier, and John Stuart Mill (see Van

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Parijs and Vanderborght, 2017, for a discussion of the history of the idea. It is an idea that appears under various labels such as "social dividend", "citizen's income" and "basic income" and has drawn support from both the left and the right end of the political spectrum.

In recent years the idea of UBI has gained traction again in the debate on reforming the welfare state in major market economies on both sides of the Atlantic and has received support from mainstream politicians in the British Labour Party, the US Democratic Party, the French Socialist Party, and the Green Party in several European countries, the UK, Canada, and Australia. It was put up for a referendum (and was defeated) in Switzerland in 2016, has been tried out on an experimental basis with mixed initial reports in various European countries like Finland and the Netherlands, and the Canadian province of Ontario.

The idea also resonates with a recent policy shift in many developing countries as well as international development assistance organizations like the World Bank and the DFID towards direct cash transfers which involves rolling all subsidies into a single lump-sum cash transfer to households. The main economic arguments behind a UBI in developed countries is the looming threat of unemployment due to globalization and automation, while in developing countries, it is proposed as a better way to approach poverty alleviation. Nevertheless, it is relatively rare for a similar economic policy to be debated and discussed in both developing and developed countries given how different their economic environments and policy priorities are.[1]

In a nutshell, the main attraction of the UBI is that it bypasses the problem of targeting which involves inclusion and exclusion errors as well as direct administrative costs, inefficiencies of various kinds including delays and waste, and corruption. Being a lump-sum transfer, leaving aside the distortions that arise from raising taxes to fund it, it involves no further distortion of resource allocation or the behavior of recipients which arise in the case of subsidies or in-kind transfers. When we move away from the representative agent framework, this argument is stronger - it empowers those within the household who are not in possession of equal economic power. Also, political support for universal programmes tend to be more than those that are viewed as aimed at specific groups, because from the point of view of self-interested voting narrow targeting reduces the probability of the majority receiving the benefits.[2]

The main concern about UBI is it is expensive, being universal. Another frequent concern that is raised about a UBI is founded on paternalistic grounds – whether having a fixed guaranteed income makes people want to work less and squander the cash on inessential consumption. The fact that the poor and rich will receive the same transfer does not seem very equitable to some but like in a negative income tax scheme, gross transfers to the rich will be offset by taxes and in net terms, only those below a certain income level will receive a net transfer. Some worry that it may crowd out funding for other social programmes.

[1] See Banerjee, Niehaus, and Suri (2018) and Hoynes and Rothstein (2018) for discussion of UBI in the context of the developing world and advanced countries.

[2] See Moene and Wallerstein (2001) for a formal analysis of this.

Another concern is that it may adversely affect work incentives. Leaving aside the distortion that will necessarily arise from taxes that need to be raised to support any redistributive programme, given the unconditional nature of lump-sum cash transfers, one would expect any further distortions or resource costs to be at a minimum compared to other welfare programmes where means-testing and ensuring compliance is a non-trivial task.

In this paper we explore justifications of a UBI scheme from the point of view of economic theory. We restrict our attention to studying UBI as a redistribution device. What are the pros and cons of guaranteeing a minimal income to all individuals? We will address this question by allowing ourselves to give different answers about developed and developing economies.

Among the many conditions that UBI lifts compared to other redistribution policies, the absence of condition on means is the one that we will have to concentrate on. Why should those who do not earn any labor income receive the same net transfer independently of their ability to earn income, independently of their own non-labor income and independently of the income of those who live with them? How should the tax burden of UBI be spread among the net contributors to the redistribution system?

To answer these questions, we distinguish between three levels of arguments, which we label as first-best, second-best, and third-best arguments. Given that an individual's labor income is equal to this agent's labor time times her wage, income inequality can then come from differences in labor time, differences in wages, or differences in non-labour income. In a first-best world, the planner distinguishes income inequalities arising from labor time differences from these arising from wage differences and non-labour income differences and can tax them differently. We will see that ignoring non-labour income, it is difficult but possible to build interpersonal comparisons in such a way that all agents who do not earn any labor income receive the same (first-best) transfer. We will also see that justifying to treat them all equally is easier to justify in terms of poverty alleviation, even if the consequences regarding the kind of unconditionality that one can justify differ between these two arguments.

In a second-best world, labor times and wages are no longer observed. Taxation is based on incomes, except in the case of formal labor markets in which a screening device exists that can be used by the planner to identify, among those who do not work but have the ability to earn income on their own. In the absence of such a device, it is much easier to justify UBI based on some egalitarian objective than in a first-best world (information asymmetries benefit individuals who have high-productivity but low-willingness-to-work). We shall argue, however, that a screening device actually exists in developed economies. It consists in the monitoring of individuals benefiting from unemployment or social assistance, with firms asked to reveal whether they would be ready to hire them or not. It is interesting to note that all existing unemployment insurance or social assistance programs in developed economies are in fact based on such a device, a point that has definitely not been sufficiently studied in the theoretical literature. In the presence of such a device, a UBI can still be justified, including on the grounds of

poverty alleviation, but the arguments in favor of it also justify complementing it with social assistance programs that remain means-tested and targeted towards the low-wage individuals.

In a third-best world, we introduce imperfections of the redistribution institutions into the picture. By imperfections, we mean that labor income may be imperfectly observed, and conditional social assistance may require the intervention of corrupt local agencies. In such a world, we argue that UBI may be a way to circumvent these imperfections under the same egalitarian objective as these who do not necessarily lead to UBI absent these imperfections.

We then turn to examining the feasibility of a UBI scheme funded by a linear income tax across environments that vary in terms of the fraction of the population that is very poor, average income levels, the degree of inequality as well as the effectiveness of the tax and benefits system. Taking into account the behavioral responses to taxation of working individuals to fund a UBI, we will show that the case for a UBI even from the point of view of feasibility may be stronger for poorer countries.

The plan of the paper is as follows. In Section 2, we propose a comprehensive definition of UBI, which will allow us to identify the characteristics of it on which we will concentrate. In Section 3, we begin our review of the theoretical arguments for and against UBI by comparing in-cash and in-kind benefit systems. In Sections 4, 5 and 6, we review the possible justifications of non-means tested transfers in first-best (full information), second-best (asymmetric information about beneficiaries), and third-best environments (imperfect enforcement of tax and benefits systems). In section 7 we carry out a positive analysis of a UBI scheme that is funded by a linear tax in terms of what it implies in terms of labour supply and budgetary feasibility. We conclude in Section 8.

# 2 Characterization of a UBI

UBI is a redistribution scheme that has three components. First, it is a cash transfer as opposed to in-kind transfer like food or fuel; second, it is universal, i.e., given to all citizens or residents which means it is unconditional; third, it implicitly assumes a change in the tax system for it to be budget balanced. Unconditionality may be defined by reference with the many types of conditions existing in current social benefit systems:

First, *means* unconditionality, i.e., receiving the basic income involves no means-testing; we can distinguish three types of means unconditionality:

a) the basic income does not depend on the beneficiary's ability to earn labor income, whereas a large spectrum of current social benefits are restricted to involuntary unemployed (those whose (temporary) wage rate is zero),

b) the basic income does not depend on the beneficiary's non-labor income, in particular her/his capital income,

c) the basic income does not depend on the income of the people living with the beneficiary, whereas current benefits may be conditional of the income of the

spouse or the parents;

Second, *demographic* unconditionality - does not depend on any demographic criteria like age, gender, marriage/family status, family composition;

Third, *need* unconditionality, using, for example, criteria like health, handicap, etc;

Fourth, *deservingness* (or, *desert*) unconditionality, which goes against conditions like parents sending their kids to school, on the beneficiary's criminal records, etc.

Many proposals, actually, admit conditions on age (UBI typically concerns people in the age of belonging to the labor force) and are not supposed to replace benefits based on special needs, such as health or handicap. Then absence of condition on means and desert seems to be crucial, and the absence of condition on family composition is often there, too.

In the context of UBI, the most difficult condition is getting rid of the test of means. We will spend a large part of this review discussing the possible justifications of non-means tested transfers. Before that, we review the debate between transfers in cash versus in-kind.

# 3 Cash versus in kind

We can classify different kind of welfare policies in three broad categories - those that are purely redistributive, those that are aimed at providing public services, and those that try to correct market failure or improve market access (e.g., housing, credit, insurance). UBI belongs to the first category and the obvious comparisons with other kind of transfer policies are unconditional but targeted cash transfers, conditional cash transfers that are contingent on monitoring of health and educational status of children in beneficiary families (e.g., programmes such as Progresa, renamed Prospera, in Mexico, and Bolsa Familia in Brazil), or in-kind transfers (e.g., food, sanitation, education, health services provided free or at a subsidized rate to the poor).

Leaving aside the issue of conditionality that we turn to in Section 4, the arguments for cash transfers over in-kind transfers turn on the following factors: first, how accessible markets are, and second, to the extent beneficiaries are subject to behavioral biases that would lead to spending money on non-merit items or intra-household resource allocation considerations may imply that the head of the household may not spend the cash in the way that is most beneficial for the whole family (in particular, issues of gender discrimination and insufficient altruism towards children). Evidence from low- and middle-income countries actually suggest that, on average, cash transfers to the poor do not cause them to work less or spend their money on inessential consumption (see, Banerjee et al. 2017, Bastagli et al 2016, and Evans and Popova, 2017). If markets are accessible (in the context of remote rural areas in developing countries, this is not an assumption that is always satisfied) and to the extent one can trust recipient households to spend money in the way that is best for the family, the arguments for cash

transfers are fairly compelling from standard microeconomic logic.

Suppose individuals care about $c$ (essential consumption) and $x$ (inessential consumption) and their preferences are represented by the utility function $u(c, x)$. Suppose the budget constraint is $c + px \leq y$ where $y$ is income, and $p$ is the price of the inessential consumption good (the price of essential consumption is normalized to 1). Let us denote the individual demand functions for $c$ and $x$ as $c(y, p)$ and $x(y, p)$, and the indirect utility function by $v(y, p)$. In this world, if a cash transfer of amount $b$ is to be given to an individual, then the new budget constraint is $c+px \leq y+b$. Assuming both essential and inessential consumption to be normal goods, we would expect $c(y + b, p) > c(y, p)$ and $x(y + b, p) > x(y, p)$. Also, $v(y + b, p)$ exceeds the utility that the individual can obtain from any other forms of transfers since a lump-sum transfer of $b$ makes the choice problem unconstrained.

Consider an alternative transfer of value $b$ that is either in-kind, in the form of a coupon or voucher, or electronic benefit transfer (EBT) cards. For example, in India, fair price shops (FPS), also known as 'ration shops", distributes food and essential items at a subsidized price to the poor. In contrast, in the US the Food Stamp programme, or its current version called the Supplemental Nutrition Assistance Program (SNAP) where benefits are directly deposited into the household's EBT card account, which can be used to pay for food at various retail outlets.[3] The new budget line can be written as $\max\{c - b, 0\} + x \leq y$. For $c \geq b$, the budget line shifts parallelly as in the case of cash transfers. However, under this scheme if the beneficiary wants $c < b$, then the amount $b - c$ cannot be converted to $x$, something that is possible under cash transfers, and the upper bound for $x$ is set by pre-transfer income $y$.[4] Let $\hat{c}(y+b, p)$ and $\hat{x}(y + b, p)$ denote the choices of $c$ and $x$ under the in-kind scheme. Given the nature of the change in the budget constraint, as long as $c \geq b$, $\hat{c}(y + b, p) = c(y + b, p)$ and $\hat{x}(y + b, p) = x(y + b, p)$: the condition on which good to buy has no bite. If $\hat{c}(y + b, p) = b$ (we assume free disposal post receiving the transfer) then $\hat{x}(y + b, p) = y$. In this case, the outcome is different from the previous case, but the consumption of $x$ is higher than in the pre-transfer situation, as $x(y, p) < y$. This means either way, there is greater consumption of $x$ compared to the pre-transfer period. Also, only for beneficiaries who are marginal the impact of cash and in-kind transfers are different - for inframarginal beneficiaries, there is no difference. Evidence seems to suggest most recipients are inframarginal (Hoynes and Schanzenbach, 2009).

Clearly the individual is better off with a flat cash transfer of $b$ and any transactions costs involved in making an in-kind transfer of the amount $b$ will

[3] In fact, India has experimentally introduced a Direct Benefit Transfer (DBT) scheme in a limited number of areas starting in 2013, that transfers subsidies directly to the bank account of beneficiaries, with the hope that this will reduce leakages and delays associated with the existing public distribution system. Some of the initial evaluations present a mixed picture,. For example, Muralidharan et al (2017) conclude that DBT-based reform holds long-term promise, and that over time beneficiaries prefer DBT to in-kind transfer via the ration shops. However, in the short-run there is not enough evidence to support a universal expansion of DBT, and responses from beneficiaries do not unambiguously establish a revealed preferences for cash transfers.

[4] See Hoynes and Schanzenbach (2009) for a detailed discussion.

make the logic stronger from the social efficiency point of view. Only when the in-kind transfer is completely fungible the two forms of transfers will be equivalent.

Therefore, the case for in-kind transfers has to rest on departures from this framework. For example, if the planner has paternalistic preferences that are different from that of the beneficiary, then in-kind transfers are preferred to cash transfers. Also, if there are transactions costs in accessing markets, in-kind transfers are effectively larger in real terms. There is also a political economy argument: if voters dislike the fact that their taxes are used by the beneficiaries to buy inessential goods, then a restriction to essential consumption makes sense because that makes voters more willing to pay and it does not effectively decrease the utility of the beneficiaries so long as they are inframarginal.

In the next sections, we will concentrate on a model of labor supply and think of UBI as an income support policy for very low income earners. Before we end this section, we would like to underline a possible reinterpretation of the model of this section into a labor supply model. We can think of $y$, as one agent's full income, that is the money value of her available time evaluated at her wage, together with her non-labor income. Then the allocation of $y$ into $c$ and $x$ can be thought of as the allocation of full income into consumption, $c$, and leisure, $x$, the price of which is the wage. Under this reinterpretation, a paternalistic planner would be one that considers that people are likely to consume more leisure than what they should. An in-kind policy would then be to impose a minimal amount of work to the agents. While we do not observe these kind of policies in practice, what we do observe are policies that try to incentivize people to work or look for jobs. Arguments to justify such policies come from the assumptions that behavioral biases prevent people from taking good decisions for themselves. An example of such biases is the present bias that may induce people to overestimate the cost of looking for jobs.[5]

# 4 In a first-best world

It is interesting to begin the enquiry into the possible justifications of UBI in a first-best world, in which a benevolent and perfectly informed planner wishes to maximize a notion of social welfare. Under which conditions on the social welfare function would such a planner implement a UBI? Of course, in reality any discussion of UBI as a redistribution scheme is premised on some departure from the first-best, e.g., we observe *earned* income but the ability to earn income and willingness to work are not perfectly observable. Later on we develop arguments for and against UBI with various departures from a first-best environment.

All through we make the simplifying assumption that agents have Cobb-Douglas preferences over net or after-tax income and leisure time. Since all through we stick to a static framework of income-leisure choice, after-tax income

[5] The consequence of this kind of bias is studied, for instance, by Lockwood (2016).

equals consumption. Preferences are represented by a utility function:

$$u(y, \ell) = \alpha \log(y) + (1 - \alpha) \log \ell, \tag{1}$$

where $\ell$ stands for the agent's leisure time, $y$ her disposable income, and $T$, the upper bound on $\ell$, stands for the available time, assumed to be equal among agents. The difference between available time and leisure is the labor supply. Preferences are heterogeneous among agents, and this is captured by $\alpha$, the fraction of an agent's endowment, including the money value of her available time, that she devotes to consumption. A larger $\alpha$ means a larger willingness to work. Given this simple preference shifter, we denote utility as $u(y, \ell; \alpha)$. We assume that $\alpha$ takes values in an interval $[\underline{\alpha}, \overline{\alpha}]$.

Agents have an ability to earn income, or wage, $w > 0$, which may also differ across agents. We assume in this section that $w$ is exogenous, as in a general equilibrium model with fixed production coefficients. Finally, we assume that all agents have some level of non-labor income, $m$, which is exogenous. As a result, the set of agents in the economy is fully described by the distribution of parameters $\alpha$ (for the preferences), $w$ (for the ability to earn income) and $m$ (non-labor income). This distribution is represented by a density function $f(\alpha, w, m)$.

In a first-best world, all Pareto efficient allocations can be obtained through lump-sum transfers based on characteristics of agents. Let $t(\alpha, w, m) \in \mathbb{R}$ denote the tax paid by an agent of type $(\alpha, w, m)$, which can be positive or negative. The $t$'s have to satisfy the global feasibility constraint, or the government budget constraint, which is:

$$\int_0^\infty \int_0^\infty \int_{\underline{\alpha}}^{\overline{\alpha}} t(\alpha, w, m) f(\alpha, w, m) da dw dm \geq B. \tag{2}$$

$B$ stands for the net revenue of the government. We can restrict our attention to situations in which an agent of type $(\alpha, w, m)$ consumes the bundle of goods that solves the problem

$$\max_{\ell \in [0,T]} u(y, \ell; \alpha) \text{ s. t. } y \leq w(T - \ell) + m - t(\alpha, w, m). \tag{3}$$

This leads to the solution

$$y^*(\alpha, w, m) = \alpha(wT + m - t(\alpha, w, m)) \tag{4}$$

$$\ell^*(\alpha, w, m) = \frac{(1 - \alpha)(wT + m - t(\alpha, w, m))}{w} \tag{5}$$

if the natural constraint that $\ell \leq T$ is met, that is if

$$w \geq \frac{1 - \alpha}{\alpha} \frac{m - t(\alpha, w, m)}{T}. \tag{6}$$

Otherwise we get a corner solution:

$$\begin{aligned} y^*(\alpha, w, m) &= m - t(\alpha, w, m) \\ \ell^*(\alpha, w, m) &= T \end{aligned}$$

This gives us the following expression for labor supply:

$$\begin{aligned} L^*(\alpha, w, m) &= \frac{(1-\alpha)wT + \alpha(t(\alpha, w, m) - m)}{w}, \text{ if } w \geq \frac{1-\alpha}{\alpha}\frac{m - t(\alpha, w, m)}{T} \\ &= 0, \text{ otherwise.} \end{aligned}$$

The corresponding indirect utility, giving us the utility level at the equilibrium bundle, is a function of the wage of the agent (the relative price of leisure) and the tax she pays (which leads to non-labor income $m - t$), and it is denoted by $v(w, m - t; \alpha)$. If $w \geq \frac{1-\alpha}{\alpha}\frac{m-t(\alpha,w,m)}{T}$ (interior solution in labor supply)

$$v(w, m-t; \alpha) = \alpha \log \alpha + (1-\alpha)\log(1-\alpha) + \log(wT + m - t) - (1-\alpha)\log w \quad (7)$$

and

$$v(w, m - t; \alpha) = \alpha \log(m - t(\alpha, w, m)) + (1-\alpha)\log T \quad (8)$$

otherwise.

In this first-best world, the planner has the freedom to treat differently income inequalities that come from differences in labor time from these that arise from differences in wages and these that arise from differences in $m$. As a result, it is not necessarily optimal for the planner to allocate transfers $-t(\alpha, w, m)$ monotonically with labor income $wL^*(\alpha, w, m)$: the planner may perfectly well distinguish between those who work a lot for a low wage from those who work less with a higher wage, even if they end up with the same labor income.

Inequalities may come from differences in $m$. If the social planner considers inequalities in $m$ normatively problematic, then she should tax $m$ at 100% and redistribute the proceeds. If the social planner does not consider these inequalities normatively problematic, then she can simply disregard them. In both cases, there is no loss of generality in developing our analysis under the assumption that $m = 0$ for all agents. This is what we do for the remaining of this section. It will be important to bring inequalities in $m$ back in the analysis in the next section.

There are two ways on thinking of UBI is this setting - first, we may think of UBI as of a lump-sum transfer that does not depend on any individual characteristics, $\alpha$ or $w$; second, we may think of UBI as a lower bound on the $y$'s. We discuss them in turn.

## 4.1 A lump-sum transfer to all

If we think of UBI as of a lump-sum transfer that does not depend on $\alpha$ or $w$, that means $t(\alpha, w) = t$ for all $\alpha$ and all $w$. Clearly, the basic income can be positive without any changes in taxes only if the government has a positive net revenue from other sources. This is the well-known Alaskan case, in which a share of the profit of the state-owned oil industry is evenly redistributed among the citizens of the State. Such a basic income is non distortionary, that is, it does not impose any inefficiency on the economy. We may observe that equal profit sharing is a prominent interpretation of common property of a technology in the fair allocation literature (see, for instance, Moulin, 1990a and 1990b, or Thomson, 2010, for a survey).

## 4.2 A lower bound on consumption

Thinking of UBI as guaranteeing a minimal $y$ independently of individual type $(\alpha, w)$ raises many questions. The most important one has to do with agents who do not work at all. These agents consume the lump-sum transfer that they get, and nothing more. Let $\underline{b}$ denote this consumption level, that is, $\underline{b} = -t(\alpha, w)$ for all the agents $(\alpha, w)$ who do not work, i.e., choose $l = T$. From our earlier analysis, it means that all agents such that

$$w \leq \frac{1-\alpha}{\alpha}\frac{\underline{b}}{T} \tag{9}$$

do not work at an efficient allocation in which they receive a basic income of $\underline{b}$. Eq. (9) shows that the group of idle agents will include low-wage-high-willingness-to-work agents and high-wage-low-willingness-to-work agents. The question that rises is, is it possible to define social welfare in a way that suggests treating all agents who do not work, i.e., whose types satisfy Eq. (9), identically.

There are two ways of answering yes to this question, which we review in the next two subsections. The first way is based on normative principles of fairness consistent with interpersonal welfare comparison among agents with heterogenous preferences. The second way is consistent with the goal of alleviating poverty.

### 4.2.1 Interpersonal welfare comparison and heterogeneity of preferences

The feature of UBI that is the most difficult to justify is that it treats those who do not work identically, whether they don't work because they are not able to earn income or because they would be able to work but they prefer not to. As Van Parijs and Vanderborght (2017) put it:

> "Of all objections to a basic income, one sticks out above all others– and is more emotional, more principled, and more decisive in the eyes of many. It relates to its being unconditional in the sense of being obligation-free, of not requiring its recipients to work or be willing to work. [...] In [one] version [of the objection], the 'liberal' one, the underlying principle is [...] about fairness. As Jon Elster puts it, an unconditional basic income 'goes against a widely accepted notion of justice: it is unfair for able-bodied people to live off the labor of others.' " (Van Parijs and Vanderborght, 2017, p 99.)

To deal with this question, one needs to develop a notion of social welfare in a world characterized by the double heterogeneity that we introduced above. This question happens to have been at the center of optimal taxation theory in the recent years, starting with Boadway, Marchand, Pestieau and Racionero (2002). It amounts to asking: how do we do inter-personal comparisons in utilities when agents have different preferences? A general answer to this question has been recently provided by Fleurbaey and Maniquet (2011) in the framework of the

theory of fair allocation (see also Fleurbaey and Maniquet, 2018, for a survey of the contribution of the fairness approach to optimal taxation).

The main idea followed in these works is that utility functions should be rescaled so as to make sense of interpersonal comparison. Rescaling utility functions, indeed, turns out to have better properties than weighting utilities or using some sophisticated aggregator of utility levels.

As it is well known, any strictly increasing transform of a utility function represents the same preferences. The question if then: which increasing transform of $u(\cdot,\cdot;\alpha,w)$ should we use so that the new utility levels can be compared in a normatively meaningful way? We answer this question in some length, before applying the answer to the issue of the normative justification of UBI.

The normative rescaling of the utility functions involves three parameters, corresponding to three clear normative stances. We begin with the general formulation of the normative rescaling and then we discuss the normative interpretation of the three parameters.

The normatively relevant utility functions all come from the realm of expenditure (or cost) functions. As it is well known, the expenditure (or cost) function provides us with a representation of the preferences that does not depend on the units in which the direct and indirect utility functions are measured. The expenditure function gives us the non-labor income that is just necessary to transfer to an agent so that she reaches a targeted utility level, after freely choosing her labor time given her wage. Let $u$ be the actual utility of the agent and $e(w,u;\alpha)$ is the expenditure function. Given the duality relationship between the indirect utility function and the expenditure function, we have: $v(w,e(w,u);\alpha)=u$. This yields:

$$e(w,u;\alpha)=\frac{\exp(u)w^{(1-\alpha)}}{\alpha^{\alpha}(1-\alpha)^{(1-\alpha)}}-wT,$$

which reduces to

$$e(w,u;\alpha)=-t(\alpha,w) \tag{10}$$

in case the agent maximizes at $y=-t(\alpha,w)$ and $\ell=T$. At this stage, we still do not have any degree of freedom: to each utility function corresponds one and only one expenditure function.

First, note that the amount $wT$ is subtracted from $\frac{\exp(u)w^{(1-\alpha)}}{\alpha^{\alpha}(1-\alpha)^{(1-\alpha)}}$ because the expenditure function defined above evaluates the non-labor income that needs to be allocated to the agent *for free*. We could, instead, subtract the amount $w(T-L)$ and we would measure the non-labor income that is just necessary to allocate to an agent *in exchange of a labor time of* $L$ so that, after she freely chooses her labor time given her wage, she reaches a targeted utility level. The fact that a labor time of $L$ is required from the agent does not mean that she has to work that much. On the contrary, she remains free to choose her labor time, but if she chooses to work less than $L$, she has to buy her additional leisure at the price of $w$. Replacing $T$ with $T-L$ in the formula above would still give us a numerical representation of the preferences, i.e., a rescaling of the $u(\cdot,\cdot;\alpha)$ function, provided $L$ is fixed. We enlarge the set of rescaled utility functions by

introducing this reference labor time which we denote $\tilde{L}$. We discuss below the normative interpretation of $\tilde{L}$. Before that, we still need to enlarge the set of rescaled utility functions.

Second, note that if we define an expenditure function by using a wage that differs from the actual wage of the agent, we still get a utility representation of that agent's preferences, provided this wage is fixed. This gives us some new degrees of freedom: because we don't need to use one individual's actual wage to evaluate her expenditure, by varying the wage that we use, we obtain different rescaled utility functions. It will prove useful to replace $w$ in the definition of the expenditure function with $\tilde{w}(w) = \tilde{\lambda}\tilde{w} + (1-\lambda)w$, that is, the wage at which the expenditure is to be evaluated is a weighted average between a common reference wage, $\tilde{w}$ and the actual wage of the individual, and the weight is itself a normative parameter, $\tilde{\lambda}$.

That gives us the following class of possible normative utility functions:

$$\tilde{u}(y, \ell; \alpha, w) = \frac{\exp(u)\tilde{w}(w)^{(1-\alpha)}}{\alpha^{\alpha}(1-\alpha)^{(1-\alpha)}} - \tilde{w}(w)(T - \tilde{L}) \tag{11}$$

if $\tilde{w}(w) \geq \frac{1-\alpha}{\alpha}\frac{e(\tilde{w},u;\alpha)}{T}$ and

$$\tilde{u}(y, \ell; \alpha, w) = \frac{\exp\left(\frac{u}{\alpha}\right)}{T^{\frac{1-\alpha}{\alpha}}} + \tilde{w}(w)\tilde{L} \tag{12}$$

otherwise (that is at a corner solution). Such a normative utility function is illustrated in Fig. 1.

Let us now interpret these normative utility functions, or, more precisely, the three parameters $\tilde{\lambda}$, $\tilde{w}$ and $\tilde{L}$. Interpreting these parameters amounts to understanding what the social planner achieves when these rescaled utilities are equalized between two individuals. This is best illustrated if we consider an economy in which there are four types of agents only. Let us assume that willingness to work is either low or high, that is $\alpha \in \{\underline{\alpha}, \overline{\alpha}\}$, and wage is either small or large, that is $w \in \{\underline{w}, \overline{w}\}$. Each combination of the two parameters is possible and we have four types $(\alpha, w)$.

The main normative value that has been used to compare the utility of agents of different wages has been called the *laisser-faire* principle. It is related to, yet different from, the famous laisser-faire ideology that bans all interventions in the functioning of markets and, therefore, all kinds of redistribution. The laisser-faire principle we are talking about recommends that no redistribution takes place *among agents with the same wage*. The idea is that agents should bear the consequences of their choices, and if income differences stem from differences in choices, no redistribution is normatively justified. This normative principle is the heart of libertarianism (see, for instance, Feldstein, 1976), laisser-fairism (see, e. g. Lockwood and Weinzierl, 2015, and Piketty and Saez, 2013) or resource equality (see Fleurbaey and Maniquet, 2011, chapter 10).

The laisser-faire principle calls for choosing $\tilde{w}(w) = w$. Indeed, in this case, if two agents with the same wage but different preferences corresponding to $\underline{\alpha}$ and

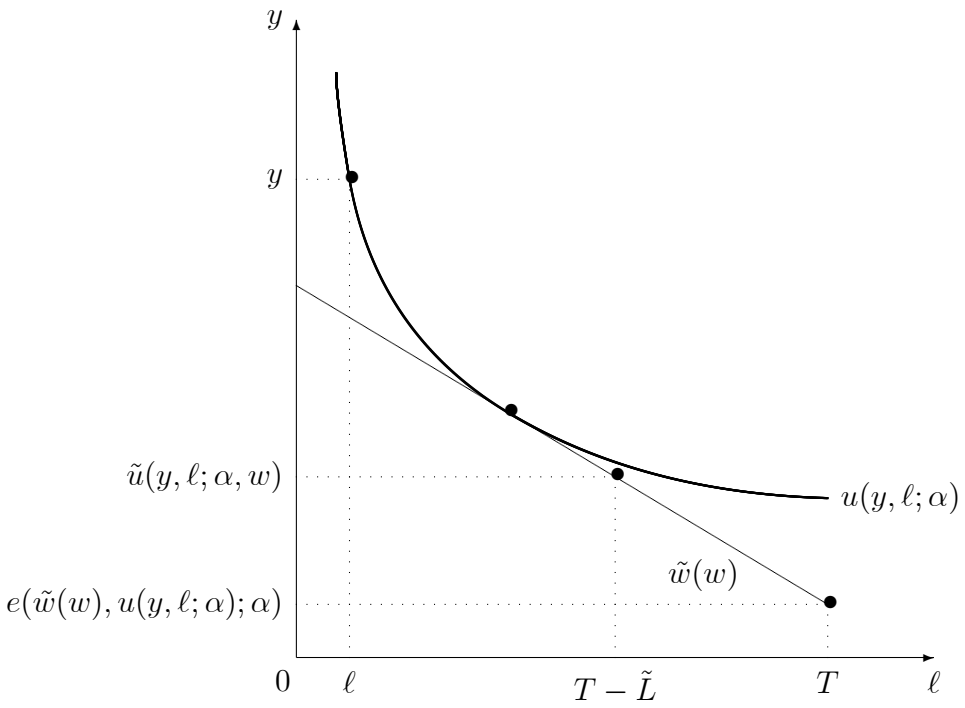


Figure 1: The normative (rescaled) utility: the agent consumes $(y,\ell)$ and reaches direct utility $u(y,\ell;\alpha)$; her preferences are parameterized by $\alpha$; she is indifferent between consuming $(y,\ell)$ and receiving $e(\tilde{w}(w),u(y,\ell;\alpha);\alpha)$ and being free to choose her labor time given wage $\tilde{w}(w)$, the slope of the budget line; her normative utility is equal to $\tilde{u}(y,\ell;\alpha,w)$.

$\overline{\alpha}$ freely choose their labor time paying the same lump sum tax $t$, that is if there is no redistribution between these two agents, then they reach utility $v(w,-t;\underline{\alpha})$ and $v(w,-t;\overline{\alpha})$ respectively, so that, using Eq. (7) and (12), we can compute that they get the same rescaled utility level

$$\tilde{u}(y,\ell;\underline{\alpha},w)=\tilde{u}(y,\ell;\overline{\alpha},w)=-t+w\tilde{L}.$$

As a result, choosing $\tilde{w}(w)=w$ leads an egalitarian planner to limit as much as possible the redistribution between individuals with the same wage.

Another normative principle, which has recently been called the compensation principle, has been key to the optimal tax literature since Mirrlees (1971). Mirrlees, indeed, assumed that all agents have the same preferences. In such a context, he considered that the actual utility functions of the agents are normatively acceptable, so that an egalitarian planner should try to equalize individuals' actual utility. That is, two agents having the same preferences should have the same normatively rescaled utility when their actual utility is the same. That calls for choosing $\tilde{w}(\underline{w})=\tilde{w}(\overline{w})$. Indeed, as can be seen from Eq. (11) and (12), with identical $\tilde{w}$, two agents with the same preferences (that is the same $\alpha$) would have the same level of $\tilde{u}$ as soon as they have the same level of $u$.

Obviously, it is impossible to satisfy both the requirement that $\tilde{w}(w)=w$ and $\tilde{w}(\underline{w})=\tilde{w}(\overline{w})$: the principles of laisser-faire and compensation are incompatible. This echoes a basic trade-off studied in the literature on fair allocation since

Fleurbaey (1994) and Bossert (1995).

By defining $\tilde{w}(w) = \tilde{\lambda}\tilde{w} + (1 - \tilde{\lambda})w$, we let $\tilde{\lambda}$ be the normative parameter that determines the choice of emphasis between the principles of laisser-faire and compensation. If $\tilde{\lambda} = 1$, then all agents are evaluated with the same reference wage $\tilde{w}$, so that the requirement $\tilde{w}(\underline{w}) = \tilde{w}(\overline{w})$ is met: the principle of compensation is satisfied. On the other extreme, if $\tilde{\lambda} = 0$, then all agents are evaluated with a reference wage equal to their actual wage, so that the requirement $\tilde{w}(w) = w$ is met: the principle of laisser-faire is satisfied. The value of $\tilde{\lambda}$ is the most fundamental normative choice of the planner.

It is not the only choice, though. Let us assume that the planner chooses $\tilde{\lambda} = 1$. Compensation is obtained between agents of types $(\underline{\alpha}, \underline{w})$ and $(\underline{\alpha}, \overline{w})$, that is the two types of low-willingness-to-work agents, as well as between agents of types $(\overline{\alpha}, \underline{w})$ and $(\overline{\alpha}, \overline{w})$, the two types of high-willingness-to-work agents. The value of $\tilde{w}$ has still to be chosen. Let us assume that the planner chooses $\tilde{w} = \underline{w}$, that is, all agents are evaluated using the minimal wage in the population. Then, the laisser-faire principle turns out to be satisfied only between agents of types $(\underline{\alpha}, \underline{w})$ and $(\overline{\alpha}, \underline{w})$, the only two types of agents for which the requirement $\tilde{w}(w) = w$ holds.

The only remaining unfairness is that, contrary to what the laisser-faire principle requires, there is redistribution between agents of types $(\underline{\alpha}, \overline{w})$ and $(\overline{\alpha}, \overline{w})$. Instead of being evaluated by using their common actual wage, they are both evaluated by using the smaller reference wage, that is, the additional work of the high willingness to work agent $(\overline{\alpha}, \overline{w})$ is rewarded at a smaller wage than her actual wage. Choosing a low reference wage $\tilde{w}$ amounts to redistribute from the high to the low-willingness-to-work agents.

A similar reasoning would have followed the assumption that $\tilde{w} = \overline{w}$. That would prevent the laisser-faire principle from being satisfied between agents of types $(\underline{\alpha}, \underline{w})$ and $(\overline{\alpha}, \underline{w})$, because the additional labor time of agents of type $(\overline{\alpha}, \underline{w})$ would then be rewarded at a larger wage than their actual wage: redistribution takes place from the low to the high-willingness-to-work agents.

To sum up, the value of $\tilde{w}$, by determining how labor time should be rewarded, independently of the actual wage of the agents, determine the level of redistribution between low and high-willingness-to-work agents. The smaller $\tilde{w}$, the larger the redistribution from hard workers to leisure lovers.

In a sort of dual fashion, we can see that the opposite choice of $\tilde{\lambda} = 0$, that is the emphasis on the laisser-faire principle, is not sufficient either to completely determine interpersonal comparisons. The consequence of $\tilde{\lambda} = 0$ is that there will be no redistribution between agents of types $(\underline{\alpha}, \underline{w})$ and $(\overline{\alpha}, \underline{w})$, nor between agents of types $(\underline{\alpha}, \overline{w})$ and $(\overline{\alpha}, \overline{w})$, that is no redistribution between agents of the same wage, independently of whether their wage is small of large.

What remains to be fixed, then, is the amount of redistribution between small and large-wage agents. As can be deduced from Eq. (11) and (12), if two agents have the same preferences and the same actual utility (because they consume bundles they deem equivalent), that is the same $u$, the differences in rescaled utility is an increasing function of $\tilde{L}$. Remember that an egalitarian planner

wishes to equalize rescaled utilities. As a consequence, the larger $\tilde{L}$, the larger the gap between large skill and low skill agents in the absence of redistribution, and, therefore, the more this planner wishes to redistribute.

To sum up, we have seen that if agents differ in two dimensions, their willingness to work and their wage, then there are two different scenarios (or social preferences) that lead to substantial redistribution. In the first scenario, the social planner wishes in priority to equalize utility among agents with the same preferences (choosing a large $\tilde{\lambda}$), and then redistribute across types of preferences by giving priority to lower-willingness-to-work agents (choosing a low $\tilde{w}$). In the second scenario, the social planner wishes in priority to avoid redistribution among agents with equal wages (choosing a low $\tilde{\lambda}$), but then redistribute a lot from high wage to low wage agents (choosing a large $\tilde{\ell}$). These two scenarios benefit and arm different groups of agents.

We can review these two scenarios in a different way. There are two ways to protect rich people from paying too much taxes. Remember that the richest people are those who have a large wage and work a lot. Either the planner limits the redistribution from large-wage to small-wage agents, by choosing a small $\tilde{\ell}$, and this is compatible with applying the laisser-faire principle (that is choosing a low $\tilde{\lambda}$), or the planner limits the redistribution from high to low-willingness-to-work agents, by choosing a high $\tilde{w}$, and this is compatible with applying the compensation principle (that is choosing a large $\tilde{\lambda}$).

We are now equipped to answer our main question: can we justify UBI by an appropriate choice of $\tilde{\lambda}$, $\tilde{w}$ and $\tilde{\ell}$? More precisely, should an egalitarian planner allocate to all agents whose types satisfy Eq. (9) the same lump-sum transfer (remember we are still in a first-best world)?

Let us come back to our four-type economy. Let us assume that both types $(\overline{\alpha}, \underline{w})$ (agents who have high-willingness-to-work but low-wages) and $(\underline{\alpha}, \overline{w})$ (agents who have low-willingness-to-work but high-wages) do not work at an efficient allocation. Let $b(\overline{\alpha}, \underline{w})$ (resp., $b(\underline{\alpha}, \overline{w})$) be the lump sum transfer received by agents of type $(\overline{\alpha}, \underline{w})$ (resp. $(\underline{\alpha}, \overline{w})$). We need to identify the conditions on $\tilde{\lambda}$, $\tilde{w}$ and $\tilde{\ell}$ that guarantee that all agents who do not work are treated equally, that is

$$\tilde{u}(b(\overline{\alpha}, \underline{w}), 0; \overline{\alpha}, \underline{w}) = \tilde{u}(b(\underline{\alpha}, \overline{w}), 0; \underline{\alpha}, \overline{w}) \Leftrightarrow b(\overline{\alpha}, \underline{w}) = b(\underline{\alpha}, \overline{w}) = b. \tag{13}$$

For the sake of simplicity, let us assume that the formula of the rescaled utility of these agents is given by Eq. (12), which corresponds to the case in which both types of agents would choose a corner bundle when facing $\tilde{w}(w)$.[6]

That requires that $\tilde{w}(\underline{w}) \leq \underline{w}$ and $\tilde{w}(\overline{w}) \leq \overline{w}$. Given that $\tilde{w}(w) = \tilde{\lambda}\tilde{w} + (1-\tilde{\lambda})w$, the two conditions boil down to $\tilde{w} \leq \underline{w}$. In this case, we apply Eq. (12), and we get (observe that when the agent consumes bundle $(b, T)$, then $\frac{\exp\left(\frac{u}{\alpha}\right)}{T^{\frac{1-\alpha}{\alpha}}} = b$)

$$\tilde{u}(b(\overline{\alpha}, \underline{w}), T; \overline{\alpha}, \underline{w}) = b(\overline{\alpha}, \underline{w}) + (\tilde{\lambda}\tilde{w} + (1-\tilde{\lambda})\underline{w})\tilde{L} \tag{14}$$

$$\tilde{u}(b(\underline{\alpha}, \overline{w}), T; \underline{\alpha}, \overline{w}) = b(\underline{\alpha}, \overline{w}) + (\tilde{\lambda}\tilde{w} + (1-\tilde{\lambda})\overline{w})\tilde{L}. \tag{15}$$

[6] It can be checked that Eq. (13) can never hold if the rescaled utility formula is given by Eq. (11), that is, if $\tilde{w}(w) \geq \frac{1-\alpha}{\alpha}\frac{e(\tilde{w}, u; \alpha)}{T}$.

Summing up, and relaxing our assumptions of only four types, all agents who do not work at an efficient allocation are treated equally in a first-best world by an egalitarian planner aggregating normative utilities $\tilde{u}(\cdot,\cdot;\alpha,w)$ if and only if the following two conditions hold:

$$\begin{aligned} \tilde{w} &\leq \underline{w} && (16)\\ (\tilde{\lambda}\tilde{w}+(1-\tilde{\lambda})\underline{w})\tilde{L} &= (\tilde{\lambda}\tilde{w}+(1-\tilde{\lambda})w)\tilde{L}\forall\, w. && (17)\end{aligned}$$

Note that the requirement that $\tilde{w} \leq \underline{w}$ reduces to $\tilde{w} = \underline{w}$ if we add the natural requirement that $\tilde{w}$ should belong to the same domain as $w$. In Section 5 below, it will be needed to add that the lower bound of the domain of $w$ is 0. Condition (16) then becomes $\tilde{w} = 0$.

Conditions (16) and (17) are satisfied in the following three cases.

1. If $\tilde{\lambda} = 1$ and $\tilde{w} = \underline{w}$: In this case, $\tilde{w}(w) = \underline{w}$ for all $w$, so that the normative utility of all those who do not work and receive a UBI of $b$ is identical and equal to $b + \underline{w}\tilde{L}$.

2. If $\tilde{\lambda} = 0$ and $\tilde{\ell} = 0$: In this case, $\tilde{w}(w) = w$ for all $w$ and Eq. (14) and (15) are still valid to compute normative utilities. They are again identical among all agents who do not work, and equal to $b$.

3. If $\tilde{\lambda} \in (0,1)$ and both $\tilde{w} = \underline{w}$ and $\tilde{\ell} = 0$. Again, Eq. (14) and (15) apply, and all normative utilities of agents who do not work are equal to $b$.

Note that in the second case, there is no redistribution at all among agents with the same wage, because $\tilde{\lambda} = 0$ (application of the laisser-faire principle), nor from large to low wage agents, because $\tilde{\ell} = 0$. Therefore, UBI is equal to zero in this case, or even negative if the budget constraint holds with a positive $B$. We can therefore drop this case. We are left with cases 1 and 3.

We can now summarize the long developments that lead us to this point. The motivating question is: is it normatively justified to allocate the same transfer to all agents who do not work, independently of whether they do not work because they prefer not to work (that is, they have a low willingness to work) or because they don't have the ability to work (they have a small wage)?

The answer to this question is that it is possible to justify such an equal treatment, but this justification requires rather extreme normative stances. These normative issues come from the fact that income inequalities have two sources: differences in labor times and differences in wages. Therefore, redistribution can take place either between agents of different preferences or between agents of different wages or both. In order to justify UBI, an absolute necessity is to wish to redistribute as much as possible from high willingness-to-work towards low-willingness-to-work ($\tilde{w} = \underline{w}$) *and* this requirement has to be accompanied either by an absolute priority given to the principle of compensation ($\tilde{\lambda} = 1$) or the complete absence of redistribution from larger to lower wage agents ($\tilde{\ell} = 0$). These are the only conditions under which a fully informed egalitarian planner

accepts not to redistribute from low-willingness-to-work-large-wage towards high-willingness-to-work-small-wage agents.

Finally, in these conditions, the transfer to non-working agents are more and more generous as a function of $\tilde{\lambda}$, that is with the relative priority given to the principle of compensation.

### 4.2.2 Poverty reduction

There is a second way, though, to justify imposing a universal lower bound on consumption. It is related to poverty reduction. Poverty, in this case, is defined as living with means that are considered, for whatever reason, insufficient. If poverty is defined in an unconditional way, that is, if being poor is defined only as a function of the means of existence that one agent has independently of why this agent lies below the means threshold, then the objective of defining a minimal consumption level can be immediately justified.

In a first-best world, this objective translates into a UBI proposal. Indeed, nobody can gain by trying to incentivize agents whose types satisfy Eq. (9). It is efficient to let them not work and allocate them the minimal consumption level $\underline{b}$.

If the objective is to prevent all agents from consuming less than $\underline{b}$, then some agents will receive a positive (lump-sum) transfer even if they work. From Eq. (4), the consumption level at an efficient allocation is equal to $\alpha(wT+m-t(\alpha,w,m))$. Note that it is important now to bring $m$ back in the picture, as the planner does not have any reason to tax it away, but it should be taken into account as it influences the minimal consumption. All agents of type $(\alpha,w,m)$ should then receive a lump sum transfer satisfying

$$-t(\alpha,w,m) \geq \frac{\underline{b}}{\alpha} - (wT+m)$$

so that their consumption is bounded below from $\underline{b}$.

To sum up, it seems almost obvious that poverty reduction may justify UBI in a first-best world, provided poverty is defined as a minimal consumption level that does not depend on individual characteristics. This, however, calls for an important qualification regarding conditionality. We had characterized means unconditionality earlier as having three components, namely, no conditions on the ability to earn income, non-labor income, and incomes of other household members. While poverty reduction justifies the absence of condition on one's ability to earn income, it does not justify to make the transfer independent of non-labor income nor of incomes of other household members, two variables that can be captured by $m$.

Let us now conclude this section on the first-best. The main lesson to draw from our inquiry is that UBI can be normatively justified even in a first-best world, but UBI is much easier to defend based on poverty alleviation than on the values that are at the heart of optimal taxation. Indeed, if the planner is able to distinguish income differences that arise from differences in wages from those that arise from differences in willingness to work, only extreme normative stances

can justify to treat agents who do not earn income independently of whether their wage or their willingness to work is too low.

# 5 In a second-best world

The previous section asked the question that even in a perfect world with no informational asymmetries or any other kinds of frictions, what kind of social welfare considerations could potentially support a UBI proposal. But as we introduced the topic, in the policy world, the UBI is essentially a second-best proposal. It aims at reforming an existing redistribution system where "means" cannot be costlessly tested. In this section, we consider the possibility that types of individuals, $(\alpha, w, m)$, are not perfectly observable, whereas pre-tax income is. In this section this is the only departure from the full information world. In the next section, we consider problems that arise in implementation of any redistribution scheme due to frictions on the administrative side.

In the optimal labor income literature, it is customary to summarize such a tax-transfer system by the equation

$$y^n = y^g - \tau(y^g), \tag{18}$$

where $y^g$ denotes gross labor income, $y^n$ net (that is after-tax) labor income and $\tau$ aggregates all the policies that transform pre-tax into post-tax incomes (labor income tax, social security contribution, in-work benefits, family benefits, housing benefits, social assistance, unemployment insurance and unemployment assistance). Is it easier to justify UBI in such a setting? This is the question we address in this section.

Before we discuss this question, we need to justify our focus on Eq. (18). We do so in two steps.

First, we refer to the celebrated Atkinson-Stiglitz theorem (see Atkinson and Stiglitz, 1976). It states that provided preferences are separable in labor time and consumption, any utility profile that is implementable by using indirect taxation is also implementable if we restrict ourselves to direct (that is labor income) taxation. It implies that indirect taxation can be dispensed with if the goal is to maximize any social welfare function. Of course, in reality preferences are often not separable between labor time and consumption. Think, for example, of day care, the demand for which increases with labor supply. These goods are easily identified, though, and optimally taxing or subsidizing them is not too difficult. What is key for our purpose is that a corollary of the theorem is that funding a generous UBI through indirect taxation is not justified. The effect of the UBI reform on social welfare is much more transparent if we restrict ourselves to studying who should bear the financial cost of the reform. Of course, if pre-tax incomes are not well observed, with the consequence that it is fairer to tax consumption, then social welfare maximization may require to use indirect taxation. We do not address this question here.

Second, by restricting our attention to Eq. (18), we disregard capital-income taxation. The literature on capital-income taxation has made it clear that taxing capital income is justified when differences in capital income reveals differences in characteristics (such as wages) that call for different fiscal treatment, and when taxing capital income turns out to be less distortionary than taxing labor income because it decreases utility less or because it disincentivizes labor supply less. That is, capital income taxation is complementary to labor income taxation to maximize social welfare.

Now, the literature has studied the optimal tax in a framework where the total tax paid by an agent depends on both labor income and capital income. That is, total tax is computed according to a formula $\tau(y^g, rk)$, where $r$ is the interest rate at which agent with capital $k$ earns capital income. Note that in our notation, income $rk$ can be part or all of $m$.

In most countries, however, tax is computed using a formula $\tau^y(y^g) + \tau^z(rk)$, i.e., all agents with a given labor income pay the same labor income tax independently of their capital income. This is known to be suboptimal. Making UBI depend on net-of-tax capital income $rk - \tau^z(rk)$ consists then in introducing an asymmetry between those who benefit from the labor income redistribution system (i.e., those who have a negative $\tau(y^g)$), whose benefits would then depend on their capital income (so that we would have $y^n = y^g + rk - \tau(y^g, rk)$) and those who contribute to the system, whose contribution would be computed independently of their capital income (i.e., they would face a tax system represented by $y^n = y^g + rk - \tau^y(y^g) - \tau^z(rk)$).

Even if the current system is suboptimal, it is not obvious on which ethical grounds this asymmetry should be introduced. We therefore limit our analysis to the relevant case $y^n = y^g + rk - \tau^y(y^g) - \tau^z(rk)$ which means that the amount of UBI, that is $-\tau^y(0)$, does not depend on capital income. This does not prevent $\tau^y$ and $\tau^z$ from needing to be determined jointly so as to maximize social welfare, with the consequence that if the choice of a particular social welfare function recommends to set up a UBI system, it is legitimate to "fund" this UBI by taxes on capital incomes. In this review, however, we are only interested in the shape of $\tau^y$ on the lower tail of the labor income distribution and, consequently, we disregard all discussions about $\tau^z$ and we drop the superscript of $\tau^y$. When we look at the constraint that balancing the government budget imposes on the generosity of a UBI system below, we will focus on linear taxation and it will be convenient at that point to consider that both labor and capital income are taxed at the same rate.

## 5.1 Does no means-test mean that there is no phasing-out?

A popular interpretation of UBI is that it will change Eq. (18) into

$$y^n = b + y^g - \tau^*(y^g), \tag{19}$$

where $b$ is the UBI, that is everybody, from Serena Williams and Floyd Mayweather to Scarlett Johansson and George Clooney, would receive an additional income, $b$, and taxation simply needs to be adjusted from $\tau$ to $\tau^*$ so as to collect the necessary funds. To put it differently, universality is understood as meaning that there is no phasing out of UBI, everybody benefits from it.

We would like to begin this section by underlining that Eqs. (18) and (19) are perfectly equivalent, as can be seen by fixing

$$b = -\tau(0) \tag{20}$$
$$\tau^*(y) = \tau(y) - \tau(0). \tag{21}$$

Any labor income tax scheme that can be described as Eq. (18) is a UBI system.

What this implies is that the UBI proposal is not about everybody receiving an additional income, it is about making $-\tau(0)$ unconditional. Remember that unconditionality of UBI requires that it is not means tested, and, in particular, that it does not depend on the ability to earn income. That requires the following two characteristics of the new tax system, which, as we will see in the next section, are absent of all existing redistribution systems:

First, if employed agents earning $y^g > 0$ and consuming $y^n = y^g - \tau(y^g)$ decide to stop working, they are entitled to receive $-\tau(0)$ independently on their type $(\alpha, w)$.

Second, unemployed agents, benefitting from unemployment insurance, unemployment assistance or social assistance, are entitled to $-\tau(0)$ independently of whether they are ready to take a job, should one become available.

How this unconditionality can be practically implemented is an important but different issue. Will $b$ be transferred on a monthly basis from the social security budget to all agents before they earn any income (with employers paying $b$ back to the social security and not to the worker at the end of the month), will it rather be paid *ex post* yearly by the fiscal authorities after they observe all the $y^g$'s, or will agents earning less than $b$ have to apply to receive it monthly, these are difficult and important practical policy questions to think about. We do not raise these questions here. Rather, we focus on the consequences of UBI on the ex-post relationship between earning and disposable income.

## 5.2 Different consequences of removing conditionality

Most existing transfers to low-income agents are means tested. Following our definition of UBI in Section 2, we can distinguish between three levels at which transfers are conditional on means: they can be conditional on a low ability to earn income, on the lack of personal non-labor incomes, and/or on the lack of incomes of other households members. The first level of condition is typical of both unemployment benefits and social assistance. The second and third levels are more typical as social assistance, which is consistent with the fact that unemployment insurance is an individual insurance against the risk of loosing one's job and one's labor income, independently of other means of subsistence. Let us illustrate these conditionality schemes.

First, transfers to low-income individuals can be conditional on a low (or even zero) ability to earn income. Implementing this level of conditionality requires to screen, among the agents with very low incomes, those who have a low ability to earn income from those who have a low willingness to work. This screening is typically done by delegating to firms the evaluation of the employability of the candidates. Candidates are requested to look for jobs and they are considered as able to earn income as soon as one or several firms are ready to hire them. Countries differ in their ways of implementing this level of conditionality, but the general spirit is clear: if the likelihood that an individual could earn income by working but refuses to take available jobs, this individual is typically excluded from unemployment insurance or social assistance.

The wider heterogeneity has to do with the eligibility for this benefit of those who have voluntarily quit their jobs. A large number of countries, such as Canada, do not pay unemployment benefits in case of voluntary unemployment, with the number of legitimate reasons that justify a voluntary quit varying (see Langenbucher, 2015). Then there are countries on the other end of the spectrum, like Slovakia, who do not even examine the reason why the previous employment ended (see `http://ec.europa.eu/social/BlobServlet?docId=13773&langId=en`).

There is less heterogeneity in the condition that beneficiaries be looking for jobs and ready to take one when it is available. In fact, with the exception of Switzerland and Spain, all countries in Europe require a "willingness to work" for unemployment assistance schemes. Exceptions, such as those depending on the family situation, and what constitutes a "willingness to work," vary by country (see MISSOC Analysis, 2011).

Second, transfers to low-income individuals can be conditional on lack of personal non-labor incomes.

Third, transfers to low-income individuals can be conditional on the lack of incomes of other household members. In the Netherlands, for instance, the TW (which is the supplementary benefits act, which is part of their unemployment insurance scheme) provides assistance to people who get a benefit from one of the employee insurance schemes if their income *plus that of their partner* falls below the minimum guaranteed income. In Belgium, the level of benefit of unemployment insurance from year two on is adjusted according to how many earners there are in the household (see `http://www.oecd.org/els/soc/benefits-and-wages-country-specific-information.htm`).

What we would like to insist on in this section, though, is that the removal of the conditionality on ability to earn income would benefit all the current workers who would stop working if they could obtain social assistance unconditionally. How many of such workers would quit the labor force is a key element of a UBI reform and we come back on the difficulty to compute this number below. Let us note that in countries with imperfect labor markets, some workers quitting the labor force may have the additional effect of freeing some jobs that would be taken by current unemployed people, who would then be the second set of beneficiaries from UBI. That could considerably alleviate the financial burden of the reform.

The removal of the conditionality on the lack of incomes of other household

members is likely to have the largest effect. Indeed, large sets of people are currently out of the labor force but do not benefit from any social security or unemployment benefits. They are all the spouses who have chosen to concentrate on household production or on leisure because of the sufficiently large income earned by their partner. They are also all the students living with their parents or all the workers having taken unpaid leaves for education or leisure projects. If UBI consists of making taxes and transfers depend on individual situations and disregarding household conditions, then a gift to all these people will follow, which cannot simply correspond to an additional tax on the income of their partners (recall, however, that the maximization of social welfare requires to tax partners jointly, as proven, for instance by Kleven, Kreiner and Saez, 2009).

The presence of all those people who do not earn any labor income and do not receive any transfer from the redistribution system because they are not ready to take available jobs creates a clear trade-off between using UBI to alleviate poverty and computing taxes and transfers on a pre individual (as opposed to household) basis.

To sum up, all current unemployment insurance or social security systems in developed economics impose conditions on the beneficiaries, and these conditions, in spite of differences, all boil down to limiting eligibility to those who are ready to take jobs when they are available. Introducing UBI would be a clear departure from all existing systems, with the consequence that those who decide not to participate in the labor force, typically as the result of a rational decision at the household level, would suddenly be entitled to the basic income, and we believe this can be a major cost for social security budgets.

## 5.3 Interpersonal welfare comparison and heterogeneity of preferences

We studied in Section 4 the possible justification to UBI in a first-best world when social welfare is defined from the values of utility equalization among agents with the same preferences and no-redistribution among agents with the same wage. We saw that many social welfare functions could be derived from these ethical principles, among which some but very few could justify UBI. We study in this section whether it is easier to justify UBI in a second-best world.

As explained in the previous paragraph, social assistance and unemployment benefit in all OECD countries are awarded under the condition that beneficiaries are ready to take jobs whenever they become available. We have interpreted this condition as a screening device between the low-wage-high-willingness-to-work agents, who will not find jobs and the high-wage-low-willingness-to-work agents, who will find jobs (if properly monitored in their job search) and will then be excluded from social assistance or unemployment benefit if they refuse them.

Let us begin by assuming that such a screening device is not available. Then, given the information asymmetry between agents and the social planner, agents choose their labor time, and, therefore, their pre-tax income by taking Eq. (18) into account. This is the incentive-compatibility constraint. As a result, all the

agents who do not work consume bundle $(0, -\tau(0))$. Consequently, as soon as social welfare maximization leads to $-\tau(0) > 0$, UBI is optimal. Note that the basic assumption of the optimal labor income taxation literature is that no such screening device exists, with the consequence that, indeed, $-\tau(0) > 0$. UBI is therefore almost a direct consequence of the incentive compatibility constraint. Note that under these assumptions there is no difference between UBI and the negative income tax proposal of Friedman. However, such screening devices do exist and the important question is then: for which social welfare functions is it optimal not to use it?

When the screening among those who do not work between those who have a wage of zero and those who have a positive wage is possible, it is convenient to assume that wages are either zero or larger than a legal minimum wage $\underline{w}$ (see Atkinson, 1980). The tax system can then be described by a function $\tau$ describing the tax paid, as a function of their income, by those who have a positive wage $w \geq \underline{w}$, and $b$, the benefit allocated to the other agents, having $w = 0$.[7] Adapting Eq. (9), we can derive that all non-constrained agents having a type $(\alpha, w)$[8] such that

$$w\frac{1-\alpha}{\alpha} \leq \frac{-\tau(0)}{(1-\tau'(0))T} \tag{22}$$

prefer not to work (assuming a non-decreasing marginal tax rate on low incomes), where $\tau'(0)$ stands for the derivative of $\tau$ at income level 0, that is the marginal tax rate at the zero earning level.

Two important observations are worth making in this context.

First, we know from Section 4 that all social welfare functions built on $\tilde{w} = 0$ and $\tilde{\ell} = 0$ recommend to transfer the same amount of consumption to all agents who do not work. As this requirement does not conflict with the incentive compatibility constraint (low-wage agents do not need to separate themselves from low-willingness-to-work agents)), it is clear that these social welfare functions do recommend that $b = -\tau(0)$: social assistance takes the shape of a UBI.

Second, for all other values of the normative parameters, it cannot be optimal to impose $b = -\tau(0)$, because it would amount to imposing an additional constraint to the maximization problem, with the necessary consequence that social welfare would be lower. In all the cases in which $b \neq -\tau(0)$, which generally (but not necessarily) means that $b > -\tau(0)$, the optimal tax system can take the form of a UBI of $-\tau(0)$ transferred to all those who do not work, complemented with a conditional additional benefit of $b - (-\tau(0))$ for those who agree to go through the screening device (that is, to look for jobs) and whom no employer is ready to hire, thereby revealing a zero wage.

This proves that the optimal second-best taxation scheme can take one out of three possible forms:

[7] We could generalize this discussion to the case in which the constrained agents have wages in an interval $[0, \underline{\underline{w}}]$, with $\underline{\underline{w}} < \underline{w}$. We would then have to design a function $b : [0, \underline{\underline{w}}] \to \mathbb{R}$.

[8] Given that we do not study the optimal design of the tax on $m$ (for the reasons explained at the beginning of this section), we assume, for the sake of simplicity, that $m = 0$ for all agents.

The first form is a pure UBI system, replacing all other social assistance program: $b = -\tau(0) > 0$. It is optimal only when the social welfare function is built on the following values of the normative parameters: $\tilde{w} = 0$ and $\tilde{\ell} = 0$ and all values of $\tilde{\lambda}$.

The second form is an hybrid system in which a smaller UBI coexists with a conditional supplement, available only to those who have a zero wage, and this supplement implies the use of the screening device that is used in existing conditional social assistance systems: $b > -\tau(0) > 0$. Given the continuity of the rescaled utility functions with respect to the normative parameters, this is likely to be optimal for parameters in a neighborhood of $\tilde{w} = 0$ and $\tilde{\ell} = 0$ and for all values of $\tilde{\lambda}$. It covers therefore a much larger set of ethical stances.

The third form is a pure conditional system, in which only those who have a zero wage are eligible for social assistance: $b > -\tau(0) = 0$. This is optimal when the recommended transfer to those who could work but prefer not to work is not positive. This corresponds to the current systems.

Drawing the exact frontier, in terms of the values of the ethical parameters, between the second and the third forms requires computing the optimal tax scheme as a function of the social welfare function. This cannot be done analytically, but calibrated simulations such as the ones presented in Fleurbaey and Maniquet (2018) could be used to answer the question.

In conclusion, UBI is easier to justify in a second-best world. Indeed, a larger range of values of the normative parameters $\tilde{\lambda}$, $\tilde{w}$ and $\tilde{\ell}$ justify to treat all non-working agents identically. However, this identical treatment is optimal only if the choice is between allocating all of them the same amount or allocating a positive amount to zero-ability-to-work agents only. The easier system to justify, however, is an hybrid system in which a plausibly modest UBI is combined with a supplemental benefit conditional on a very low ability to earn income. In this case, UBI means that a certain amount of money is allocated to all non-working agents, independently of the reason why they do not work, but UBI does not mean that all agents who do not work are treated identically: a part of the transfers dedicated to non-working agents remains conditional on a zero-ability-to-work, and the same screening device as the one existing in current systems is used to discriminate among non-working agents.

## 5.4 Poverty reduction

In a first-best world, we saw in the previous section that fighting against poverty in the sense of guaranteeing all agents, including those who do not work, a minimal consumption, was a clear an almost immediate justification of UBI. It turns out that this simple justification is no longer true in a second-best world. Indeed, two main differences arise. They are both linked to the need to satisfy incentive constraints.

First, compared to the first best, many more agents will be tempted to stop working and benefit from UBI. Second, the taxation that is needed to transfer the UBI amount to all poor agents is distortionary. These two elements imply that

the consumption guarantee must be lower in second best than in first best.

All OECD countries turn out to have (conditional) income guarantees that are below the income poverty line (see Maniquet and Neumann, 2017, for a detail account of the difference between what we refer in this paper as $-\tau(0)$ and the income poverty line). If this income guarantee becomes unconditional, it is quite likely that the amount will decrease. As a result, it is plausible that the maximization of a universal income guarantee will not reach the income poverty line.

As a consequence, it is quite likely that poverty minimization does not lead to UBI. Models in which the minimal wage is strictly positive, such as Saez and Stantcheva (2016) and Maniquet and Neumann (2017), have studied the optimal labor income taxation when the objective is to minimize poverty while, at the same time, respecting preferences in the sense that poverty alleviation cannot take place at the cost of a decrease in the utility of the poor (Kanbur, Keen and Tuomala, 1994a and b, on the contrary, do not use preference-consistent criteria and obtain the result that low incomes should be so much taxed that poor agents would be forced to work a lot and earn an income above the poverty line). Even if they use different social welfare functions, both papers conclude that the highest subsidy should not be transferred to agents who do not work, that is, marginal income tax rates should be negative on low incomes. None of these two papers can conclude that the transfer to agents who do not work should be positive. If agents with zero wage and a screening device are added to the models studied in these papers, then a (possibly generous) positive transfer to these agents would be optimal (the $b$ of the previous subsection) but UBI would not necessarily prevail.

To sum up, poverty alleviation becomes more difficult to use as a justification of UBI in a second-best compared to a first-best world. This is true under the (plausible) assumption that guaranteeing a basic income equal to the poverty line is infeasible. As a result, minimizing poverty does not necessarily require to be generous to those who do not work and to treat them all identically. It may be optimal, on the contrary, to incentivize these agents to work, by applying negative marginal tax rates on very low incomes, so that they choose the labor time that allow them to obtain an after-tax income above or equal to the poverty line.

# 6 In a third-best world

In this section, we allow for imperfections in the tax and benefits system and examine the case for a UBI from a "third-best" point of view - namely, when not only there is possibility of various informational and incentive issues that arise on the side of beneficiaries but also on the side of those in charge of administering the tax and benefits system.

An argument often made in favour of a UBI is that it cuts administrative costs. In particular, it does not involve targeting and so avoids screening costs (inclusion and exclusion errors) as well as administrative costs (direct costs, inefficiencies of

various kinds including delays and waste, and corruption).[9] In an economy in which public agencies cannot be relied to deliver benefits to the targeted groups, due to corruption (or lack of accountability more broadly) or due to limited state capacity, there is a risk that those who need transfers most are at risk of being excluded from the benefits. In such a setting, the less there is scope for discretion, as in the case of any uniform and universal policy, the lower will be such risks. Accordingly, an egalitarian planner may prefer to divide the budget equally rather than ask public agencies to target. As we discussed earlier, if $y^g$ is perfectly observable, then any tax system $\tau$, such that $y^n = y^g - \tau(y)$ can be reinterpreted as a UBI system in which everybody receives a UBI equal to $-\tau(0)$ and pays $\tau(y) - \tau(0)$. In such a context, either there is a way to discriminate among these who do not earn any labor income based on their wage, or all proposals are but definitions UBI's and the debate is not interesting. If there is no way to discriminate but income itself (or more broadly, testing for any conditionality to qualify for some form of benefits) is noisily measured, is there a stronger case for UBI?

Let us consider an economy where income is not perfectly observed. Suppose the tax authorities observe a noisy signal about gross income $y^g$, $s$. With probability $p(y^g)$, $s = y^g$ where $p(y^g) \in [0,1]$ and $p(0) < 1$. With probability $1 - p(y^g)$ a completely uninformative signal $s = \varphi$ about $y^g$ is obtained, which has the same support as $y^g$ but is uniformly distributed.[10] For a given $y^g$, the signal $s$ can thus take two values $\{y^g, \varphi\}$ where $\varphi$ denotes a null or uninformative signal. If an uninformative signal is observed, no tax is collected since the level of income could be anything, from the lowest possible to the highest possible.

We ask the question: do we transfer $-\tau(0)$ only to those who have an observable $y^g = 0$ (or, less than some threshold level $\underline{y^g} > 0$) or do we transfer $-\tau(0)$ to all the agents for whom we do not observe $y^g$ and observe the uninformative signal? Or, do we transfer different amounts to those for whom a low $y^g$ is observed and to those whose incomes are unobservable as an uninformative signal is received. In this context, the desirability of UBI will depend on the degree of inequality aversion of the planner. In case the planner is infinitely inequality-averse, a UBI with the same amount to $y^g = 0$ and $y^g = \varphi$ will be optimal. Alternatively, when the noisiness of income measurement goes up, even with planners who are not very inequality-averse, UBI would be more and more attractive. After all, if $p(y^g) = 0$, the limit case where income cannot be measured at all, UBI is the only possible fiscal instrument for making a transfer that is available to the planner, although in this extreme case, it cannot be funded by direct income taxes and must be funded from other sources, such as indirect taxes.

Consider a variant of frictions in the tax and benefits system: suppose with probability $p(y^g)$, $s = y^g$ where $p(y^g) \in (0,1)$ and $p(0) < 1$ as before, but

[9] It is not that there are no administrative costs associated with cash transfers or that there is no potential for corruption. Also, for cash transfers to be feasible, a well-functioning financial infrastructure is necessary. This is often not the case in developing countries, though mobile banking is making a dent in the problem.

[10] This is the same formulation as in the model of supervision in Tirole (1986).

with probability $\sigma\{1-p(y^g)\}$, you measure a higher value of income $y^g(1+\delta)$ and with probability $(1-\sigma)\{1-p(y^g)\}$, you measure a lower value of income $y^g(1-\delta)$. A similar dilemma arises - unless $p(y^g)$ is high, or $\sigma$ and $\delta$ are small, there is a risk of denying benefits to a deserving beneficiary. A flat transfer does not have this problem, but of course, it is more expensive.

The solution to this problem can be less stark than posed above. The central government could tag regions based on characteristics that cannot be manipulated or monitored by these agencies (see Ravallion, 2018). In other words, UBI could be adjusted not just to prices but also spatially, depending on specific regional characteristics. Moreover, as a large literature on using various screening devices (such as workfare) points out (see Currie and Gahvari, 2008 for a recent review), one can make claiming benefits costly for the non-poor. To the extent these cannot be manipulated, these would ameliorate the stark trade off of no screening costs under a UBI but a larger bill than targeted scheme because it is universal.

# 7 On Some Positive Aspects of a Balanced Budget UBI Scheme

In this section, we take the basic income-lesiure choice framework introduced in section 4 and examine some positive implications of introducing a UBI scheme that is funded by an additional income tax. In particular, taking into account the effect of a UBI funded by additional taxes on the labor supply decision of both net recipients and net payees, we ask what factors will determine the size of the basic income.

## 7.1 Labor supply responses to UBI

What should be the amount of the UBI? Optimal tax theory does provide a formula for the optimal tax system. However, in the absence of estimation of labor supply elasticity under unconditionality of a UBI, optimal tax theory is silent about the magnitude of a feasible UBI. Compared to the existing tax and benefits system in developed economies, the introduction of UBI would make it attractive to stop working for some, because of the lack of conditionality, and in general, create incentives for working less, because of the additional taxes needed to finance the additional spending. Both factors go into the direction of reducing overall labor supply.

The main problem in figuring out the behavioral responses to the introduction of UBI is in estimating the number of people who would decide to leave the labor market when they have access to a basic income that is unconditional. Many attempts to estimate this number have been made, but they do not provide persuasive estimates. At least in the context of low and middle income countries, there is no systematic evidence of the effect of unconditional cash transfers on labor force participation or labor supply. For example, Banerjee et al. (2016) reanalyze the results of seven randomized controlled trials of government-run cash

transfer programmes from six countries worldwide to examine their impacts on labor supply. Across the seven programmes, they find no systematic evidence of impact on either the propensity to work or the overall number of hours worked, for either men or women. A similar conclusion is reached by Bastagli et al. (2016) who review evidence on the effects of cash transfers on individuals and households through a literature review from 2000 to 2015, covering 201 studies.

It would be fair to conclude though that these studies do not give us a sense of what would happen if UBI is introduced in a large scale in a developed or developing country (see Van Parijs and Vanderborght, 2017, for details on the limitations of the experiments).

First, these experiments tend to be small scale and are often not randomized and so we cannot draw conclusions for larger populations.

Second, in some experiments, the basic income was not really unconditional. It was limited in time, with the consequence that subjects knew they would have to go back to the labor market after the end of the experiment.

Third, and more importantly, in some experiments, subjects receive some additional income to what they currently get, and the experiment consists in looking at the effect of this increase (which is equivalent, in our model, to an increase in $m$) on their labor supply. These experiments miss the crucial point that the amount of the basic income is transferred only to those who do not work, and the labor income of those who continue working needs to be taxed more in order to balance the public budget. To present this drawback differently, we can say that experiments would be really valid only if a random sample of people is chosen, each of them is given the opportunity to stop working in exchange of the basic income, and the amount spent in basic incomes for those who stop working and those who did not work at the first place is paid by an increase in the labor income taxes of the other members of the sample.

In spite of the difficulty of estimating the behavioral responses to the introduction of UBI, we can provide a theoretical framework to think about the issues, which will throw some light when we compare developed and developing countries.

The model that we studied above from a normative viewpoint can also be used to illustrate the potential effects of UBI. To begin with notice that a combined package of a basic income and the increase in taxes that will be necessary to fund a UBI for the population will not affect the labor supply of two kinds of agents/households.

The first group of unaffected agents in our model is the group of very rich agents. We can see immediately that leisure is a normal good. As income grows, the consumption of leisure will go up for everyone, except for the very wealthy who were not working to start with. Indeed, for high levels of non-wage income there is a possibility of a corner solution, namely, it is possible that $\ell = T$. This would happen if

$$\frac{(1-\alpha)(wT+m)}{w} \geq T$$

or,

$$m \geq \frac{\alpha}{1-\alpha} wT.$$

This will occur when $m$ is relatively high with respect to $w$, namely, the marginal cost of not working is low, while overall income is high.

Slightly stretching the model, this case can be thought of as representing partners of spouses with higher incomes. If we agree to consider that $m$ in the model can stand for the labor income of a partner, then the model illustrates that spouses may prefer to stay home rather than participate in the labor force as a consequence of having a large wage spouse. Note, of course, that staying home may mean producing house goods, developing charitable or social activities as well as what is typically seen as leisure. In India, it seems that many women decide not to work for pay as a consequence of their spouse earning higher incomes. In particular, as Klasen and Pieters (2015) show, female labor force participation seems to be a decreasing function of husbands' incomes. For these households, an increase in the tax rates following the introduction of UBI is unlikely to affect the corner equilibrium of the household: wives will keep away from the labor market and husbands will continue working full time.

The second type of agents/households whose labor supply is likely to remain unaffected by UBI are the very poor. Now let us modify our simple set-up and introduce subsistence considerations. In particular, let the utility function take the Stone-Geary form

$$\begin{aligned} u(y,\ell) &= \alpha \log\left(y-\underline{y}\right)+(1-\alpha)\log\left(\ell+\underline{\ell}\right) \text{ for } y>\underline{y} \text{ and } \ell \geq 0 \\ &= -V, \text{ otherwise} \end{aligned}$$

where $\underline{y} \geq 0$, $\underline{\ell} \geq 0$, and $V$ is some large positive number, and $\underline{y}$ (resp., $\underline{\ell}$) represents the minimal level of consumption (resp., non-paid-labor time) required for subsistence. This formulation allows $\ell$ to take the value of 0 at an optimum, something that the Cobb-Douglas functional form does not permit.

Let us now turn to agents who are inframarginal. In the case of interior solutions we have:

$$\begin{aligned} \ell &= \frac{(1-\alpha)}{w}\left(wT+m-\underline{y}\right)+\alpha\underline{\ell} \\ L &= \alpha\left(T-\underline{\ell}\right)-(1-\alpha)\frac{m-\underline{y}}{w} \\ y &= \alpha\left\{w\left(T-\underline{\ell}\right)+m\right\}+(1-\alpha)\underline{y}. \end{aligned}$$

For $\ell \geq 0$ we need

$$wT+m \geq \underline{y}+\frac{\alpha}{1-\alpha}w\underline{\ell}.$$

Similarly, for $y > \underline{y}$ we need

$$wT+m > \underline{y}-w\underline{\ell}.$$

The first condition is more strict than the second. Therefore if

$$\underline{y}-w\underline{\ell} < wT+m < \underline{y}+\frac{\alpha}{1-\alpha}w\underline{\ell}$$

then we have a corner solution with $\ell = 0$ and

$$y = wT + m.$$

This needs to be greater than $\underline{y}$ for the subsistence constraint to be met for income (which means it also satisfies the condition $wT + m \geq \underline{y} - w\underline{\ell}$ that applies for interior solutions). If $wT + m < \underline{y}$ then there is no solution to the optimization problem that satisfies both the budget constraint and the subsistence constraint and whatever is the choice, the individual receives a payoff of $-V$. For simplicity we assume the individual continues to choose $\ell = 0$ and $y = wT + m$.

Using the notation $z$ to denote full income and defining $\overline{z} \equiv \underline{y} - \frac{\alpha}{1-\alpha} w\underline{\ell} + \frac{1}{1-\alpha} wT$, we can sum up the above analysis as:

$$\begin{aligned} y &= z \text{ for } 0 \leq z \leq \underline{y} + \frac{\alpha}{1-\alpha} w\underline{\ell} \\ &= \alpha z + (1-\alpha)\underline{y} - \alpha\underline{\ell} \text{ for } z \in \left[\underline{y} + \frac{\alpha}{1-\alpha} w\underline{\ell}, \overline{z}\right] \\ &= m \text{ for } z \geq \overline{z} \end{aligned}$$

and

$$\begin{aligned} \ell &= 0 \text{ for } 0 \leq z \leq \underline{y} + \frac{\alpha}{1-\alpha} w\underline{\ell} \\ &= (1-\alpha)\frac{z}{w} - (1-\alpha)\frac{1}{w}\underline{y} + \alpha\underline{\ell} \text{ for } z \in \left[\underline{y} + \frac{\alpha}{1-\alpha} w\underline{\ell}, \overline{z}\right] \\ &= T \text{ for } z \geq \overline{z}. \end{aligned}$$

We assume $\underline{\ell} < \frac{1}{2\alpha} T$ and so $\overline{z} > \underline{y} + \frac{\alpha}{1-\alpha} w\underline{\ell}$.

The take away from this exercise is that in situations where income levels are so low that subsistence considerations are important (i.e., $w$ and $m$ are low relative to $\underline{y}$ and $\underline{\ell}$) a good proportion of the population will be working very hard with $\ell = 0$. For them, a UBI that is not large in size may not have any effect on the labor supply. It should also be noted that for those who are below the level of subsistence (namely, $wT + m < \underline{y}$) the utility gains from a UBI that pushes them above the subsistence level is high.

To sum up, even with the classical model of the labor supply there are some theoretical reasons to think that the potential disincentive effect of a UBI on labor supply is more likely to be an issue in developed economies in which the labor market is formal and all the workers are paying taxes and are sensitive to tax rates and where the labor supply of second earners is somewhat elastic in contrast to developing economies in which only a small fraction of income earners face direct taxation, the labor supply of very poor people is determined by subsistence considerations, and the labor force participation of wives of men who are not poor is rather inelastic. There are additional channels to this simple framework such as missing markets, price effects from conditions attached to transfers, and dynamic and general equilibrium effects that would tend to reinforce this general conclusion in the context of low and middle income countries.[11]

[11] See Baird, McKenzie, and Özler (2018) and Ghatak (2015) for a discussion of some of these mechanisms.

## 7.2 How generous UBI can be?

We have insisted in the previous subsection that introducing UBI and increasing the tax needed to finance it is likely to have limited labor supply responses from two subsets of the population, the very rich and the very poor. For those who will be affected, though, it is quite likely that their labor supply will decrease. First, the redistribution associated with the basic income and its funding increases the income and some and decreases the income of others, so that the sum of the income effects is likely to be low, and, second, the most important effect is an increase in the tax rates facing all agents, with an unambiguous substitution effect leading to a decrease in the labor supply. This has drastic consequences on the level of the basic income that an economy can afford. We illustrate the major trade-offs related to this issue here, first in the case of a linear income tax system, and then in the case of a non-linear tax.

Let us go back to the model without subsistence considerations. Then the revised optimization problem is:

$$u\left(y^n, \ell\right) = \alpha \log y^n + (1-\alpha) \log \ell$$

subject to

$$y^n = b + \left\{w\left(T - \ell\right) + m\right\}\left(1 - t\right),$$

where $b$ is the basic income and $t$ the linear tax rate that applies to all incomes, labor income $w\left(T-\ell\right)$ and other income $m$. With $b = 0$ and $t = 0$ we have the benchmark model. Therefore, we have the same first-order conditions adjusting for the new budget constraint under a UBI scheme:

$$\ell = \frac{(1-\alpha)}{w\left(1-t\right)}\left\{b + \left(1-t\right)\left(wT + m\right)\right\} \tag{23}$$

$$L = \alpha T - \frac{(1-\alpha)}{w\left(1-t\right)}\left\{b + \left(1-t\right)m\right\} \tag{24}$$

$$y^n = \alpha\left\{b + \left(1-t\right)\left(wT + m\right)\right\}. \tag{25}$$

Given $y^n$, we can solve for

$$\begin{aligned} y^g &= \frac{y^n - b}{1-t} \\ &= \alpha\left(wT + m\right) - \frac{(1-\alpha)b}{1-t} \end{aligned}$$

Using the notation of $z$ we can write:

$$y^n = \alpha\left\{b + \left(1-t\right)z\right\} \tag{26}$$

$$y^g = \alpha z - \frac{(1-\alpha)b}{1-t}. \tag{27}$$

Observe that $\alpha z$ is the value of gross income in the absence of basic income and taxation. When the latter are implemented, the income effect associated to

receiving $b$ and the income and substitution effects associated to being taxed affect labor supply and gross income in the same direction and this is captured by the second term of the left-hand side of the above equation.

For the sake of simplicity, we can assume away the heterogeneity in preferences. We also assume that total available time, $T$, is the same for everyone. Each individual is then characterized by a pair $(m, w)$. Let the joint distribution of $m$ and $w$ in the population be denoted by the probability density function $f(m, w)$. Without loss of generality, we assume $w \in (0, \infty)$ and $m \in (0, \infty)$.

Let the associated cumulative distribution function be $F(m, w)$. Given that full income $z = wT + m$ is a linear function of $m$ and $w$, we can derive the distribution of $z$ across individuals in the population from $f(m, w)$ (even when $m$ and $w$ are not independently distributed).[12] In particular, we have:

$$G(z) = P(wT + m \leq z) = \int_0^{\infty} \left[ \int_{wT}^{z} f(u - wT, w)\, du \right] dw$$

and

$$g(z) = \int_0^{\infty} \left[ f(z - wT, w)\, dw \right].$$

Henceforth we work with the pdf and CDF of $z$, defined over $z \in (0, \infty)$, $g(z)$ and $G(z)$ respectively.

Let us define average full income as:

$$\tilde{z} \equiv \int_0^{\infty} z g(z)\, dz.$$

Since both gross and net incomes are functions of $z$, this allows us to derive the personal (as opposed to functional) distribution of net and gross incomes from the personal distribution of full income.

For the budget to be balanced on aggregate, we must have

$$t \int_0^{\infty} y^g(z) g(z)\, dz = b. \tag{28}$$

Let us define average gross income as:

$$\tilde{y}^g \equiv \int_0^{\infty} y^g(z) g(z)\, dz.$$

We can derive $\tilde{y}^g$ as a function of $\tilde{z}$, using Eq. (27):

$$\begin{aligned} \tilde{y}^g &= \int_0^{\infty} \left\{ \alpha z - \frac{(1-\alpha)b}{1-t} \right\} g(z)\, dz \\ &= \alpha \tilde{z} - \frac{(1-\alpha)b}{1-t}. \end{aligned}$$

[12] See the appendix for details.

Analogously, we can define average net income as:

$$\tilde{y}^n \equiv \int_0^\infty y^n(z) g(z)\, dz.$$

We can derive $\tilde{y}^n$ as a function of $\tilde{z}$, using Eq. (26):

$$\begin{aligned} \tilde{y}^n &= \int_0^\infty \alpha \{b + (1-t) z\} g(z)\, dz \\ &= \alpha \{b + (1-t) \tilde{z}\}. \end{aligned}$$

The fact that gross and net incomes are linear functions of full income is a consequence of our assumption that preferences are of the Cobb-Douglas type. As we will see below, this simplifying assumption will allow us to give the explicit form to some key variables.

Substituting the expression for $\tilde{y}^g$ in the budget balance Eq. (28) condition above and solving we get

$$b = \tilde{z} \frac{\alpha t (1-t)}{(1-\alpha t)}. \tag{29}$$

An obvious implication of this expression is, the higher the average income of a country, the easier it is to fund a basic income scheme so long as $b$ does not rise proportionally with average income. A recent report by the IMF (2017) provides a calculation of the fiscal cost of a UBI as percentage of GDP when the basic income is set at 25% of the per capita *median* income. Interestingly, to the extent richer countries have less inequality, the ratio of median to mean income would be less, and the fiscal cost of a UBI would be less. Indeed that is what the calculations that are provided tend to suggest, with figures for the USA and UK being 6.4 and 6.7% while that of Mexico is 3.7% and South Africa is 2.3%. In this context, however, we have to keep in mind that the fiscal capacity of poorer countries is more limited and so despite these calculations, raising the relevant tax revenue could be much harder (see Ghatak, 2017).

A lot of debate about UBI concerns what is the appropriate level of $b$. Clearly it cannot be the same absolute level (even controlling for purchasing power) across countries that have different levels of average income since standard of living changes with the level of prosperity. What our argument suggests is so long $b$ does not increase proportionally with average income levels, it is easier to fund the richer is the country.

The formula for basic income in (29) gives an aggregate trade-off between $b$ and $t$ given the need for budget balance, the formula of the so-called Laffer curve. Again, the fact that it only depends on the average full income and not on its distribution is particular and follows from our choice of Cobb-Douglas type of preferences.

The first question that Eq. (29) allows us to raise is that of the largest possible level of $b$. Differentiating (29) and rearranging, we get that $b$ is maximized whenever

$$\frac{\alpha t^2 - 2t + 1}{(1-\alpha t)^2} = 0, \tag{30}$$

which gives us

$$t = \frac{1 - \sqrt{1-\alpha}}{\alpha}. \tag{31}$$

If, for instance, $\alpha = 0.5$ (which means that individuals like to spend half of their full income in consumption and devote the other half to their leisure), then the income tax rate that maximizes the basic income is equal to 58.58%. Taxing income at a higher rate would be detrimental for everybody in the economy.

Eq. (31) also teaches us that the largest $t$ compatible with efficiency is an increasing function of $\alpha$. This comes from the fact that a larger $\alpha$ is associated with a lower elasticity of the labor supply.[13] If we take Eq. (29) and we fix the average gross income in the absence of taxation, $\alpha\tilde{z}$, we see that $b$ is an increasing function of $\alpha$: if individuals become more sensitive to taxation (a lower $\alpha$ for a fixed $\alpha\tilde{z}$), then the same tax rate $t$ leads to a lower UBI.

All tax rates between zero and $\frac{1-\sqrt{1-\alpha}}{\alpha}$ lead to more or less generous basic incomes, and some agents, typically the poorer, gain from an increase in $t$, whereas the others lose. The second question that Eq. (29) allows us to raise is the preferred tax rate of the average agents, the ones with full income $\tilde{z}$. Remember that several types of agents $(m, w)$ have full income $\tilde{z}$. We know from Eq. (27) that the gross income of each individual decreases as $t$ increases, and so does the gross income of the average agents. As the average agents are precisely those whose net income is equal to their gross income, we can easily deduce that their net income also decreases with higher $t$. What is unclear, though, is the effect of $t$ on their utility. Indeed, the decrease in net income goes together with a decrease in labor time, and the total effect on utility is unclear.

Indirect utility of an agent with full income $\tilde{z}$ and wage $w$ is given by

$$v(w, \tilde{z}; \alpha) = \Gamma(\alpha) + \log(b + (1-t)\tilde{z}) - (1-\alpha)\log(w(1-t)). \tag{32}$$

where $\Gamma(\alpha) = \alpha\log\alpha + (1-\alpha)\log(1-\alpha)$. Taking the value of $b$ in Eq. (29) into account and rearranging, we get

$$v(w, \tilde{z}; \alpha) = \Gamma(\alpha) + \log\tilde{z} - (1-\alpha)\log w + \log\frac{(1-t)^{\alpha}}{1-\alpha t}, \tag{33}$$

so that the sign of the derivative of the indirect utility $v(w, \tilde{z}; \alpha)$ with respect to the tax rate boils down to the sign of the derivative of $\frac{(1-t)^{\alpha}}{1-\alpha t}$ with respect to $t$, that is, the sign of:

$$\frac{\alpha(1-t)^{\alpha-1}}{(1-\alpha t)^2}(t(\alpha-1)). \tag{34}$$

This is negative because $\alpha < 1$. This proves that the average full income individual always prefers a lower tax rate, independently of whether her full income is large because of her wage or because of her non-labor income.

[13] The (uncompensated) elasticity of the labor supply, $\frac{\partial L}{\partial w}\frac{w}{L}$ can be computed from Eq. (23) and it is equal to $\epsilon_{Lw} = \frac{1-\alpha}{\gamma\alpha-(1-\alpha)}$, where $\gamma = \frac{w(1-t)T}{b+(1-t)m}$ and it is decreasing in $\alpha$: $\frac{\partial\epsilon_{Lw}}{\partial\alpha} = \frac{-\gamma}{(\gamma\alpha-(1-\alpha))^2}$.

Income distributions are always skewed, so that median income is typically smaller than average income. The result above is independent of the distribution of incomes, which means that the median income may be arbitrarily close to the average one, with the consequence that the median individual would also prefer a lower tax rate. That illustrates the fact that there is no guarantee that a majority of people would benefit from UBI, should it be financed by a linear tax, as proven by Romer (1975), who pioneered the study of voting on the labor income tax when behavioral responses are taken into account.[14]

If labor income tax is allowed to be non-linear, and if the planner wishes to implement a generous UBI, what should be the shape of the tax system (see Boadway and Jacquet (2008) for a recent and comprehensive treatment of this question)? There is a consensus in the literature to say that the optimal non-linear tax should be convex, at least on low incomes, which means that individuals earning very low incomes should face higher marginal income tax rates. The intuition of this result is reasonably simple. With the basic income becoming larger and larger, the amount of tax that needs to be collected increases. That requires an increase in the average tax rates. In order not to deter high wage individuals from working hard, this increase in the average tax rates should be accompanied as much as possible by low *marginal* tax rates on large incomes. This is accomplished by having large marginal tax rates on low incomes, thereby increasing the average tax rates on the whole income distribution (remember that the average tax rate at a point in the distribution is determined by the integral of all the marginal tax rates below that point), with the drawback that it deters *low* wage individuals from working, followed by lower marginal tax rates on larger incomes, so that very productive individuals continue to work and a sufficiently large amount of tax is collected.

The main lesson of this subsection is that the amount of UBI and the labor income tax system that needs to be designed to finance it depend in a strong way on the behavioral responses of the tax payers. The simple linear tax example above has shown that there is a maximal feasible amount of UBI and a maximal rate of taxation beyond which everybody looses. The example has also illustrated the result that even if low income earners necessarily benefit from an increase in UBI when it is financed by a linear tax, a majority of individuals may strictly prefer a lower tax and a lower UBI. Finally, a quick look at the optimal non-linear taxation literature has shown that the optimal way of financing UBI was typically not through a linear tax but a convex one, in which low income earners face higher marginal tax rates. This is likely to even decrease the set of individuals benefitting from UBI.

The arguments in this subsection are mainly valid for economies in which all individuals either earn income and pay tax or do not earn income and then receive unemployment benefits or social assistance conditionally on being ready to work in case these benefits are conditional or independently of any condition in case

[14] Romer also studies the case in which part of the tax return goes to financing fixed government spendings, in which case the preferred tax rate of the median voter is even lower than in the pure redistributive case that we study here.

of UBI. Developing economies, on the contrary, are characterized by a low rate of income tax payers and a low rate of social assistance beneficiaries. We have also shown in the previous subsection that the effect of UBI and its financing on the labor supply is likely to be modest in such economies. It is therefore time to quit the second-best world and, instead, assume that institutions in charge of redistributing incomes and protecting the poor do not work perfectly well.

## 7.3 Inequality and Tax Revenue for UBI with Frictions in the Tax System

Now we turn to a different issue in the setting where there is noisiness in measuring income and so a first or second-best tax and benefits system cannot be implemented without inclusion and exclusion errors. We ask a question related to fiscal resources: if economies differ in terms of both the extent to which the administrative capacity is subject to frictions, as well as the distribution of income, under what circumstances a UBI scheme can provide the same amount of benefits with lower taxes, or higher benefits for the same amount of taxes.

For the budget to be balanced on aggregate for a UBI scheme, the modified condition is:

$$t\int_0^{\infty} y^g(z)p\left(y^g(z)\right)g\left(z\right)dz = b.$$

If $p\left(y^g\right) = p$ for all $y^g$ then

$$tp\tilde{y}^g = b$$

where $\tilde{y}^g = \frac{\alpha}{\alpha+\beta}\tilde{z} - \frac{\beta}{\alpha+\beta}\frac{b}{1-t}$. Therefore, the tax rate has to be higher to fund the same $b$ compared to an economy where income is measured accurately.

Let $\underline{y}$ and $\overline{y}$ be the lowest and highest value of gross income in the economy, corresponding to $\underline{z}$ and $\overline{z}$, the lowest and highest possible values of true income. Also, let us define $\phi\left(z\right) \equiv y\left(z\right)p\left(y\left(z\right)\right)$.

To consider more interesting possibilities, suppose $y^g p\left(y^g\right)$ is increasing in $y^g$ - that is, as true income goes up, the expected value of the signal of income also goes up. As $y^g p\left(y^g\right)$ is assumed to be increasing, a shift in the distribution of income in the sense of first-order stochastic dominance (FOSD) will raise more revenue and so a lower $t$ will be needed to fund a given $b$. This means, other things constant, it is easier to fund the same level of UBI in richer countries, and also, comparing two countries with the same distribution of income, if the overall tax enforcement improves, i.e., the function $p\left(y^g\right)$ shifts out.

More interestingly, suppose we compare two economies where the mean value of $y^g p\left(y^g\right)$ is constant but one of them has more inequality in the sense of second-order stochastic dominance. If $y^g p\left(y^g\right)$ is concave (which means, in the case where $p\left(y^g\right)$ is differentiable, $y^g p''\left(y^g\right) + 2p'\left(y^g\right) < 0$) the more unequal economy will yield lower tax revenue on average. Symmetrically, if $y^g p\left(y^g\right)$ is convex, the more unequal economy will yield higher tax revenue on average. The curvature of $y^g p\left(y^g\right)$ reflects whether, as $y^g$ increases, marginally it is easier or more difficult to conceal income. If $y^g p\left(y^g\right)$ is increasing but concave that means as true income

increases, reported income increases but not proportionally. This may be relevant in developing countries where the fiscal capacity of the state is limited and the rich may be better able to hide income. Now consider the effect of increasing inequality of the income distribution. Earlier we saw that with perfect observability of income, only the average income level matters for how much $b$ can be funded with a given tax rate $t$. But now suppose there is a shift of $g(z)$ in the sense of second-order stochastic dominance. In that case, the less unequal economy will have a higher value of $\int_{\underline{z}}^{\overline{z}} \phi(z) g(z) dz$ and so a lower $t$ will be needed to fund a given $b$.

The reverse will hold when $y^g p(y^g)$ is increasing and strictly convex. Now if there is a shift of $g(z)$ in the sense of second-order stochastic dominance, the more unequal economy will have a higher value of $\int_{\underline{z}}^{\overline{z}} \phi(z) g(z) dz$ and so a lower $t$ will be needed to fund a given $b$. We can think of convexity of $y^g p(y^g)$ as the case where the richer people find it harder to evade taxes. In other words, the curvature of $y^g p(y^g)$ is a measure of progressivity of tax enforcement. What this implies is, with good tax enforcement greater inequality raises greater revenue for a UBI while the opposite holds for bad tax enforcement. Actually, if we compare two economies just in terms of second-order stochastic dominance, the effect of inequality on tax collection depends only on the curvature of $y^g p(y^g)$ and not its slope and therefore, the same conclusions apply when $y^g p(y^g)$ is not monotonically increasing.

We summarize our main conclusion as : when income is noisily measured, this tightens the fiscal budget constraint for funding a UBI-scheme. However, if tax enforcement is progressive then greater inequality in the distribution of income relaxes the fiscal budget constraint, while the opposite holds if tax enforcement is not progressive.

# 8 Conclusion

We conclude by making a few points to take away from the debate between UBI and other forms of welfare programmes.

First, one size does not fit all. Indeed, UBI does not look like the proposal that all egalitarian planners should wish to implement. There are many egalitarian social welfare functions that do not call for closing one's eyes on the reason why people have low incomes. Moreover, we should be open to the possibility that different policies could work well in different contexts. Cash transfers only make sense if you have ready access to markets, which is not true if you live in remote rural areas in which we have to rely on in-kind transfers. In a study of a bicycle scheme for school children in Bihar (Ghatak, Kumar, and Mitra, 2016), it was found that those living in remote areas do in fact prefer in-kind to cash transfers, with the opposite holding for those who live in urban areas. Muralidharan, Niehaus, and Sukhantkar (2017) in their study of cash transfers replacing food-ration entitlements for the poor, called the Direct Benefit Transfer (DBT) programme, found that costs varied across beneficiaries depending on access to

banking.

Second, among the normative values that may be called for to justify redistribution policies, poverty alleviation seems to be the ultimate value to justify UBI. That suggests first to compare UBI with other programs dedicated to the poor. That also suggests that UBI might be more appropriate in poor countries, especially those in which UBI could help circumvent the imperfections of government institutions in charge of helping the poor.

Third, we do not see any reason why guaranteeing a universal basic income and, through it, a universal minimal consumption, should be coupled with the crowding-out of any other social policies. Complementing UBI with other, conditional income support policies have all reasons to be better than UBI alone.

Fourth, we should consider giving choice to beneficiaries: instead of policymakers deciding between the form of transfer beneficiaries should be given the choice. Mobile banking and digital IDs enable portability of benefits for many in-kind transfers and subsidies and so such an approach should be feasible. A recent study on cash transfers replacing food rations in India (Muralidharan, Niehaus, Sukhantkar, 2017) finds that over time, as logistical problems are sorted out and people adapt to the new system, the acceptability of cash transfers replacing in-kind transfers to beneficiaries goes up.

Finally, we should recognize there is no magic pill that will cure all problems. Different policies are needed to address different problems. So yes, a UBI or a cash transfer will provide some relief to the poor, but will not provide a long-term solution to the problem of poverty. For that one needs investment in health, education, and skill formation to enable the poor to take advantage of growth opportunities, and investing in infrastructure and regulatory conditions to facilitate private investment for employment generation. Therefore, even if unconditional cash transfers are generally accepted to be better than in-kind transfers, that does not mean that the entire budget of poverty alleviation should be devoted to transferring money.

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