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Abstract

Using microsimulations this paper analyzes the poverty and tax implications of replacing current transfers and subsidies by a budget-neutral (no change in the fiscal deficit) universal basic income program (UBI) in Brazil, Chile, India, Russia, and South Africa. We consider three UBI transfers with increasing levels of generosity and identify scenarios in which the poor are no worse off than in the baseline scenario of existing social transfers. We find that for poverty levels not to increase under a UBI reform, the level of spending must increase substantially with respect to the baseline. Accordingly, the required increase in tax burdens is high throughout. In our five countries and scenarios, the least increase in taxes required to avoid poverty to be higher than in the baseline is around 25% (Brazil and Chile). Even at this lower rate, political resistance and efficiency costscould limit the feasibility of a UBI reform.

Keyword: Universal basic income, microsimulation, inequality, poverty, tax incidence

JEL Cassification: H22, H31, H55, I32, D63

Universal Basic Income Programs: How Much Would Taxes Need to Rise? Evidence for Brazil, Chile, India, Russia, and South Africa[1]

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Abstract

Using microsimulations this paper analyzes the poverty and tax implications of replacing current transfers and subsidies by a budget-neutral (no change in the fiscal deficit) universal basic income program (UBI) in Brazil, Chile, India, Russia, and South Africa. We consider three UBI transfers with increasing levels of generosity and identify scenarios in which the poor are no worse off than in the baseline scenario of existing social transfers. We find that for poverty levels not to increase under a UBI reform, the level of spending must increase substantially with respect to the baseline. Accordingly, the required increase in tax burdens is high throughout. In our five countries and scenarios, the least increase in taxes required to avoid poverty to be higher than in the baseline is around 25% (Brazil and Chile). Even at this lower rate, political resistance and efficiency costs could limit the feasibility of a UBI reform.

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1. Introduction

Using microsimulations this paper analyzes the trade-offs between the generosity of a budget-neutral (no change in the fiscal deficit) universal basic income (UBI) and the implied tax burden in five emerging countries: Brazil, Chile, India, Russia, and South Africa. A UBI is often seen as an attractive policy option because, in theory, it can provide a broad-based safety net for income-earning related contingencies, avoid errors of exclusion frequently observed in targeted programs, eliminate issues of stigma, entail administrative simplicity, and ensure more political buy-in because everybody could potentially receive a (net) benefit. Another potential advantage is that, in the face of an income shock, a UBI can provide an income floor to individuals regardless of whether they are employed in the formal or informal sectors or not employed at all (Gentilini et.al, 2019). Thus, a UBI can provide a consumption-smoothing mechanism in contexts where credit and insurance markets are imperfect.[3]

While UBI programs have advantages, their costs are larger than targeted transfers; hence to evaluate their impacts a detailed incidence analysis that takes into account both the spending and required increase in taxation is necessary. Moreover, if the main objective of transfer programs is poverty reduction one should consider UBI transfers that are generous enough to maintain or exceed the poverty impacts of existing social transfers, as the poor should not be worse off than under the existing transfer programs. If the aim is to both reduce poverty *and* create a social protection floor, then the generosity of a universal transfer program should be even higher, to allow pre-UBI poor households to live out of (extreme) poverty.

To the extent that a budget neutral UBI program requires an increase in taxes, its benefit needs to be calculated net of the loss due to higher taxation. If the bulk of higher taxation were to come from taxes on consumption, for example, poor people may end up losing from a UBI reform. Overall, a UBI would need to be sufficiently generous and financed in such a way that the welfare of the poor is higher in the post-UBI scenario after the additional taxes and spending cuts (from programs replaced by the UBI) are taken into consideration. However, to achieve the latter may be quite expensive and come at significant efficiency costs. As Salanie (2011) puts it: "If such a reform [a UBI] were adopted, part of the middle classes would face an increased marginal tax rate, which would discourage its labor supply—not to mention the political difficulties this would entail."[4] In fact, when Daruich & Fernández (2020) model the implications of a UBI equal to the poverty line in an intertemporal general equilibrium framework, they find that "the higher tax rate required to finance this policy reduces investment in skills, lowers the share of agents with college education, and decreases saving, requiring even higher taxes over time. (p. 2)."[5] Thus, there is a trade-off between efficiency and the size of the universal basic income floor: the higher the floor,

[3] UBI programs are also consistent with welfarist (Fair, 1971; Mirrlees, 1971) and non-welfarist optimal tax theory (see Kanbur et.al, 2018; Kanbur et.al, 2006) which in the derivation of the optimal tax schedule assume that redistribution will take place through lumpsum uniform transfers. For a survey of the optimal tax theory, see, for example, (Tuomala, 1990).
[4] Salanie (2011): paragraph 19 in section 9.3.1 "The Negative Income Tax".
[5] Their results occur regardless of whether the additional tax comes from a progressive income tax or a neutral (flat) tax on consumption.

the larger the potential losses in efficiency due to the increase in tax burden but the lower the floor, the smaller the ability of a UBI to reduce poverty and act as a genuine safety net.[6]

The main objective of this paper is to study the potential trade-off between the generosity—hence, the poverty impact— of a UBI and the concomitant tax burden in five countries with diverse government sizes and characteristics of their welfare system: Brazil, Chile, India, Russia, and South Africa.[7] We simulate the first-round effects on post-UBI incomes and tax burdens that result from replacing the existing social assistance cash transfers and consumption subsidies by alternative UBI scenarios in a budget-neutral form.[8] To moderate the required increase in tax burden, we assume in the simulations that both current social transfer programs *and* consumption subsidies are replaced by the UBI, and that the funds from both are reallocated to the UBI program.[9]

Our microsimulations use household surveys and administrative information housed in the World Bank's Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE) and the fiscal incidence of taxes and consumption subsidies by decile available in the Commitment to Equity Data Center on Fiscal Redistribution (CEQ Data Center). An advantage of using the data in the CEQ Data Center is that the studies were produced using a common methodological framework described in (Lustig, 2018).

We start by reporting inequality and poverty in the "baseline scenario:" that is, in the existing transfer and fiscal system. We then simulate a "spending neutral" UBI reform. Specifically, we take the current levels of spending on direct transfers and consumption subsidies and reallocate them to all the population with everyone receiving the same amount. It should be noted, however, that a budget neutral spending neutral scenario may still require a change in taxes because gross incomes change when a UBI replaces current transfers and subsidies since, in our simulations, the amount of taxes paid depends on the applicable tax rates on corresponding incomes (gross income or disposable income, as explained below).[10] The next scenario is the "poverty gap" scenario. Here too the UBI replaces existing transfers and consumption subsidies but the size of the universal transfer is set equal to the average poverty gap measured with prefiscal income (i.e., income before taxes and transfers). Taxes are adjusted accordingly to ensure budget neutrality. We also consider a scenario in between the spending neutral and the poverty gap scenarios: the "equivalent benefit"

[6] In their article on UBI in advanced countries, Hoynes & Rothstein (2019) find that "...A UBI would direct much larger shares of transfers to childless, non-elderly, non-disabled households than existing programs, and much more to middle-income rather than poor households. A UBI large enough to increase transfers to low-income families would be enormously expensive. (page 6)."

[7] The reference years and data sources are in Table 2. The classification of countries by category of gross national income per capita in 2011 purchasing power parity is based on World Bank thresholds; see https://datahelpdesk.worldbank.org/knowledgebase/ articles/906519-world-bank-country-and-lending-groups. Russia is classified as a high-income country because that is how it was classified in 2016, the data collection year of the survey for which the analysis presented here was conducted.

[8] Budget neutrality includes the automatic change in direct and indirect taxes that results from changes in gross incomes and expenditures as a result of changes in direct transfers.

[9] In contrast, Rigolini, et.al, (2019) did not consider subsidies as a source of financing nor impose strict budget neutrality.

[10] For example, if the tax rate on gross income of two individuals are 10% and 20% respectively, transferring one dollar from the second to the first person would *mechanically* result in a reduction of $0.10 in total taxes. Budget neutrality requires that we increase tax rates to compensate for this reduction.

scenario. In this scenario, the UBI also replaces existing transfers and subsidies but the level of the universal transfer is set equal to total spending on transfers and subsidies divided by total beneficiaries of at least one of the existing transfer programs. Again, we achieve budget neutrality through adjusting taxes.

Our simulations consider two broad tax options: direct taxes on personal incomes and indirect taxes on consumption (VAT, excise and sales taxes, etc.). In total, we consider therefore seven scenarios: the baseline and two for each of the spending neutral, equivalent benefits, and poverty gap scenarios depending on whether budget neutrality is attained through direct or indirect taxes.[11] Note that the concentration shares of taxes change mechanically from one scenario to another because of the change in the size of UBI. However, in each scenario we make sure that the adjustment to the direct or indirect taxes to achieve budget neutrality does not introduce any additional change to the concentration shares. This additional adjustment is proportional, through an identical percentage change in the corresponding tax rates for each scenario.[12]

The welfare concept used in our analysis is income per person after both direct *and* indirect taxes net of cash transfers and subsidies.[13] In the literature, this income concept is known as *consumable income*. While data on inequality and poverty is usually reported for *disposable income* (income after direct taxes net of cash transfers), we consider consumable income the relevant welfare concept because it captures what people are really able to consume after one takes into account what they pay in consumption taxes and receive in the form of consumption subsidies when they use their disposable income to make purchases.[14] For the poverty impact, we used the World Bank Income Class International Poverty Lines, which vary by countries' income levels. In addition, we measure not only the incidence of poverty (headcount ratio) but its severity: that is, we use the squared poverty gap index which captures what happens to the poorest rather than those close to the poverty line (a drawback of the headcount ratio).

The choice of countries analyzed here is driven by various criteria. First, we aimed to include countries with distinct welfare systems regarding their cash transfers programs: countries with poverty-targeted cash transfer programs but relatively limited generosity (Brazil and Chile); countries with relatively generous poverty-targeted cash transfer programs (South Africa); countries with categorical coverage (Russia); and countries which relied on targeted subsidies rather than transfers (India). Our set of countries also include a wide spectrum in terms of the size

[11] The spending neutral scenario may also require an adjustment in taxes, and — unlike Rigolini et al. (2019) — our calculations also take this into account.

[12] See the methodology section for further discussion.

[13] In the cases of India and South Africa, the welfare indicator is expenditures per person. For the construction of consumable income, we assume that expenditures are equal to disposable income (i.e., there are no savings or dissavings). For more details, see Lustig (2018), chapter 6. The welfare measure includes consumption of own production in both cases, and imputed rent for owner's occupied housing in South Africa, while it includes actual rent in the case of India.

[14] Think about two households in different countries with identical disposable incomes but in one country food is exempt from VAT and in the other the VAT rate is 10 percent. Clearly, the welfare level of these two households would not be the same.

of the state measured by the share of primary government spending to GDP.[15] At the lower end of the spectrum is Chile which has a relatively small state (21.1%), especially considering that the country belongs to the high-income group. At the higher end are Brazil (39.5%) and Russia (37.5%), and South Africa (32.3%) is in between. In addition, measured by the baseline prefiscal income Gini coefficient, our sample includes high inequality countries (South Africa and Brazil: 73.9 and 53.8); countries with intermediate inequality (Chile: 49.3); and low(er) inequality countries (India and Russia 36.2 and 37.8). In terms of income per capita and using the World Bank's classification, India belongs to the category of low middle-income countries, Brazil and South Africa belong to the group of upper middle-income countries, and Chile and Russia are at the lower end of what the World Bank classifies as high-income countries.[16] There are, of course, a large number of countries which would fit under the above criteria that are available in the databases of ASPIRE and the CEQ Data Center. The final decision was based on the quality of the data. Our preference was to include countries in which the household survey captured the largest cash transfer programs and, to avoid having to use imputation methods to allocate discrepancies, we selected countries for which the administrative and household survey totals (both in terms of beneficiaries and amounts spent) are relatively similar.

The simulations are carried out applying the so-called "accounting framework:" that is, we ignore behavioral and general equilibrium effects. In other words, we capture the first-round effects. While this is a limitation, first-round effects are considered a reasonable approximation for the short-run. Furthermore, for the purposes of our analysis, they are enough to assess the fiscal feasibility of the options considered here. If the policy alternatives are viewed as potentially not feasible (due to efficiency costs and/or political resistance) in the absence of labor supply and other behavioral responses, they would be even less feasible if the latter were taken into account.

In order to assess the desirability and feasibility of the simulated UBI programs, we first identify the scenarios in which the poor are no worse off than in the baseline with two types of poverty indicators: the conventional (anonymous) incidence and severity of poverty and the nonanonymous fiscal impoverishment (Higgins and Lustig, 2016).[17] We find that even if the headcount and the severity of poverty are lower under some scenarios, in most cases some of the prefiscal poor are made worse off. For scenarios that pass the "poverty test," we assess their fiscal feasibility by first looking at the increase in the tax incidence (average tax rate) by decile. In our five countries and across scenarios, the least increase in taxes required for poverty to be lower than in the baseline is around 25% (Brazil and Chile). Such a high tax increase may limit their

[15] Data is from the Commitment to Equity Data Center on Fiscal Redistribution (www.ceqinstitute.org) consulted on December 25, 2020. The figures are provided by the respective studies and do not necessarily match numbers in administrative accounts.

[16] The reference years and data sources are discussed in appendix D in (Rigolini et al., 2019). The classification of countries by category of gross national income per capita in 2011 purchasing power parity is based on World Bank thresholds; see https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. The Russian Federation is classified as a high-income country because that is how it was classified in 2016, the data collection year of the survey for which the analysis presented here was conducted.

[17] The nonanonymous indicator is the change in consumable income per person by decile for individuals ranked by their prefiscal income where the change is the difference between consumable income in each scenario and the baseline.

feasibility. We also explore whether the fiscal gap could be absorbed through a higher deficit (lower surplus) or a reduction in government spending on other items, but both options appear to be challenging.

Our analysis suggests that budget neutral UBI reforms that do not make some of the poor worse off may require excessive increases in taxation; on the other hand, implementing a feasible budget neutral UBI that is funded by taxes without incurring major increases in taxation and high efficiency costs may entail that some of the poor will be made worse off comparing to the existing system of transfers and subsidies.

It is worth noting that our decision to include some specific UBI scenarios in this paper (leaving out others) is guided by the fact that our analysis is focused on the feasibility of a UBI reform not only as an income floor for all, but also as a poverty reducing instrument. We believe our scenarios capture the two important ends of the range of possible scenarios that are designed to reduce poverty as well as one interesting in-between scenario. On one end (the lower end), we have the spending neutral scenario in which the total expenditure on UBI is exactly equal to the current expenditure on transfers and subsidies. On the other end, we have the poverty gap scenario in which the size of UBI is set equal to the average poverty gap in a country. These two scenarios set reasonable boundaries for the size of the average transfer under a UBI that a country may opt for, especially if the objective is to combine the social protection and poverty reduction goals. While there are many options to choose from for an in-between scenario, we analyze one of the more interesting ones which we refer to as equivalent benefit scenario: we set the universal transfer equal to total spending on transfers and subsidies divided by total beneficiaries of at least one of the direct transfers programs considered.[18]

Our study builds upon existing studies that simulate the impact of a UBI on inequality and poverty. Among others, Browne & Immervoll (2017) use EUROMOD data to simulate the effects of existing means-tested cash transfers versus a UBI. Hoynes & Rothstein (2019) review the distributional and behavioral effects of a UBI in the United States. Based on household survey data from Indonesia and Peru, Hanna & Olken (2018) use Receiver Operating Characteristic (ROC) curves and other methods to estimate trade-offs between targeting errors (exclusion and inclusion) and transfer adequacy among a UBI and flagship targeted programs. Based on LSMS data, Brown et.al (2016) predict the performance of various proxy-means testing methods against a UBI in nine African countries. IMF (2017) examines the distributional effects of a UBI in a handful of high and middle-income countries, while Coady & Prady (2018) do so for India. Ortiz et.al (2018) set out estimates for the cost of a UBI for a large number of low and middle-income countries.

Our main contributions are the following. Most cross-country analyses for middle income countries focus on the spending side without taking into account the implications on tax burdens,

[18] We opted for calculating the equivalent benefit transfer considering the beneficiaries of at least one direct transfer program (and not both transfer and subsidy programs) because, as it is discussed in our methodology section, our simulations allocate subsidies to each household based on the decile of income distribution its members belong to so, implicitly, every individual in the decile receives the average benefit of the subsidy. In other words, the number of beneficiaries from subsidies equals the total population in the survey which would put us in the spending neutral scenario.

and what the latter mean for the post-UBI poverty and inequality indicators.[19] Second, the existing analyses do not always assume budget-neutrality. Third, prior research focuses on the impact on poverty and inequality measured with disposable income rather than consumable income: that is, it does not consider the negative impact on living standards caused by higher consumption taxes. To the best of our knowledge, ours is the first paper that does all three: looks at tax burdens, assumes budget neutrality, and uses consumable income as the welfare indicator. In addition, our paper makes two further contributions. We rely on a clear set of conditions to select feasible UBI scenarios based both on poverty impacts and the required increase in tax burdens. By analyzing the budgetary conditions prevailing in our selected countries, we also consider whether a UBI could be financed through a higher fiscal deficit or lower spending in other items.

The paper is organized as follows. Section 2 discusses the microsimulation methodology of this paper and renders more details regarding the household survey data and administrative accounts of the five countries considered in this paper. Section 3 presents our results regarding the impact of each budget neutral UBI scenario on the inequality, poverty, and tax incidence in all five countries. Finally, section 4 provides our concluding remarks.

2. Methodology and Data

Our purpose is to estimate the impact of budget neutral UBI programs on poverty, inequality and tax burdens. More precisely, we want to show the potential trade-off between the generosity of a UBI — and, hence, its poverty impact — and the required increase in taxes. For this, we resort to microsimulation to construct prefiscal and postfiscal household income per person for each country and for seven scenarios. The scenarios are the following: 1) baseline, 2) spending neutral UBI financed by direct taxes, 3) spending neutral UBI financed by indirect taxes, 4) equivalent benefits UBI financed by direct taxes, 5) equivalent benefits UBI financed by indirect taxes, 6) poverty gap UBI financed by direct taxes, and 7) poverty gap UBI financed by indirect taxes. The UBI scenarios are ordered from the least (spending neutral) to the most generous (poverty gap). Table 1 describes the characteristics of each scenario.

The microsimulations are carried out applying the so-called "accounting framework:" that is, we ignore behavioral and general equilibrium effects on labor supply, consumption patterns, and taxable income. In other words, we capture the first-round effects. While this is a limitation, first-round effects are considered a reasonable approximation for the short-run. More importantly and as mentioned before, for the purposes of our analysis, they are enough to assess the fiscal and political feasibility of the options considered here. If the policy alternatives are not feasible in the absence of labor supply and other behavioral responses, they would be even less feasible if the latter were taken into account.

[19] Exceptions are Lustig et.al (2019) and Rigolini et al. (2019).

Table 1: Description of Baseline and Simulated UBI Scenarios

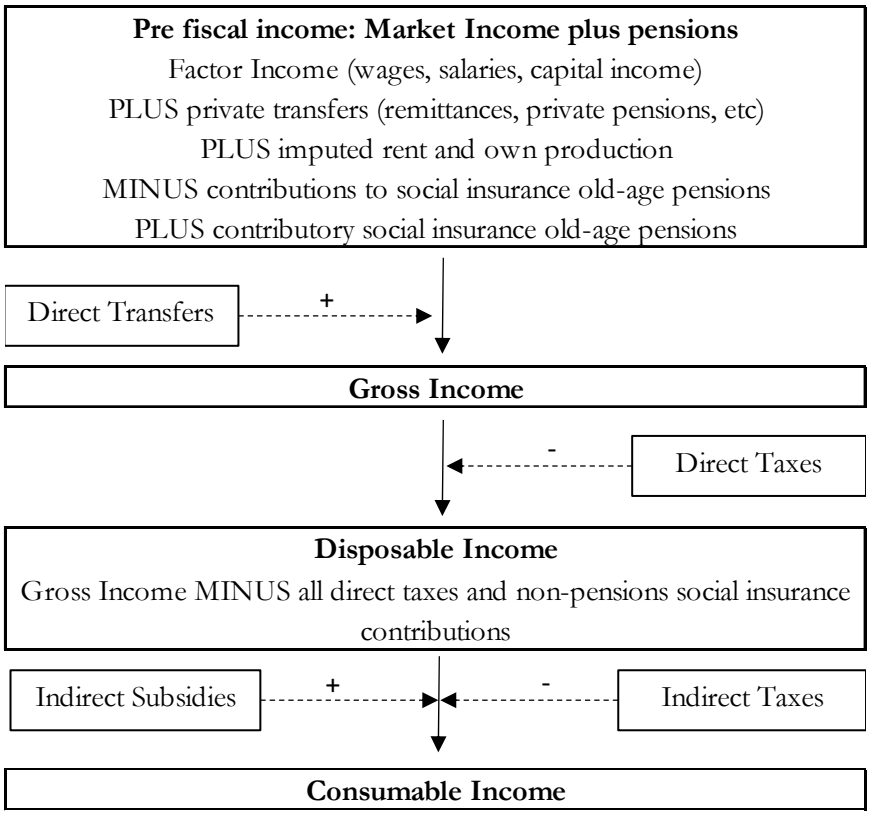
1	Baseline	Current	The existing transfer programs and fiscal system.
2	Spending Neutral	Universal	The UBI is set equal to current levels of spending on direct transfers and consumption subsidies. Budget neutrality is achieved by proportionally changing **direct taxes.**
3		Universal	The UBI is set equal to current levels of spending on direct transfers and consumption subsidies. Budget neutrality is achieved by proportionally changing **indirect taxes.**
4	Equivalent Benefits	Universal	The UBI is set equal to total spending on transfers and subsidies divided by total beneficiaries of at least one of the existing transfer programs. Budget neutrality is achieved by proportionally changing **direct taxes.**
5		Universal	The UBI is set equal to total spending on transfers and subsidies divided by total beneficiaries of at least one of the existing transfer programs. Budget neutrality is achieved by proportionally changing **indirect taxes**.
6	Poverty Gap	Universal	The UBI is set equal to the average poverty gap measured with prefiscal income (i.e., income before taxes and transfers). Budget neutrality is achieved by proportionally changing **direct taxes.**
7		Universal	The UBI is set equal to the average poverty gap measured with prefiscal income (i.e., income before taxes and transfers). Budget neutrality is achieved by proportionally changing **indirect taxes.**

Source: Own elaboration

Our microsimulations allow us to obtain measures of poverty and inequality with prefiscal and postfiscal incomes for each scenario. They also allow us to quantify and compare the required increases in direct or indirect tax burdens. The selected prefiscal income here is market income plus contributory pensions.[20] The postfiscal income is consumable income: that is, prefiscal income plus direct transfers and subsidies net of personal income and consumption taxes. While data on inequality and poverty is usually reported for disposable income (income after direct taxes net of cash transfers), we use consumable income as the relevant welfare indicator because our simulations contemplate raising consumption taxes. Consumable income captures what people are able to consume in actual terms after one takes into account not only personal income taxes but also consumption taxes. Consumable income is constructed by adding to prefiscal incomes the transfers reported in the household surveys plus the simulated subsidies, and minus the simulated direct (personal income) and indirect (consumption) taxes. The income concepts used in the analysis are summarized in Figure 1.[21] As we shall explain below, for simulating the impact on tax burdens, we will need to make use of gross income and disposable income too.

[20] We chose to treat contributory pensions as part of the prefiscal income to avoid the distortions that treating them as pure transfers introduced. See chapter 1 in Lustig (2018) for a detailed presentation on this matter.
[21] Note that for the baseline scenario we start from observed disposable income in the microdata and work "backwards" to construct baseline gross income and prefiscal income and work "forward" to generate the baseline consumable income.

Figure 1: Definition of Income Concepts



Source: Adapted from Lustig (2018), Chapter 1.

Having calculated the income concepts, for each scenario we calculate the Gini coefficient, the poverty measures and the indicators of tax burdens. In our simulations, we consider two poverty measures: the *poverty headcount* and the *squared poverty gap*. The poverty headcount is widely used in policy circles but fails to capture the impacts of poverty reforms among the extremely poor. To give an example, assume that social assistance covers the extremely poor well, but coverage is not as good among households whose income or consumption lies close to the poverty line. A spending-neutral UBI reform may show greater poverty reduction when measured with the poverty headcount index (because with the UBI all households close to the poverty line would now receive a transfer — and hence jump over the poverty line); but the reform could come at the expense of higher extreme poverty, because the budget would be taken away from the extremely poor to be redistributed among a greater number of people. The squared poverty gap measure, by giving a greater weight to the welfare of the extremely poor, will capture such an increase in extreme poverty. As we shall see below, in South Africa a spending neutral UBI reform would reduce the headcount ratio but increase the squared poverty gap.

In our analysis of the poverty impact, we use the World Bank Income Class International Poverty Lines, which vary by countries' income levels, since in wealthier countries, higher international poverty lines are more appropriate. As described by Jolliffe & Prydz (2016), each income class–specific poverty line is chosen as the median of the national poverty lines of the countries in that income class. Specifically, there are two income class–specific poverty lines:

US$3.20 a day in PPP for lower-middle-income countries (India), and US$5.50 a day for upper-middle-income countries (Brazil, and South Africa[22]). The World Bank has not generated poverty lines for high-income countries. Thus, for Chile and the Russian Federation, we computed a poverty line based on the methodology proposed by Ravallion & Chen (2017). Using their formula, we compute the poverty line for Chile and the Russian Federation as a function of inequality-adjusted mean and intercept for the lower boundary of income (consumption per capita) in high-income countries. The result is a poverty line of US$11.66/day in 2011 PPP. We set the poverty line for Chile and the Russian Federation at US$11/day, which lies between our estimate and the US$10/day lower-bound national poverty line reported for Estonia and Poland, two high-income countries (Ravallion and Chen, 2017).[23]

The impact on tax burdens is assessed by the difference in the incidence of taxes (average tax rate) of each decile for each scenario and the baseline. The incidence of direct taxes here is defined as the ratio of direct taxes to gross income. For the incidence of indirect taxes, we use the ratio of indirect taxes to disposable income.

For each UBI budget neutral scenario, we use the CEQ Tax Simulator tool and calculate these indicators so that we can compare them with the baseline and each other. Budget neutrality is obtained by multiplying the existing tax rates (in the baseline scenario) by a constant multiplier that we calculate for each scenario. The existing tax rates are the observed direct tax incidence by decile with respect to gross income and the indirect taxes with respect to disposable income.[24] While this rule will change ex post progressivity in the UBI scenarios, it is a simple and neutral manner to change taxes: everybody's taxes are increased proportionally. Note that with a new gross income in each UBI scenario, before taxes are adjusted to balance the budget, the actual concentration shares and progressivity of taxes with respect to gross income changes. It changes even if tax rates are kept constant because with alternative UBI scenarios – in the case of direct taxes – gross incomes change, and tax rates are applied to gross income. This is a "mechanical" or automatic change in the concentration shares and progressivity, and it would have happened even if tax rates were not adjusted. Our tax multiplier, however, assures that there is no additional change in the concentration shares or progressivity even after taxes are adjusted (usually upwards, but not always) to balance the budget. The advantages of using this approach to achieve budget neutrality are twofold. First, it is easy to implement in practice. Second, it keeps the share of taxes paid by each income decile constant (i.e., constant concentration shares of taxes) across scenarios. The details of the microsimulations using the CEQ Tax Simulator are described in Appendix 2.

[22] For more detail, see Jolliffe and Prydz (2015, 2016, 2017).

[23] Our simulations involving the Poverty Gap scenarios are sensitive to the choice of poverty line, which vary by country. If two countries have the same poverty line, but one is wealthier than the other, as a percentage of GDP, transfers will appear to be lower in the wealthier country. As a robustness check, we reproduced our analysis for Chile and Russia, which are on the lower end of the "high income" World Bank category, using the $5.50 poverty line (the one we use for upper middle-income countries). Since our main conclusions do not change, we do not show these results, but they are available upon request. In the case of Russia, in fact, with this lower poverty line yields that almost one hundred percent of the population is not poor.

[24] Implicitly, we are assuming that all gross income is taxable and that the effective tax rates are equivalent to the statutory ones.

In order to assess the desirability and feasibility of the simulated UBI programs, we first identify the scenarios in which the poor are no worse off than in the baseline with two types of poverty indicators: the conventional (anonymous) incidence and severity of poverty and the nonanonymous fiscal impoverishment (Higgins and Lustig, 2016). The latter could be interpreted as applying the Pareto criterion to the prereform poor. We shall see that even if the headcount and the severity of poverty are lower under some scenarios, some of the prefiscal poor are made worse off. For scenarios that pass the "poverty test," we assess their fiscal feasibility by first looking at the increase in the tax incidence (average tax rate) by decile. While there are no general conventions on the latter, we leave out a policy scenario that implies an increase in the average tax rate above 30%. The scenarios that fulfill the poverty condition and are feasible but imply a change in average tax rates above this threshold are excluded from the feasible set.

We then look at whether the fiscal gap could be absorbed through a higher deficit (lower surplus) or a reduction in government spending on other items. Both options seem quite unfeasible too. Thus, it seems that in order to implement a feasible budget neutral UBI that is funded by taxes without incurring high efficiency costs, the size of the universal transfer may entail that some of the poor will be made worse off comparing to the existing system of transfers and subsidies.

The main sources of information for this paper are twofold. The household surveys and administrative data on transfers programs come from the World Bank's Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE).[25] The household surveys (Table 2) include information on social assistance programs disaggregated by program, welfare indicator (disposable income, expenditure, or consumption), and household demographic characteristics. The ASPIRE database posts program-level information on social protection programs including spending, number of beneficiaries, and program design features from administrative sources. Administrative data were available for all but Russia; for the latter we used World Bank staff estimates. This database is used to validate/compare amounts spent on social assistance programs from administrative data by country, with the total benefit amounts retrieved from household surveys. The second main source of information are the fiscal incidence of taxes and subsidies by decile published in the Commitment to Equity Data Center on Fiscal Redistribution (CEQ Data Center).[26] An advantage of using the data in the CEQ Data Center is that the studies were produced using a common methodological framework described in Lustig (2018). The World Development Indicators database is used for some of the indicators reported in this study, such as the income groups of countries, gross domestic product (GDP), and purchasing power parity (PPP).

[25] https://www.worldbank.org/en/data/datatopics/aspire. See Appendix 1 for more details.
[26] To view and download information, visit www.ceqinstitute.org and click on the Data Center tab.

Table 2: Household Surveys

Country	ASPIRE administrative data year	Survey name	Survey year	Welfare variable
Brazil	2015	Income and Expenditure Survey	2015	Harmonized household total income per person
Chile	2015	Encuesta de Caracterización Socio-Economica Nacional (CASEN)	2013	Harmonized household total income per person
India	2011	National Sample Survey 68th Round	2011-2012	Total household consumption per person
Russia	Not available in Aspire; collected from World Bank staff	Statistical Survey of Income and Participation in Social Programs	2016	Total household income per person
South Africa	2014	Income and Expenditure Survey	2014	Total household expenditure per person

Source: Own elaboration based on Rigolini et al. (2019), Appendix D, p. 272.

The cash transfer programs included in the baseline and which are replaced by a UBI in the simulated scenarios cover noncontributory programs only: that is, means-tested conditional and unconditional cash transfers, cash transfers based on categorical targeting (e.g., people with disabilities), and noncontributory pensions.[27] Contributory pensions and unemployment compensation programs are not included in the analysis because, by definition, these programs have an insurance component and reforming them involves complexities (e.g., financing for the transition period) that are beyond the scope of this study.[28] We also do not consider public works or cash-for-work programs because strictly speaking they are not transfers as people need to work

[27] See Appendix 1 for more detail. The choice of programs a UBI would replace, and the way we interpret the results, deserves some explanation. The choice is not dictated by the belief that a UBI *should* replace specific programs, but by our intention to explore the implications on poverty, inequality, and the tax burden when certain programs are replaced. In this respect, the simulations that follow should not be viewed as an actual recommendation for the countries included in the paper — any country-specific proposal would require analyses that are better tailored to the specific context of that country. Rather, the objective is to reach a better understanding of how varying contexts affect the impacts on poverty, inequality, and tax burden of varying UBI schemes.

[28] For a discussion of contributory social security systems and the challenges of reforming them see, for example, Barr and Diamond (2008).

to receive them. Table 3 presents the existing cash transfer programs (which together with spending on consumption studies) were replaced in our simulations by a UBI.[29]

Table 3: Selected Social Assistance Programs by Country

Country	Program	Administrative data		Household survey	
		US$ PPP 2011	% GDP	US$ PPP 2011	% GDP
Brazil (2015)	Bolsa Familia Program (Programa Bolsa Familia)	13,282,189,862	0.4	8,575,958,263	0.3
	Continuous Delivery Benefit (Beneficio de Prestaçao Continuada, BPC): Disabled	11,331,165,059	0.4	11,551,632,218	0.4
	Continuous Delivery Benefit (Beneficio de Prestaçao Continuada, BPC): Elderly	8,954,343,338	0.3	N/A	N/A
	Total	**33,567,698,259**	**1.1**	**20,127,590,481**	**0.7**
Chile (2015)*	Basic Solidarity Old Age Pension (Pension Basica Solidaria de Vejez)	1,108,094,928	0.3	1,215,544,614	0.3
	Basic Solidarity Disability Pension (Pension Basica Solidaria de Invalidez)	505,536,797	0.1	538,194,795	0.1
	Family Allowance (Subsidio Familiar, SUF)	305,845,100	0.1	389,405,995	0.1
	Solidarity Pension Contribution (Aporte Previsional Solidario, APS)	1,295,529,151	0.3	209,076,168	0.1
	Family and Maternal Allowance (Asignacion Familiar y Maternal)	82,936,115	0.02	244,037,866	0.1
	Human Rights Reparation Laws-Political Exonerated (Leyes de Reparacion de DD.HH-Exonerados Politicos)	447,601,702	0.1	195,055,320	0.0
	Protection and Exit Allowance (Bonos Proteccion (SSyOO y Chile Solidario) y Egreso (Chile Solidario))	85,464,589	0.02	56,335,996	0.01
	Mental Disability Allowance (Subsidio Discapacidad Mental)	46,288,323	0.01	55,304,713	0.01
	Basic Allowance and Conditional Cash Transfers (Bono Base y Transferencias Condicionadas—SSyOO)	125,000,732	0.03	40,629,681	0.01
	Winter Allowance (Bono Invierno	140,825,960	0.04	2,799,001	0.0007

[29] For more details, see Appendix 1.

	School Achievement Allowance (Bono Logro Escolar—SSyOO)	22,854,945	0.01	673,626	0.0002
	Drinking Water Consumption Subsidy (Subsidio al Consumo de Agua Potable)	158,792,300	0.04	124,520,324	0.03
	Total	**4,324,770,642**	**1.1**	**3,071,578,098**	**0.8**
India (2012)	Public Distribution System (PDS): Kerosene	19,853,164,547	0.3	8,827,838,809	0.2
	PDS: Food	50,908,902,586	0.9	35,820,361,032	0.6
	Total PDS	**70,762,067,133**	**1.2**	**44,648,199,841**	**0.8**
Russian Federation (2016)	Unconditional allowances and other social payments for people entitled to social support	42,202,603,824	1.22	33,312,357,100	0.9
	Child allowances	7,812,588,431	0.23	3,103,520,048	0.1
	Poverty-targeted cash transfers	1,612,969,255	0.05	729,564,718	0.02
	Benefit for children who lost one parent	2,365,854,706	0.07	2,300,920,185	0.1
	Maternal capital	13,848,847,359	0.4	23,444,527,045	0.7
	Social pensions including disability, survivorship	7,945,456,430	0.23	5,684,758,569	0.2
	Free use of the milk kitchen	N/A	N/A	222,374,535	0.006
	Housing subsidy	5,714,431,336	0.16	6,215,305,699	0.2
	Scholarships	3,244,741,369	0.09	2,021,617,825	0.1
	Food and transportation allowances	N/A	N/A	92,862,531	0.003
	Food and transportation privileges/ discounts	6,954,628,852	0.2	2,933,754,874	0.1
	Transfers for caretakers of people in need of assistance	2,463,910,583	0.07	1,042,914,248	0.03
	Other cash transfers for government organizations	N/A	N/A	606,380,961	0.02
	Unemployment benefit	1,276,056,942	0.04	856,143,152	0.02
	Total	**95,442,089,088**	**2.75**	**82,567,001,491**	**2.3**
South Africa (2014)	Disability grant	3,148,871,388	0.5	3,135,960,060	0.5
	Child support grant	7,021,930,184	1.0	8,415,128,106	1.2
	Care dependency grant	353,204,767	0.1	343,155,536	0.1
	Foster child grant	944,927,895	0.1	765,130,255	0.1
	Old-age grant	7,808,852,658	1.2	8,623,683,291	1.3
	Grant in aid	48,573,267	0.01	50,271,480	0.01
	War veteran's grant	1,356,936.74	0.0002	7,932,685	0.001
	Social relief	94,464,027	0.01	111,056,067	0.02
	Total	**19,422,181,124**	**2.9**	**21,452,317,480**	**3.14**

Source: Own calculations based on the household surveys housed in World Bank's ASPIRE and Rigolini et al. (2019), Appendix D, Table D.2, p. 273.

Note: N/A means not available. * Due to data availability, the administrative information for Chile corresponds to 2015 even though the survey is for 2013. Thus, the numbers from survey and administrative data are not strictly comparable. ** The Public Distribution System in India is a subsidy on kerosene and food. However, because for the target population the purchase of these goods is inframarginal, we can treat it as a cash transfer.

To calculate the inequality, poverty, and tax burdens in each scenario, we use the incidence of taxes and consumption subsidies by decile housed in the Commitment to Equity Data Center on Fiscal Redistribution. The CEQ Data Center includes information on the incidence of direct (mainly, personal income tax) and indirect taxes (VAT, excise and other consumption taxes) and subsidies by decile from fiscal incidence analyses that used a common methodological framework (Lustig, 2018).[30] Details on data sources, methodological assumptions, and results by country can be found in: Brazil (Higgins and Pereira, 2013), Chile (Martinez Aguilar et.al, 2017), India (Kundu and Cabrera, 2018), the Russian Federation (Lopez-Calva et.al, 2017), and South Africa (Inchauste et.al, 2017).

As indicated before, the fiscal incidence studies used here for our baseline scenario is based on the accounting framework and, thus, the derived prefiscal income cannot be presumed to equal the true counterfactual income in the absence of taxes and transfers. Therefore, the analyzed scenarios should be considered as a first-order approximation.[31] In essence, the underlying assumption is that payroll taxes and contributions (both by employee and employer) in the formal sector are borne by labor and that consumption taxes (and subsidies) are fully shifted forward to consumers. This is equivalent to assuming that the supply of labor and demand for goods and services are perfectly inelastic.[32] The baseline scenario is not, however, a mechanical application of statutory rules. We analyze the incidence of taxes by their economic rather than their statutory incidence and take into account tax evasion and avoidance. For example, individuals who do not report being registered in the social security administration are assumed not to pay personal income and payroll taxes. In the case of consumption taxes, we generate effective rates of taxation – which we use in place of the statutory rates – by calculating the actual revenues collected by the revenue authority over the actual sales value of the taxable base.

[30] For a detailed description of the fiscal incidence analysis method applied see Chapters 1, 6, and 8. It is important to note that the incidence of direct and indirect taxes is not the incidence of statutory rates but the economic incidence. Due to tax evasion or informality, which are widespread in developing countries, a significant number of self-employed and salaried workers may not pay direct taxes; and consumers in rural areas and those who purchase from informal sellers (for example, street vendors, farmers' markets, and so on — when the survey contains a question about place of purchase) may not pay consumption taxes such as VAT or excise taxes. The studies housed in the CEQ Data Center make assumptions about informality and evasion. Typically, individuals who do not report being registered in the social security administration are assumed not to pay personal income and payroll taxes. In the case of consumption taxes, for purchases from informal sellers it is assumed that no consumption taxes are paid (at least, directly at the time of purchase although the price of the good may carry the effect of taxes on inputs). If there is no information on the place of purchase, some studies assume that households in rural areas do not pay consumption taxes. For details, we refer to the country studies cited above. The information can be found in the CEQ Data Center by clicking here.

[31] A first-order approximation suffices for a reasonable impact estimate. Coady et al., for instance, state, "The first order estimate is much easier to calculate, provides a bound on the real-income effect, and is likely to closely approximate a more sophisticated estimate. Finally, since one expects that short-run substitution elasticities are smaller than long-run elasticities, the first-order estimate will be a better approximation of the short-run welfare impact (Coady et al., 2006, p. 9)." Moreover, although public spending on, for example, education, health, and infrastructure has an inherent investment element that is likely to affect long-run inequality and poverty dynamics, we do not attempt to capture these dynamic effects.

[32] The economic incidence, strictly speaking, depends on the elasticity of demand and/or supply of a factor or a good, and the ensuing general equilibrium effects. In essence, the accounting approach implicitly assumes zero demand price and labor supply elasticities, and zero elasticities of substitution among inputs, which may not be far-fetched assumptions for analyzing effects in the short-run, especially when changes are small (Lustig, 2020).

3. Results

To recapitulate, our analysis is based on simulations of the first-round effects on poverty, inequality, and tax burdens that result from changing the baseline social assistance and subsidies system (baseline scenario) with three alternative budget-neutral UBI scenarios. We have called these scenarios spending-neutral, equivalent benefits, and poverty gap. In order to focus on the implications for taxes, the initial resource pool includes not only spending on transfers but also on consumption subsidies. In the spending neutral UBI scenario the current cash transfers and consumption subsidies are replaced by a per capita UBI keeping total spending on cash transfers *and* subsidies unchanged and direct or indirect taxes are adjusted accordingly to ensure budget neutrality. In the poverty gap UBI scenario the universal transfer is set equal to the average poverty gap and direct or indirect taxes are adjusted accordingly to ensure budget neutrality. We treat these two scenarios as a lower and upper bound.[33] In the in-between equivalent benefits scenario, the universal transfer is set equal to total spending on transfers and subsidies divided by total beneficiaries of at least one of the direct transfer programs considered and direct or indirect taxes are adjusted accordingly to ensure budget neutrality. Considering the baseline and the three UBI scenarios and the two possible sources of financing the fiscal gap – direct and indirect taxes – we have **seven** scenarios in total (see Table 1 above).

Table 4 shows daily transfers and subsidies per person and per poor person in the baseline and transfers per person in the UBI scenarios. The last three columns are of particular interest because they record the ratio of the UBI transfer divided by the transfers and subsidies per poor person in the baseline. As expected, a spending neutral scenario results in a reduction in average benefits for the poor when compared to the baseline situation. In the equivalent benefits UBI, the poor receive roughly the same as in the baseline in India and Russia, somewhat more in South Africa, and considerably more in Brazil and Chile. Needless to say, the amount in transfers the poor receive under the poverty gap UBI is at least twice as much as what they receive currently except for Russia where the increase is close to just 30 percent. The latter is the result of the fact that in Russia categorical targeting approximates a universal system much more than the current targeted schemes in the other countries.

[33] We also tried a UBI reform with the uniform transfer equal to the country-specific poverty line. The tax burden would be too high to make it feasible so we discarded this scenario at the outset.

Table 4: Summary Table for Pre-fiscal Income and Transfers by Scenario (US$ 2011 Per capita, daily,

Country	Country data						
	Poverty Line (1)	Population (2)	GNI per capita (3)	Pre-fiscal income per capita[1] (4)	Per person direct transfers[2] (5)	Per person indirect subsidies[3] (6)	Per trans in sul
Brazil (2015)	5.5	200,290,036	40.5	18.9	0.28	0.02	
Chile (2013)	11.0	16,239,401	60.4	22.2	0.50	0.12	
India (2011)	3.2	1,108,970,012	11.9	3.6	—	0.11	
Russia (2016)	11.0	146,123,935	68.1	37.8	1.55	0.22	
South Africa (2014)	5.5	54,767,427	34.4	12.9	1.07	—	

Source: Own elaboration based on World Bank Data (https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD), ASPIRE Hou 2017); India (Kundu and Cabrera, 2018); Russia (Lopez-Calva et al., 2017); and South Africa (Inchauste et al., 2017).

Note: "—" implies that there are no cash transfers in India considered here since our exercise does not include employment guara table are in 2011 PPP $ per capita and daily terms; International Poverty lines: 3.2 for lower middle income, 5.5 for upper spending on direct transfers and subsidies is transformed into a UBI. Poverty gap: scenario in which UBI transfer equals the av subsidies of beneficiaries in the current system.

3.1. Poverty and Inequality

In Table 5, we show the results of the UBI simulations on poverty and inequality. As expected, in general, the spending neutral scenario results in higher poverty headcount ratio and squared poverty gap index and an increase in the Gini coefficient. However, this is not true for every country. In the case of India, all three indicators are lower under the spending neutral scenario than the baseline. How can that be? It is telling us that the Public Distribution System was not benefiting the poorest individuals in comparison to a scenario in which we distribute the total benefit equally across the whole population. In the case of South Africa, while the headcount ratio falls under the spending neutral scenario, the squared poverty gap and the Gini coefficient rise. South Africa illustrates how the headcount ratio, by focusing on what happens to poor (and nonpoor) individuals near the poverty line, can lead to a misleading appreciation. We would not want to switch to a system in which the poorest of the poor are worse off. For the spending neutral scenario, whether budget neutrality is achieved through direct or indirect taxes makes little difference.

Table 5: Poverty and Inequality in Baseline and Spending Neutral, Equivalent Benefits, and Poverty Gap Scenarios

				Consumable Income (Post-fiscal Income)						
					UBI Direct tax financing[7]			UBI Indirect tax financing[8]		
Indicator	Country	Poverty Line (US$ PPP 2011 per day)	Pre-fiscal Income[1]	Baseline	Spending Neutral[3]	Equivalent Benfits[4]	Poverty Gap[5]	Spending Neutral[3]	Equivalent Benfits[4]	Poverty Gap[5]
Headcount ratio	*Brazil (2015)*	5.5	22.3	25.5	26.2	22.5	17.1	26.2	23.3	19.5
	Chile (2013)	11.0	36.4	41.1	41.7	39.4	32.1	41.7	39.8	34.6
	India (2011)	3.2	61.4	65.8	63.7	63.1	47.1	63.6	63.5	60.2
	Russia (2016)	11.0	8.8	9.1		8.1	7.2	9.0	8.2	7.6
	South Africa (2014)	5.5	59.2	60.3	59.2	56.8	43.0	59.2	57.7	51.3
Squared poverty gap	*Brazil (2015)*	5.5	6.1	5.5	6.6	4.0	2.0	6.6	4.2	2.4
	Chile (2013)	11.0	7.0	6.8	7.3	5.9	2.4	7.3	6.2	3.2
	India (2011)	3.2	9.0	10.6	9.1	8.7	3.5	9.0	8.8	4.1
	Russia (2016)	11.0	1.1	1.0	0.9	0.7	0.5	0.9	0.7	0.6
	South Africa (2014)	5.5	36.6	19.9	25.0	19.0	5.4	24.9	19.6	7.3
Gini	*Brazil (2015)*	5.5	53.8	50.8	51.4	47.9	44.0	51.4	48.7	45.9
	Chile (2013)	11.0	49.3	46.9	47.4	45.4	38.7	47.4	45.9	41.1
	India (2011)	3.2	36.2	35.3	34.3	33.6	19.1	34.2	33.9	24.5
	Russia (2016)	11.0	37.8	35.8	35.8	35.0	34.3	35.8	35.2	34.7
	South Africa (2014)	5.5	73.9	62.5	64.9	60.7	46.2	64.8	61.4	50.5

Source: Own elaboration based on ASPIRE Household Survey Database and CEQ Data Center on Fiscal Redistribution: Brazil (Higgins and Pereira, 2013); Chile (Martinez Aguilar et al., 2017); India (Kundu and Cabrera, 2018); Russia (Lopez-Calva et al., 2017); and South Africa (Inchauste et al., 2017).

Notes:

1. Pre-fiscal income is Market Income plus Pensions.

2. Post-fiscal income is Consumable Income which equals Pre-fiscal Income minus direct and indirect taxes plus direct transfers and subsidies.
3. Spending neutral: The current spending on direct transfers and subsidies is transformed into a UBI.
4. Equivalent Benefits: Each individual receives the average transfers and subsidies of beneficiaries in the current system.
5. Poverty Gap: The UBI transfer equals the average poverty gap for each country.
6. Perfect Targeting: The UBI is equal to the average distance to the poverty line for each income decile.
7. In all cases the budget deficit induced by UBI is financed with a proportional increase in the direct taxes.
8. In all cases the budget deficit induced by UBI is financed with a proportional increase in the indirect taxes.

Another general result that comes out as expected is that, under the poverty gap scenario, the headcount ratio, the squared poverty gap index, and the Gini coefficient fall in all the countries compared to the baseline. And, as expected, the reduction is higher when the budget neutral UBI is financed with direct taxes.[34] If poverty and inequality reduction and providing a social protection floor to all were our only goals, then clearly this is the most desirable scenario of the ones analyzed here. In fact, if one could target the amount spent in this scenario perfectly to those who are prefiscal poor, poverty could be eradicated. However, and as we are able to confirm later, the required increase in taxes to fund such a scenario may be too onerous.

Thus, a more realistic scenario from the tax implications point of view may be the equivalent benefits one. This scenario is the closest of those considered here to introducing a UBI in which the poor (measured with anonymous indicators as the ones shown on Table 5) are as well off as in the baseline. Although this is not strictly true for each individual, it is true for the poor on average. In this scenario, the poverty and inequality indicators are lower than in the baseline for all the countries. Therefore, it would seem that this scenario could be an option if the goals are to reduce poverty and provide a social protection floor for all. However, if we look at Table 6, which shows the change in consumable income per person by decile for individuals ranked by their prefiscal income for each UBI scenario versus the baseline, we observe that in India, Russia, and South Africa the poorest deciles lose under the equivalent benefits scenario (compared to the baseline, that is). In these three countries, thus, even a relatively generous budget neutral UBI would result in the poorest being worse off because they would end up paying more in taxes than what they receive in benefits. This result holds whether budget neutrality is achieved by raising more direct or indirect taxes.

[34] This is expected because direct taxes are more progressive than indirect taxes.

Table 6: Change in Consumable Income: UBI Scenarios versus the Baseline (in percent)

Panel a. Direct tax financing

Decile	Brazil (2015)			Chile (2013)			India (2011)			Russia (2016)			South Africa (2014)		
	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap
1	-28.5%	6.2%	45.1%	-12.0%	2.4%	53.5%	-4.0%	-2.0%	64.1%	-6.6%	-0.4%	4.1%	-100.7%	-63.6%	67.9%
2	-4.9%	13.8%	34.7%	-3.0%	5.3%	34.3%	-2.0%	-0.4%	51.6%	-2.1%	1.4%	3.9%	-26.2%	6.7%	123.6%
3	-1.4%	11.0%	24.8%	-1.9%	3.7%	22.5%	-1.6%	-0.2%	44.9%	-0.6%	1.6%	3.2%	-10.0%	13.9%	97.7%
4	-0.6%	7.9%	17.5%	-1.2%	2.8%	16.2%	-1.1%	0.1%	40.1%	-0.3%	1.2%	2.3%	-2.9%	15.1%	77.9%
5	0.5%	6.5%	13.1%	-0.5%	2.4%	11.9%	-0.7%	0.3%	35.7%	0.3%	1.4%	2.1%	5.0%	19.2%	68.6%
6	1.1%	5.1%	9.5%	0.3%	2.2%	8.5%	-0.4%	0.5%	31.5%	-0.2%	0.3%	0.7%	4.1%	13.8%	47.6%
7	1.0%	3.4%	5.8%	0.7%	1.8%	5.4%	-0.1%	0.7%	27.4%	0.6%	0.8%	0.9%	5.4%	11.2%	31.0%
8	1.1%	1.8%	2.5%	0.9%	1.4%	3.0%	0.3%	1.0%	22.7%	0.2%	-0.3%	-0.7%	3.4%	3.5%	2.2%
9	0.9%	-0.5%	-2.2%	1.0%	0.7%	-0.1%	0.6%	1.1%	15.6%	0.7%	-0.4%	-1.2%	2.5%	-1.0%	-13.9%
10	0.4%	-5.8%	-12.6%	0.5%	-3.2%	-15.9%	1.3%	-1.1%	-79.4%	0.4%	-1.2%	-2.3%	1.3%	-4.2%	-22.9%

Panel b. Indirect tax financing

Decile	Brazil (2015)			Chile (2013)			India (2011)			Russia (2016)			South Africa (2014)		
	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap	Spending Neutral	Equivalent Benefits	Poverty Gap
1	-28.4%	3.4%	37.1%	-11.9%	0.3%	39.6%	-3.9%	-2.4%	37.5%	-6.6%	-1.3%	2.4%	-100.7%	-64.5%	48.9%
2	-4.9%	10.9%	27.6%	-3.0%	3.7%	24.9%	-1.9%	-0.8%	27.3%	-2.1%	0.6%	2.5%	-26.1%	4.0%	98.7%
3	-1.4%	8.4%	18.8%	-1.9%	2.6%	16.8%	-1.4%	-0.6%	20.5%	-0.6%	1.1%	2.3%	-9.8%	11.0%	76.4%
4	-0.6%	5.7%	12.4%	-1.2%	1.9%	11.9%	-0.9%	-0.3%	17.2%	-0.2%	0.8%	1.6%	-2.7%	12.2%	58.5%
5	0.5%	4.4%	8.5%	-0.5%	1.6%	8.4%	-0.6%	-0.1%	11.0%	0.4%	1.0%	1.5%	5.3%	16.0%	49.0%
6	1.1%	3.2%	5.5%	0.3%	1.6%	5.7%	-0.2%	0.0%	7.6%	-0.2%	0.1%	0.3%	4.3%	10.6%	29.7%
7	1.1%	1.9%	2.7%	0.7%	1.2%	2.9%	0.1%	0.2%	2.8%	0.6%	0.5%	0.5%	5.6%	8.4%	16.5%
8	1.1%	0.6%	0.1%	0.9%	0.7%	0.2%	0.5%	0.5%	-1.5%	0.2%	-0.2%	-0.5%	3.5%	2.9%	0.7%
9	0.9%	-1.0%	-2.9%	1.0%	0.0%	-3.4%	0.9%	0.6%	-8.1%	0.7%	-0.1%	-0.6%	2.5%	-0.5%	-9.8%
10	0.4%	-3.6%	-7.8%	0.5%	-1.9%	-9.4%	0.9%	0.2%	-18.9%	0.4%	-0.8%	-1.6%	1.2%	-3.0%	-15.9%

Source: Own elaboration based on ASPIRE Household Survey Database and CEQ Data Center on Fiscal Redistribution: Brazil (Higgins and Pereira, 2014); Chile (Martinez-Aguilar et al., 2018); India (Kundu and Cabrera, 2018); Russia (Lopez-Calva et al., 2017) and South Africa (Inchauste et al., 2017).

This table shows a nonanonymous comparison and reveals that some of the poorest could be impoverished by a policy change that would mimic the equivalent benefits scenario. The fact that anonymous and nonanonymous indicators can yield different stories regarding the poor was first introduced by Higgins and Lustig (2016). When determining whether a certain policy change is desirable from the poor's perspective, nonanonymous indicators such as fiscal impoverishment must be considered. Otherwise, we may miss the fact that we are making the poorest in a country worse off. For instance, if we use the nonanonymous indicator shown in Table 6, the spending neutral scenario in the case of India reveals the fact that every decile that includes people in poverty, is worse off. Thus, this is another example of how we would have missed this important

fact if we just relied on the anonymous poverty measures (headcount ratio and squared poverty gap) shown in Table 5 and alluded above.

3.2. Tax Burden

Based on the implications on consumable income (Table 6), one can conclude that a spending neutral UBI reform is undesirable because the poorest deciles are made worse off in all countries. One can also conclude that an equivalent benefits UBI reform is undesirable for India, Russia, and South Africa for the same reasons. An equivalent benefits UBI reform seems "doable" in the cases of Brazil and Chile: the poor are not made worse off while the net losses in consumable income for the top deciles are small (around 5% or less). The poverty gap scenario makes the poor better off in all the countries. However, the losses in consumable income for the top deciles can be very large (see India and South Africa, for example). The only country in which the losses for the top are small (significantly below 5%) is Russia. This is because the categorical targeting in Russia is probably the closest to a UBI and the average benefit under a UBI is the closest to the current system (Table 4).

In sum, all the countries pass the "poverty test" under the poverty gap scenario. However, what is the change in tax burdens? Table 7 shows the change in the incidence of taxes (average tax rate) per decile between the equivalent benefits and poverty gap scenarios and the baseline.[35] How feasible would a UBI be if budget neutrality is attained through taxes? Recall that we chose to define an increase in the average tax rate equal or above 30%. The poverty gap scenario would imply such a large increase in tax burdens for every country that it is clearly not feasible. Not even for Russia, where the increase in the incidence of direct taxes and indirect taxes would be 42% and 35%. For the equivalent benefits scenario, the "poverty test" is passed by Brazil and Chile. For both countries, the simulated required increase in direct average tax rates is large: 58% and 66%. The required increase in indirect taxes is 27% in Brazil and 26% in Chile. The latter may be borderline feasible if we assume away behavioral responses. However, the required increases in the average indirect tax rates are large enough that behavioral responses could end up limiting their feasibility.

[35] The increase in direct tax incidence under the poverty gap scenario ranges from 42% in Russia to over 5000% in India. The equivalent benefits scenario, as expected, implies a lower increase in tax burdens. However, it is still quite large. The range is from 10% in South Africa to 119% in India. These increases are sufficiently large to conclude that such a reform would not be politically feasible and, even if it were, the efficiency costs could be high. Would a budget neutral UBI financed with indirect taxes be feasible? The poverty gap scenario would entail an increase in the incidence of indirect taxes between 35% for Russia to 263% for India. Again, too high to make it politically feasible and with likely high efficiency costs. The equivalent benefits budget neutral UBI has a smaller range in the change in the burden of indirect taxes: from 7% in India to 28% in South Africa (and for the rest of the countries the change is also above 20%). We do not show results for the spending neutral scenario because the changes are minimal, but they are available upon request.

Table 7: Change in the Incidence of Taxes by Decile

Panel a. Incidence of direct taxes with respect to gross income: Direct tax financing

Decile	Brazil (2015)			Chile (2013)			India (2011)			Russia (2016)	
	Baseline incidence	Change in incidence		Baseline incidence	Change in incidence		Baseline incidence	Change in incidence		Baseline incidence	Change in i
		Equivalent benefits	Poverty Gap		Equivalent benefits	Poverty Gap		Equivalent benefits	Poverty Gap		Equivalent benefits
1	0.031	0.018	0.037	0.0139	0.009	0.040	0.00000	0.000	0.000	0.0527	0.013
2	0.034	0.020	0.041	0.0218	0.014	0.063	0.00000	0.000	0.000	0.0565	0.014
3	0.038	0.022	0.046	0.0296	0.019	0.086	0.00000	0.000	0.000	0.0628	0.015
4	0.043	0.025	0.052	0.0323	0.021	0.094	0.00000	0.000	0.000	0.0631	0.015
5	0.046	0.027	0.056	0.0339	0.022	0.098	0.00000	0.000	0.000	0.0620	0.015
6	0.049	0.029	0.060	0.0355	0.023	0.103	0.00001	0.000	0.000	0.0660	0.016
7	0.056	0.032	0.067	0.0359	0.024	0.104	0.00003	0.000	0.001	0.0651	0.016
8	0.060	0.035	0.072	0.0343	0.022	0.100	0.00014	0.000	0.007	0.0763	0.018
9	0.071	0.041	0.086	0.0329	0.022	0.095	0.00049	0.001	0.025	0.0830	0.020
10	0.111	0.064	0.134	0.0622	0.041	0.180	0.016	0.019	0.798	0.0842	0.020
Total	0.079	0.044	0.090	0.0441	0.028	0.123	0.005	0.006	0.208	0.0734	0.018

Panel b. Incidence of indirect taxes with respect to disposable income: Indirect tax financing

Decile	Brazil (2015)			Chile (2013)			India (2011)			Russia (2016)	
	Baseline incidence	Change in incidence		Baseline incidence	Change in incidence		Baseline incidence	Change in incidence		Baseline incidence	Change in in
		Equivalent benefits	Poverty Gap		Equivalent benefits	Poverty Gap		Equivalent benefits	Poverty Gap		Equivalent benefits
1	0.139	0.038	0.079	0.1038	0.027	0.114	0.058	0.004	0.153	0.1030	0.020
2	0.141	0.039	0.080	0.1053	0.027	0.116	0.057	0.004	0.151	0.0985	0.019
3	0.142	0.039	0.081	0.1065	0.027	0.117	0.060	0.004	0.158	0.0959	0.019
4	0.144	0.040	0.082	0.1060	0.027	0.117	0.058	0.004	0.154	0.0931	0.018
5	0.147	0.040	0.083	0.1055	0.027	0.116	0.065	0.005	0.170	0.0896	0.018
6	0.147	0.040	0.083	0.1053	0.027	0.116	0.065	0.005	0.171	0.0880	0.017
7	0.149	0.041	0.084	0.1046	0.027	0.115	0.069	0.005	0.181	0.0876	0.017
8	0.148	0.041	0.084	0.1037	0.027	0.114	0.072	0.005	0.188	0.0868	0.017
9	0.150	0.041	0.085	0.1041	0.027	0.115	0.079	0.006	0.207	0.0851	0.017
10	0.155	0.042	0.088	0.1058	0.027	0.117	0.089	0.006	0.236	0.0834	0.017
Total	0.150	0.041	0.085	0.1051	0.027	0.116	0.074	0.005	0.189	0.0878	0.017

Source: Own elaboration based on ASPIRE Household Survey Database and CEQ Data Center on Fiscal Redistribution: Brazil (Higgins an et al., 2018); India (Kundu and Cabrera, 2018); Russia (Lopez-Calva et al., 2017) and South Africa (Inchauste et al., 2017).

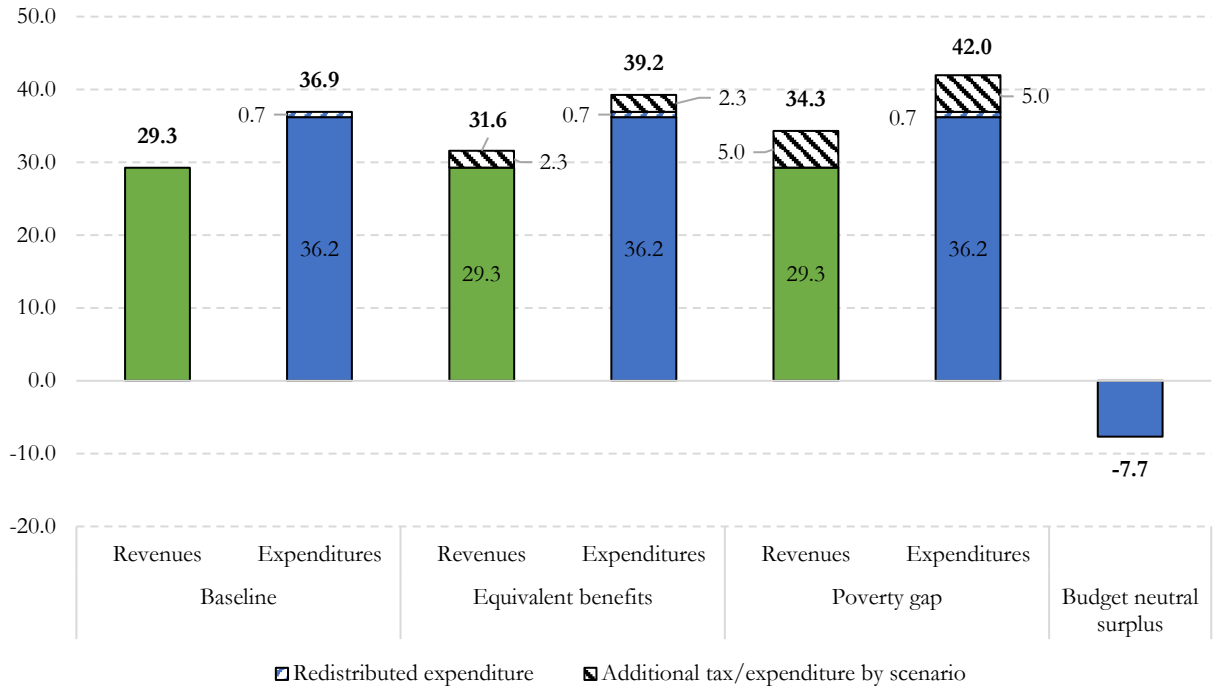
Note: The incidence of direct taxes here is defined as the ratio of direct taxes to gross income. For the incidence of indirect taxes we use the income.

3.3. Deficit Financing and Cutting Other Expenditures

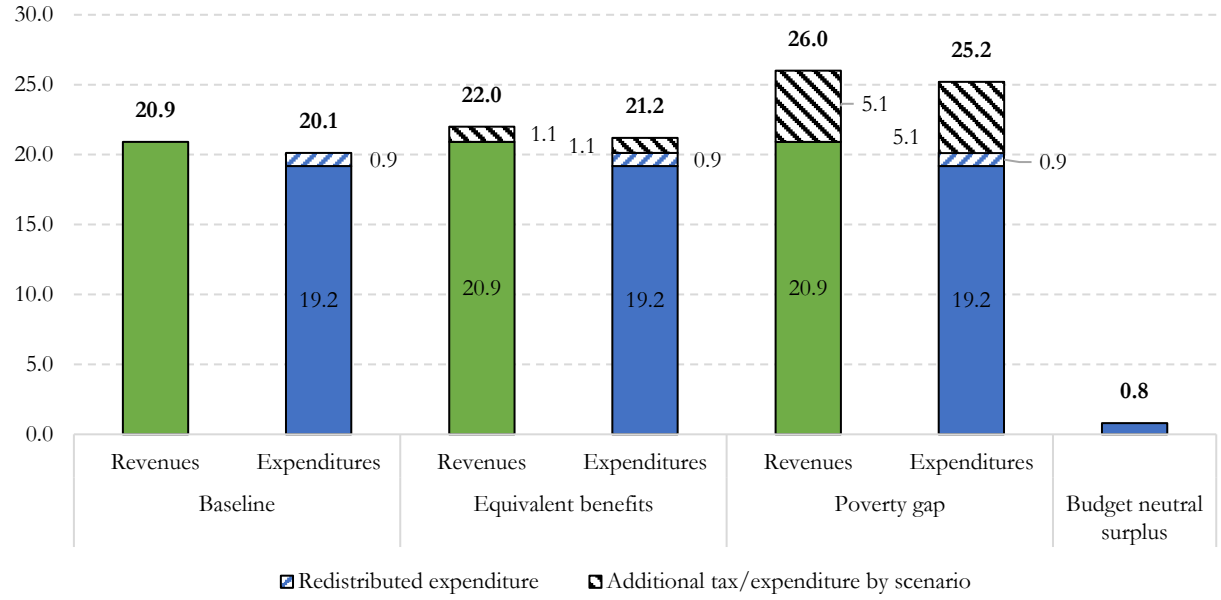
The above results suggest that, in general, a budget neutral UBI financed by an increase in taxes appears not to be feasible for poverty gap scenario and not even for the equivalent benefits scenario. There are two other options: let the government deficit increase or cut spending in other items. Figure 2 shows the government deficit as a share of GDP. India, Brazil, and South Africa have relatively large government deficits so for them the first option is not really feasible. In the case of Chile, the budget surplus would not only be wiped out but there would be a deficit. In the poverty gap scenario, it would be around 4.3%; that is, large. Thus, deficit financing does not seem to be an option either. Cutting down on other expenditures for all countries and both scenarios is high except for India and for the case of equivalent benefits: expenditures would need to be cut by 0.8%. For the other countries, current spending would have to be reduced by 4.3% in Russia (equivalent benefits scenario) to close to 26% in Chile and India (the poverty gap scenario).

Figure 2: Fiscal Cost of Alternative Scenarios (as % of GDP)

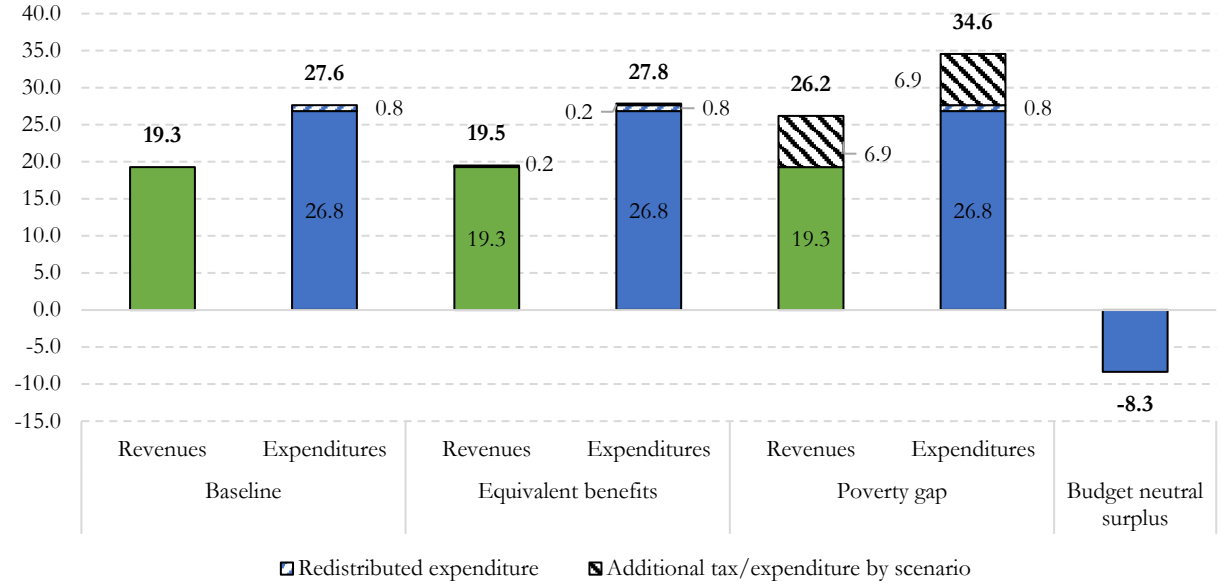
Panel a. Brazil (2015)



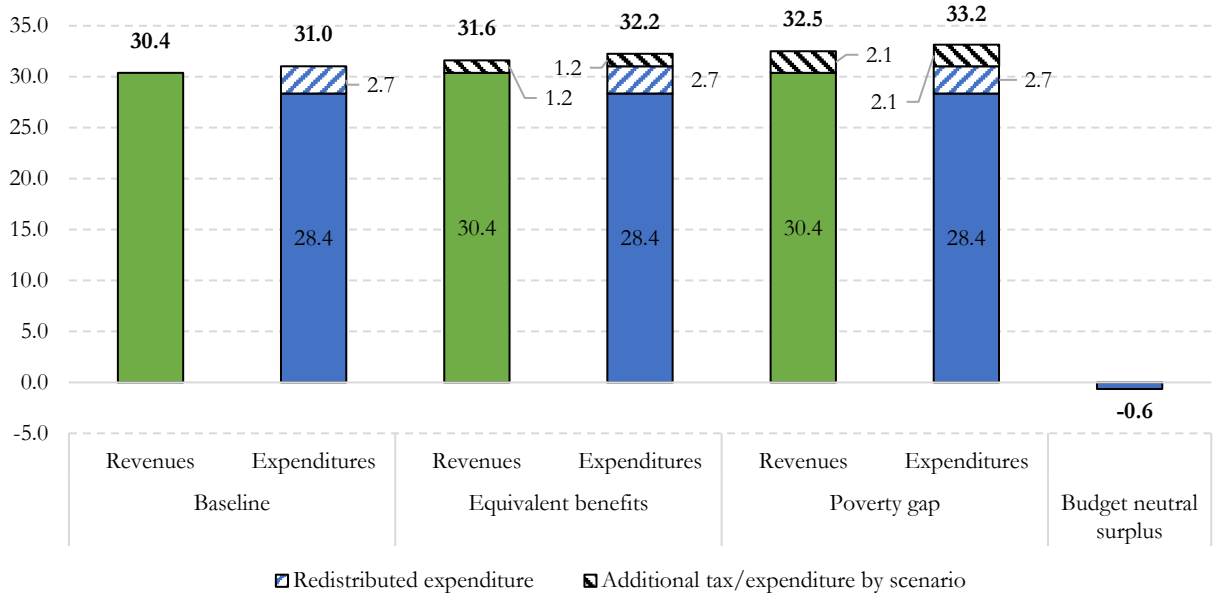
Panel b. Chile (2013)



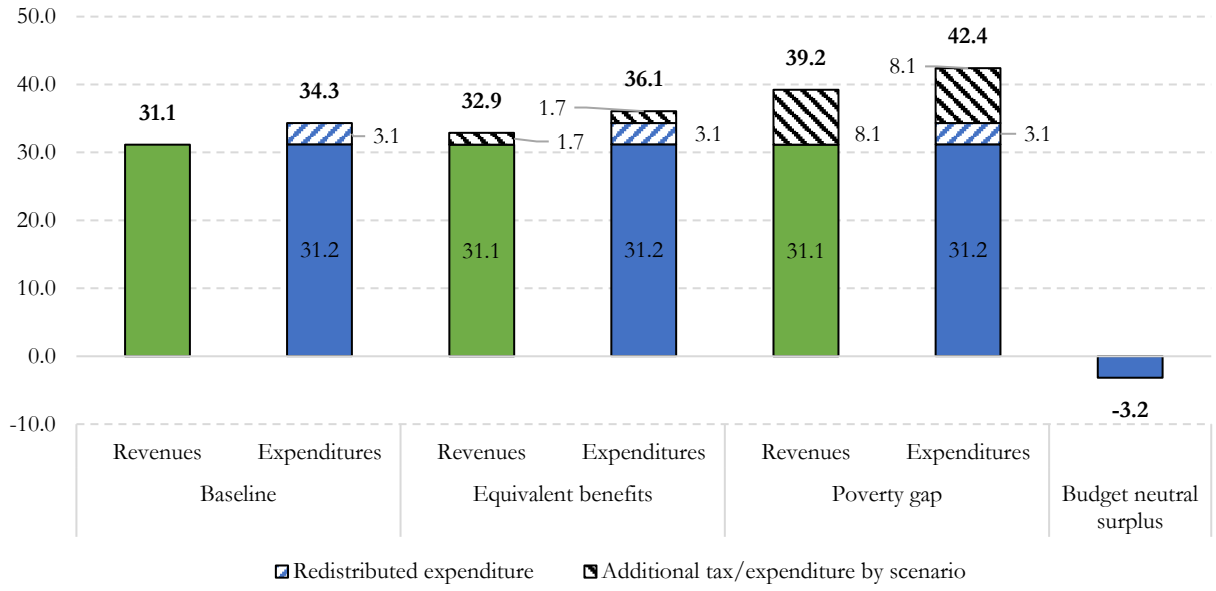
Panel c. India (2011)



Panel d. Russia (2016)



Panel e. South Africa (2014)



Source: Own Elaboration based on GFS-IMF and Fiscal Monitor data IMF. Consulted February 10, 2021.
Notes:

1. In the case of Brazil, Chile, Russia, and South Africa we use data from IFS-IMF using the central government data including social security. "Revenues" includes: (i) Taxes; (ii) Grants; (iii) Property income; (iv) sales of goods and servicies; (v) Fines, penalties, and forfeits; (vi) Voluntary transfers other than grants; (vii) Miscellaneous and unidentified revenue. Expenditures includes: (i) Compensation of employees; (ii) Use of goods and services; (iii) Interest; (iv) Subsidies; (v) Grants; (vi) Social benefits; (vii) Other expense; and (viii) Consumption of fixed capital. Finally, "Surplus" is the difference between what we call Revenues and Expenditures. For more details please see De Clerck & Wickens (2019).

2. India have no information in the GFS-IMF for any of the government aggregates. Hence, we use the data coming from the Fiscal monitor for the general government. We use the data from revenues and expenditures as reported in the Fiscal monitor which uses the methodology of the World Economic Outlook.
3. Redistributed expenditure is the sum of the total direct transfers plus the indirect subsidies as percentage of the GDP in the baseline scenario.
4. Additional tax/expenditure by scenario is the required additional amount of tax and expenditures needed to maintain constant the initial surplus in each scenario.

4. Concluding remarks

The results shown in this article reinforce the view that, even in middle income countries, it may be very challenging to design a UBI program that would leave the poor no worse off than under the existing transfers and subsidies schemes and simultaneously keeps the increased tax burden in check.

Thus, it would seem that whenever reducing poverty is the primordial goal, targeted transfers (either means tested or categorical) will be a superior option. Many decades ago, Akerlof (1978) formally showed that if beneficiaries could be selected ("tagged," using his terminology) without a cost, a welfare system that gives transfers to people with special needs or characteristics (e.g., the poor) would be superior to a uniform negative income tax that gives the same benefit to everyone.

This rationale is the basis for targeted programs. In categorical targeting, the benefits are provided to people with characteristics that are exogenous in the sense that these characteristics are more difficult to manipulate or change through behavior (e.g., social pensions to the elderly). In means-tested targeting, the benefits are provided to people with, for instance, incomes below a certain threshold. The problem is that people can change a characteristic such as income through behavior: e.g., nonbeneficiaries could decide to work less in order to become eligible.[36] The evidence for developing countries, however, does not show that transfers targeted to the poor result in a reduction in adult labor supply (see, for example, Fiszbein & Schady (2009), chapter 4 and Bastagli et al. (2016)).

[36] Hence the amount of effort that governments place in defining eligibility criteria that are complicated and nontransparent. The more complicated and obscure, the more difficult it is for people to change their behavior to become eligible. In Mexico, for instance, the the eligibility criteria of the now defunct Progresa/Oportunidades/Prospera program used a formula that was kept secret from the public.

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Appendix 1: Welfare State Typology[37]

Social Assistance is Targeted to the Poor and Size is Relatively Small (1.5% of GDP or less)

Brazil (2015). Spending on social assistance accounted for 1.5 percent of GDP in 2015. This is only a small share of the country's total social protection spending, which accounted for 13.8 percent of GDP that same year, with social insurance pensions absorbing the bulk of spending (11.1 percent of GDP). Brazil's overall allocation to social assistance is in line with the global average for developing countries, but lower than regional (1.6 percent) and BRICS (1.9 percent) averages. Two programs account for 75 percent of federal spending on social assistance: the Beneficio de Prestação Continuada (BPC) social pension and the Bolsa Família conditional cash transfer. Although a wide array of social programs is financed from the federal budget, the BPC, which is targeted to poor elderly and disabled persons, is the largest program, absorbing 0.69 percent of GDP (nearly half of all social assistance spending) in 2015. Brazil's social safety net also includes numerous smaller programs which have become more diverse over time.

Chile (2013). According to the ASPIRE database, in 2015 Chile spent around 3.5 percent of GDP on more than, ranging from social pensions, to other cash transfers, housing, scholarships, school feeding, other in-kind transfers, social care, and employment programs, among others. The programs we consider are social pensions, disability, and family support programs. Overall, they represent 1.1 percent of GDP, of which 0.8 is captured in the survey (see Table 2). Because not all the programs we consider have a clear poverty focus, coverage is not highly progressive—45 percent of individuals in the seventh income decile, for example, live in a household that receives some of the benefits. Note that the largest poverty-targeted cash transfer program, Aporte Familiar Permanente (0.1 percent of GDP), started in 2014 and is thus not included in the simulations, which are based on 2013 data.

Social Assistance is Targeted to the Poor and Size is Relatively Large (above 1.5%)

South Africa (2014). South Africa has a very generous social assistance system. According to ASPIRE, in 2015 the country spent around 3.3 percent of GDP on cash transfers alone. Cash transfer programs cover a large share of the poor population—91, 85, and 74 percent of the population in the three poorest quintiles live in a household that receives benefits. Some benefits spread to the richest quintile, but coverage decreases significantly (22 percent of the population in the richest quintile lives in a household that receives benefits). The survey captures most beneficiaries (in fact, when weights are used, the survey registers slightly more beneficiaries than administrative data).

[37]For more details see Rigolini et al. (2019).

Social Assistance is Targeted Based on Categories

The Russian Federation (2016). According to official statistics, the Russian Federation currently spends 3.2 percent of GDP on social assistance. However, some of the spending is statistical misclassification—for example, wage subsidies are counted as social assistance. Moving to internationally harmonized data, the overall level of spending is 2.8 percent of GDP, which comes close to the survey estimate of 2.4 percent of GDP in social assistance received. Only a handful of programs are poverty targeted, while most are targeted to specific groups or categories (e.g., veterans, artists, civil servants, sportsmen); and everyone within the same group is entitled to the same benefit, regardless of actual need. Hence, while 85 percent of the poor are covered by social assistance, they receive a disproportionately small share of it, with 80 percent of the budget going to the nonpoor.

Social Assistance is Through Targeted Price Subsidies

India (2012). While the bedrock of social assistance, the Public Distribution System (PDS), has been in place since 1941, the Right to Food legislation of 2001 provided new impetuous to social assistance provisions. For instance, half of the country's children age 6–14 benefit from the national school meals program; 29 percent of rural households participate in the National Rural Employment Guarantee Scheme (NREGS), which provides 100 days of work at the minimum wage to anyone interested in applying; 52 percent of the population access PDS food subsidies; and between 19 and 22 percent of senior citizens above the age of 60 receive a form of social pension. The analysis in this article is based on the PDS, since we do not consider public works in any country.

Appendix 2: Microsimulation

Baseline Scenario

Our microsimulation begins with the construction of the baseline scenario (i.e., the current system). The process is as follows. First, we use the ASPIRE Household Survey Database to extract the disposable income of households.

Second, using the ASPIRE Household Survey Database, for each member of the household observed in the microdata, we subtract the corresponding amount for the selected cash transfers currently received (i.e., the programs chosen to be replaced later with a UBI) from the reported baseline disposable income per person.[38] The control totals used for direct transfers are those obtained from household surveys as shown in Table 3.

Third, we apply the incidence of direct taxes by decile (from CEQ Data Center) to generate the baseline household prefiscal income per person. Note that prefiscal income here treats contributory pensions as deferred income rather than a government transfer.[39] Thus, we use the results for the so-called Pensions as Deferred Income (PDI) scenario in the CEQ Data Center. Note that by using the prefiscal income per person and adding the direct transfers discussed in the second step, we can construct the gross income per person.

Fourth, in order to construct baseline consumable income per person, we use the baseline household disposable income per person and apply the incidence of indirect taxes and subsidies by decile (from CEQ Data Center).[40]

The construction of income concepts also yields the baseline direct taxes, indirect taxes, and subsidies paid or received by each household and the totals. As it was mentioned before, the baseline direct transfers are directly observed in the ASPIRE Household Survey Database. We thus have the baseline incidence and concentration shares of each of these four components of the fiscal system.

Simulated Scenarios

We generate six budget-neutral UBI simulated scenarios. There are three UBI reforms: spending neutral, poverty gap, and equivalent benefits. We consider two tax scenarios for each: financing the budget gap (if there is one) by direct taxes or indirect taxes. Subsidies are considered part of the initial financing pool, therefore our UBI scenarios do not have any indirect subsidies.

[38] In the case of India, the program to be replaced is not a cash transfer. We replace the PDS (Public Distribution System) which consists of targeted price subsidy system. The subsidy each household receives was not reported in the survey but was calculated as part of the incidence analysis by Kundu and Cabrera (2018). The most important cash transfer in India is the National Rural Employment Guarantee Scheme (NREGS). We did not include it in our simulation because employment programs were not part of the exercise.

[39] For a discussion on the treatment of pensions see Lustig (2018), chapter 1.

[40] Note that for direct taxes, indirect taxes, and subsidies, we apply the incidence by decile to each household in the decile because the information is only available at the decile level. Although this misses some within-decile heterogeneity, we do not expect this heterogeneity to affect the results fundamentally.

This allows us to concentrate on the implications for the tax burden overall and across the income distribution.

The first simulated scenario is the *spending neutral UBI reform* where the total cost of the UBI program is equivalent to the cost of the programs it replaces[41] (i.e., direct cash transfers and subsidies). As shown in Table 4, under the spending neutral scenario, the size of the benefit going to the poor will be smaller than the average under the current programs.[42] An alternative could be to make the size of the UBI transfer large enough so that it fills the gap between the average prefiscal income of the poor and the poverty line. This is what we do in the poverty gap UBI, i.e., everybody receives the average poverty gap.[43] We also consider an in-between scenario: the equivalent benefits UBI. In the latter, everybody receives the equivalent of the average benefits to all beneficiaries under the existing programs (direct cash transfers and subsidies); Since current transfer programs are progressive, switching to an equivalent benefits UBI would leave the poorest of the poor with a smaller transfer (and, thus, one should expect this to be captured by a higher squared poverty gap ratio than the current system's).

We construct the six post-UBI household consumable income per person as follows (see Table A1):

1) We rank households by their baseline prefiscal income.

2) We aggregate our baseline scenario incomes, taxes, and transfers to be at the decile level.

3) We calculate the baseline direct tax rate with respect to gross income and baseline indirect tax rate with respect to disposable income for each decile. These are the baseline tax rates. (See Panel A of Table A1)

4) For each UBI scenario, we calculate the size of UBI allocated to each individual using our microdata and aggregate individuals at the decile level.

5) In each UBI scenario, we begin with the baseline prefiscal income per person (aggregated at the decile level), then add the UBI to obtain the new gross income, apply and subtract the baseline direct tax rate to construct disposable income and then apply and subtract the baseline indirect tax rate to generate consumable income (See Panel B of Table A1).[44]

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[41] For internal consistency, we consider the costs as captured by the household survey, as opposed to the administrative data.

[42] Our simulations involving the Poverty Gap scenarios are sensitive to the choice of poverty line, which vary by country. If two countries have the same poverty line, but one is wealthier than the other, as a percentage of GDP, transfers will appear to be lower in the wealthier country. As a robustness check, we reproduced our analysis for Chile and Russia, which are on the lower end of the "high income" World Bank category, using the $5.50 poverty line (the one we use for upper middle-income countries). Since our main conclusions do not change, we do not show these results, but they are available upon request. In the case of Russia, in fact, with this lower poverty line yields that almost one hundred percent of the population is not poor.

[43] In our simulations, prefiscal income equals market income plus contributory pensions. That is, we opted for treating contributory pensions as deferred income rather than as a pure government transfer to avoid an artificial exaggeration in the number of prefiscal poor since a large portion of the pensioners have "paid for" for what they receive in pensions in the form of contributions during their working years (a form of forced savings). The rationale for this option is described in chapter 1 of Lustig (2018).

[44] As mentioned before, indirect subsidies are zero in the UBI scenarios because they are considered part of the available budget for a UBI program.

6) To make the UBI scenarios budget neutral we need to adjust either the direct taxes or indirect taxes (of course, both could be adjusted simultaneously but we do not try this option here). This step creates two sub-scenarios for each of our UBI scenarios depending on which type of tax is used to observe the budget neutrality requirement. When direct taxes are adjusted, we call it DTA. The ITA sub-scenario refers to the case when indirect taxes are adjusted. We adjust the tax rates on direct or indirect taxes so that the concentration shares of the corresponding tax remain unchanged within each scenario compared to the pre-adjustment concentration shares. Note that the pre-adjustment concentration shares are not the same as the baseline scenario since we have different gross incomes in each scenario. In other words, when our baseline tax rates are applied to the new gross incomes, the concentration shares in each UBI scenario will change. This is a "mechanical" change in concentration shares resulting from the existing tax system. Our adjustment to the tax rates keeps this new concentration shares constant within each UBI scenario (again, compared to the pre-adjustment concentration shares) and achieves budget neutrality. For example, if in a UBI scenario decile 1 pays 5% of total direct taxes before the adjustment to direct taxes (to observe budget neutrality), we require this decile to pay 5% of the new total direct taxes after the adjustment.[45] This requirement has a desirable feature for policy makers: they would just need to multiply the baseline tax rates (with respect to gross income in the case of direct taxes and with respect to disposable income in the case of indirect taxes) for all deciles by a constant (i.e., a proportional increase in tax rates). To find the actual number by which tax rates need to change so that a UBI scenario is budget neutral while keeping the concentration shares of the adjusted tax constant (that is, identical concentration shares pre- and post- adjustment to the tax rates within each scenario), we use a tool developed by the CEQ Institute known as the CEQ Tax Simulator. Step 6 is described in Panel C of Table A1 for the ITA sub-scenario to illustrate how this step works. Note that all indirect tax rates from the baseline scenario are multiplied by a constant (m in Panel C).

Note that while our UBI scenarios do not change the concentrations shares of taxes pre- and post- adjustment to tax, they do change the progressivity of the tax system with respect to the baseline scenario because gross incomes change when we replace the existing transfers and subsidies with a UBI. This is part of the mechanical adjustment mentioned before, however, the adjustment to tax rates for budget neutrality does not introduce further changes to the progressivity of the tax system beyond the so-called mechanical change.

7) Once the adjustment to taxes is done, we can calculate consumable incomes by decile for each UBI scenario and corresponding sub-scenarios. Note that the budget-neutrality condition means that *total* consumable income in the baseline and all UBI scenarios is the same even though consumable incomes by decile may be different across scenarios.

8) Finally, we apply the new direct and indirect tax rates (which are determined at the decile level in the previous steps) to our household prefisc income alongside the value of UBI. This

[45] Note that we use the word "adjustment" because it is not always the case that taxes need to be *increased* in order to observe budget neutrality.

microsimulation allows us to compare each UBI scenario to the baseline and, thus, to calculate the change in poverty and inequality.

Table A1. A general example of how the baseline and a UBI scenarios are set up

Panel A: Baseline scenario

Income Decile	Prefiscal Income	Direct Transfers	Gross Income	Direct Tax Rate	Direct Taxes	Dispos Inco
1	X_1	B_1	X_1+B_1	t_1%	$T_1=(X_1+B_1)t_1$%	$DI_1=X_1$
2	X_2	B_2	X_2+B_2	t_2%	$T_2=(X_2+B_2)t_2$%	$DI_2= X_2$
…	…	…	…	…	…	…
10	X_{10}	B_{10}	$X_{10}+B_{10}$	t_{10}%	$T_{10}=(X_{10}+B_{10})t_{10}$%	$DI_{10}=X_{10}$

Income Decile	Disposable Income	Indirect Tax Rate	Indirect Taxes	Consumption Subsidy Rate	Consumption Subsidy	
1	DI_1	t'_1%	$T'_1 =DI_1\ t'_1$%	s_1%	$S_1= DI_1\ s_1$%	C
2	DI_2	t'_2%	$T'_2= DI_2\ t'_2$%	s_2%	$S_2= DI_2\ s_2$%	C
…	…	…	…	…	…	
10	DI_{10}	t'_{10}%	$T'_{10}= DI_{10}\ t'_{10}$%	s_{10}%	$S_{10}= DI_{10}\ s_{10}$%	CI_{10}

Panel B: UBI scenario before adjustment to the tax rate ("mechanical" change)

Income Decile	Prefiscal Income	Aggregated UBI	Gross Income	Direct Tax Rate	Direct Taxes	
1	X_1	UBI_1	X_1+UBI_1	t_1%	$T_1^{UBI}=(X_1+UBI_1)\ t_1$%	DI_1^{UI}
2	X_2	UBI_2	X_2+UBI_2	t_2%	$T_2^{UBI}=(X_2+UBI_2)\ t_2$%	DI_2^{U}
…	…	…	…	…	…	
10	X_{10}	UBI_{10}	$X_{10}+UBI_{10}$	t_{10}%	$T_{10}^{UBI}=(X_{10}+UBI_{10})\ t_{10}$%	DI_{10}^{UI}

Income Decile	Disposable Income	Indirect Tax Rate	Indirect Taxes	Consumable Income
1	DI_1^{UBI}	t'_1%	$T_1'^{UBI}=DI_1^{UBI}\ t'_1$%	$CI_1^{UBI}= DI_1^{UBI}-T_1'^{UBI}$
2	DI_2^{UBI}	t'_2%	$T_2'^{UBI}= DI_1^{UBI}\ t'_2$%	$CI_2^{UBI}= DI_2^{UBI}-T_2'^{UBI}$
…	…	…	…	…
10	DI_{10}^{UBI}	t'_{10}%	$T_{10}'^{UBI}= DI_1^{UBI}\ t'_{10}$%	$CI_{10}^{UBI}= DI_{10}^{UBI}-T_{10}'^{UBI}$

Panel C: UBI scenario after adjustment to the indirect tax rate (ITA sub-scenario).

Income Decile	Prefiscal Income	Aggregated UBI	Gross Income	Direct Tax Rate	Direct Taxes	
1	X_1	UBI_1	X_1+UBI_1	$t_1\%$	$T_1^{UBI}=(X_1+UBI_1)\ t_1\%$	DI_1^{U}
2	X_2	UBI_2	X_2+UBI_2	$t_2\%$	$T_2^{UBI}=(X_2+UBI_2)\ t_2\%$	DI_2^{U}
…	…	…	…	…	…	
10	X_{10}	UBI_{10}	$X_{10}+UBI_{10}$	$t_{10}\%$	$T_{10}^{UBI}=(X_{10}+UBI_{10})\ t_{10}\%$	DI_{10}^{UB}

Income Decile	Disposable Income	Indirect Tax Rate (Adjusted)	Indirect Taxes	Consumable Income
1	DI_1^{UBI}	$t''_1\%=mt'_1\%$	$T_1''^{UBI}=DI_1^{UBI}\ t''_1\%$	$CI_1''^{UBI}= DI_1^{UBI}$-T
2	DI_2^{UBI}	$t''_2\%=mt'_2\%$	$T_2''^{UBI}= DI_1^{UBI}\ t''_2\%$	$CI_2''^{UBI}= DI_2^{UBI}$-T
…	…	…	…	…
10	DI_{10}^{UBI}	$t''_{10}\%=mt'_{10}\%$	$T_{10}''^{UBI}= DI_1^{UBI}\ t''_{10}\%$	$CI_{10}''^{UBI}= DI_{10}^{UBI}$-T