The Effectiveness of Governmental Cash Transfer in promoting Economic Growth and reducing Income Inequality

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December 12, 2017

Abstract: *One of the more widely used programs to reduce poverty rates in Latin America has been cash transfers, both conditional and unconditional. Specific program evaluations suggest that these programs were successful in reducing poverty, increasing school attendance, improving healthcare access, and fueling consumption and even economic growth. We use a theoretical model to examine the macroeconomic impact of such programs and find that the recipients are able to increase consumption and their income, but such programs are detrimental for economic growth when they don't improve human capital, or the technological level of the economy. Empirical results suggest that poverty and inequality are indeed reduced by cash transfer programs, but these transfers have a muted or negative effect on output. Adjustments to the model to account for its impact on poverty rates and its contribution to technological improvements result in cash transfers raising output to pre-program levels and even generating economic growth when the correlation between the transfers and technological development is set high enough.*

Keywords: Cash Transfers; Latin America; Development.

JEL Classification: O15; F24; N96

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1.- Introduction

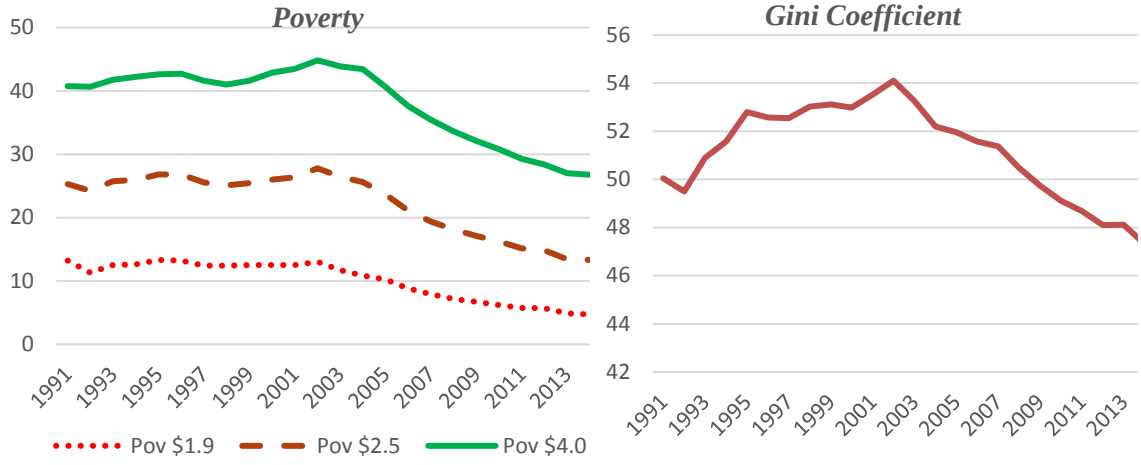
Latin America is known for its high level of poverty and inequality, prompting governments to devise policies to improve the conditions under which their populations live. The region has also experienced disappointing economic performance, especially when compared with the relatively high standing that the region enjoyed until the early 1900s. To tackle these issues, Latin American countries have been introducing programs since the 1990s to transfer monetary resources to poor families to alleviate poverty and promote economic activity through redistributive schemes. Some programs are conditioned on participation in human capital development programs, like schooling and healthcare access, and other have no strings attached when they target broader portions of the population. These transfers aim at lowering current poverty but when they can raise human capital they could affect future poverty as well. The early success of such programs has led to the implementation of similar programs in countries around the world.

The reasoning behind the use of *conditional cash transfers* (CCTs) lays in reducing poverty while encouraging educational development of the young population. In particular, CCTs take away or minimize the opportunity cost of education for poor children. For example, *Oportunidades* in Mexico and *Bolsa Familia* in Brazil are programs that aim at assisting families in poor rural areas, particularly, to keep their children in school. The goal is to alleviate poverty by providing cash payments to families in exchange of greater educational participation, improving labor productivity in the long run. By tackling poverty through educational advancement, families are not the only ones benefitting, the country as a whole benefit as well because underprivileged families are able to raise the skill of their children to eventually become more productive. The benefitting families are expected

to ensure that their children regularly attend school, receive preventive health checkup in local clinics, and are provided nutritional support to keep them healthy.

Figure 1 below shows the significant declines in poverty rates and income inequality – measured through the Gini coefficient – in the region since the turn of the century, coinciding with the implementation of such programs. While there are no long-term studies of the influence that cash transfers have had on poverty and inequality, program evaluations have provided substantial evidence of their beneficial impacts, leading policymakers and scholars to suggest that these programs are working effectively in reducing poverty and creating a more equal society. This suggested impact is particularly intuitive if such programs raise the skill of the beneficiaries, allowing them to enhance their productivity and secure better paying jobs, making such improvements permanent.

Figure 1: Evolution of Poverty and Inequality in Latin America (1991-2013)



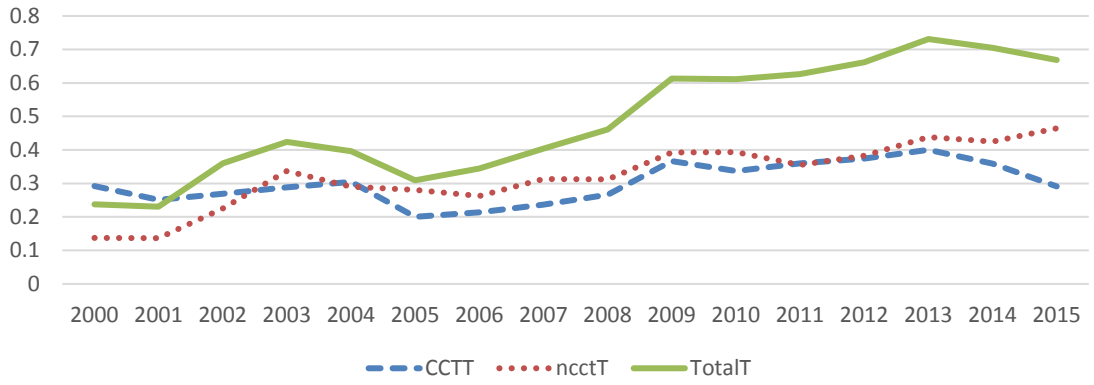
Note: Author's own calculation using data from the Socio-economic Database for Latin America and the Caribbean (SEDLAC in Spanish) and expressed as simple averages. Poverty rates are measured using the global measure of extreme poverty ($1.9 international dollars per person per day) and the two regional measures ($2.5 international dollars for extreme poverty and $4 international dollars as measure of total poverty).

While the effectiveness of cash transfers on reducing poverty and inequality seem apparent, economists have some reservation on these *conditional cash transfers* that impose requirements to entice human capital development, as they incur in additional costs to monitor compliance – relative to unconditional transfers. CCTs can also become welfare reducing if such funds end up having a muted effect on the quality of education, if used in an inefficient manner. Attaching specific uses to funds can be also perceived as paternalistic in nature, even when the social benefits of higher education are clearly greater than what individuals perceive, especially in poor households. Many countries consequently have programs that provide payments to support targeted populations without strings attached, like the elderly, the native population, specific sectors of society, etc.

By 2013, these conditional cash transfer programs have reached 135 million people in 17 Latin American and Caribbean countries and non-contributory schemes have reached 17 million individuals in 18 of these countries, with beneficiaries amounting to approximately 90 percent of the number of poor in the case of *conditional cash transfers* – although it only reaches half of the extremely poor. Figure 2 below presents simple averages for Latin American countries that have cash transfers in place during the 2000-2015 time period. While only Brazil, Ecuador and Mexico had CCT programs in place in 2000, devoting on average 0.29 percent of GDP, its popularity led 16 countries to offer these transfers by 2015 – devoting a similar percentage than them. In the case of non-contributory cash transfers, only four countries provided this support to its population in 2000, averaging 0.138 percent of GDP, but these contributions were raised to 0.46 percent by 2015, when 13 countries had programs in place. Total monetary transfers sit at around

0.69 percent of GDP in 2015 for a group of 17 Latin American countries. On average, non-contributory pensions provide bigger transfers than *conditional cash transfer* programs.

Figure 2: Evolution of Cash Transfers in Latin America (2000-2015)



Note: Author's own calculation using data from the Economic Commission for Latin America and the Caribbean, for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay. Averages for countries with Conditional Cash Transfers, non-contributive Social Pensions, and Total Cash Transfers, as a percentage of GDP.

While the literature has provided ample evidence of the effect of particular programs – especially *conditional cash transfer* programs – on education attainment, nutrition, consumption, and labor participation, the impacts that such monetary transfers could have on output, and the standard of living, in countries that have implemented such programs for the less privileged portions of their populations is still deficient, primarily because of the lack of long-term data. In addition, because these transfers aren't always fully matched with resources to the educational system, there are concerns if they truly lead to improved educational performance. Furthermore, these monetary transfers could also be affecting labor supply decisions, since a monetary windfall could reduce the incentive that poor households have to work. Because one of the end goals of these programs is to influence the future job opportunities that the poor could have to succeed, its long-term impact is critical for poverty alleviation and economic development.

The program's long-term impact is examined in this study through a theoretical model to compensate for the lack of long-term comprehensive data. The modeling strategy makes it the first study that uses a dynamic stochastic general equilibrium framework to examine the effectiveness of cash transfers on the generation of economic growth, differentiating recipients from the overall population. The model uncovers indirect effect that affect the economic performance of the country that implements the permanent cash transfer, changes that work through its effect on prices, like wages and interest rates. More importantly, it accounts for the increase in cash transfer as a reallocation of governmental expenditures to be more in line with budgeting constraints that preclude countries from freely distributing resources to the poor – aspect that differs from Cespedes (2014) and Peruffo and Cavalcanti (2017) who allocate government revenues completely for transfers and subsidies. Our results are compared to empirical findings, and the structure of the model is updated to reflect the behavior found in the data.

We find that the recipients are able to increase consumption and their income, but such programs are detrimental for economic growth when they don't improve human capital, or the technological level of the economy. Empirical results suggest that poverty and inequality are indeed reduced, but these transfers have a muted effect – or even negative – on output. Adjustments to the model to account for the hypothesized impact on poverty rates and its contribution to technological improvements result in cash transfers raising output to pre-program levels and even generating economic growth.

The rest of the paper is organized as follows. Section 2 presents a brief summary of the literature examining cash transfers and its impact on welfare, especially in terms of economic growth. Section 3 develops the closed economy model used in the study and

Section 4 presents the results. Section 5 presents empirical evidence and updates the structure of the model to account for these findings and Section 6 summarizes and concludes.

2.- Literature Review

Cash transfer to the poor have been utilized in Latin America since the late 1990s, but the two programs that have generated the most research are *Oportunidades* in Mexico and *Bolsa Familia* in Brazil. Parker and Todd (2017) provide a detailed review of the *Oportunidades* conditional cash transfer program in Mexico, and shows that most findings support the idea that the program was able to reduce poverty while improving school attendance, grade progression, healthcare access, savings and even income. They also document improvements in women's status and political participation, but caution against possible negative effects on obesity, migration, and environmental degradation (since higher consumption puts additional pressure on the country's resources).

Some of these programs have also introduced differential payments according to the age of the recipient, recognizing that the opportunity cost of staying in school is higher for older students. When conditions are met, cash payments are awarded directly to the mother or direct caregiver of the child. This method has been chosen to overcome – or at least reduce – the high levels of corruption that exist when transferring public funds and to better utilize such resources within the household. Since mothers are usually the ones responsible for sending kids to school and taking them to medical checkups, they are thought to administer these transfers better, which has even empowered females within households and incentivized political participation at the communal level.

Since students, and their families, may not have a clear appreciation of the returns to education, rendering private returns to education to be smaller than social returns, cash transfers that promote education should enhance the welfare of the population. Schultz (2004) and Berhman *et al.* (2005) find that the *Oportunidades* program in Mexico has improved school enrollment and facilitated grade progression. Furthermore, Todd and Wolpin (2006) show that *conditional cash transfers* are significantly more efficient in improving schooling, relative to unconditional transfers. However, while attendance seem to be greatly impacted, there are still questions on its impact on educational quality, especially in terms of learning and achievement. Governments usually devote resources to accommodate the increases in enrollment, but existing studies still have a hard time determining if these extra funds are sufficiently large to avoid diluting existing resources.

Robles *et al.* (2015) look at the effect of *conditional cash transfers* and non-contributory pension programs in Latin America and the Caribbean on poverty levels using the most recent nationally representative surveys for each country (usually 2013) and find that coverage is not as optimal as thought. They also show that there are significant leakages to the non-poor with 39.2 non-poor receiving *conditional cash transfers* and 48.6 percent receiving non-contributory pensions. Rural inhabitants have a greater coverage than urban dwellers, per design, as most programs were introduced to reduce extreme poverty in those areas, but leakages to the non-poor are more severe in urban centers. Better overall targeting in their simulation produces a fiscal gain that can be sufficient to improve existing poverty reduction schemes in most countries.

Cespedes (2014) uses a competitive general equilibrium model with overlapping generations calibrated to the Mexican economy to analyze the long-term effects of CCTs.

The study models households as to be composed of a parent and a child, with higher schooling acting as a skill enhancement that improves future productivity, and income. Monetary transfers fully utilize the tax revenues collected in this economy, specified as lump-sum transfers to the whole population and *conditional cash transfers* targeted to the poor. With the additional schooling raising the efficiency of labor, the *conditional cash transfers* act as a positive labor supply shock. The results of the model indicate that the permanent implementation of the program leads to an increase in human capital and years of education, reducing poverty and income inequality in the long-run. It also fuels an economic expansion of approximately 6.5 percent.

Peruffo and Calvanti (2017) extend this analysis in the overlapping generations framework to examine long-term effects on child labor and school attainment. Calibrating their model to the Brazilian *Bolsa Familia* program, they find that *conditional cash transfers* have a significant effect on increasing primary school attainment and reducing child labor in the long-run, although it temporarily forces children to work more to became eligible to participate in the program. While schooling increases, its long-term impact on human capital slowly builds up and its full impact is perceived as still forthcoming, leading to increases in output that improves welfare and reduces poverty and inequality.

Cash transfers to the poor can also affect economic activity if such monetary transfers allow the recipients to enhance their economic activities or to take additional risk, given that they can count with a constant flow of resources. Bianchi and Bobba (2013) for example examine the behavior of entrepreneurs in Mexico and find that recipients of such transfers increase their risk taking when they expect a stable source of income, the future transfers. Both unemployed and employed in salaried work recipients of cash transfers

show a greater willingness to start self-employed ventures, increasing micro-entrepreneurship. In addition, Gertler *et al.* (2012) show that recipients of these monetary transfers that presumably invested part of their payments in productive initiatives were able to increase their long-term income and consequently raise their consumption levels. Cash transfer seem to affect productivity besides the improvement arising from higher levels of education and healthcare.

Since the transfers would reduce the relative value of children's activities besides school, reducing the marginal cost of schooling, the price effect could have a magnifying effect on human capital as well, improving skills for the overall population and not just the recipients. These programs could have long-term impacts that enhance employment, investment, and income, reducing the intergenerational impact of poverty. Berham *et al.* (2011) and Parker and Vogl (2017) indeed find that *Oportunidades* raised education and labor force participation of females in the longer-term. However, even if all these effects should increase an economy's productivity and output, these cash transfer increase a family's total income and consequently could produce an income effect that reduces the provision of labor, something that current findings were not able to rule out.

While the literature provides ample evidence of the effects that cash transfers have on schooling, nutrition, and health indicators, based on empirical studies, very little is known about the long-term effects that such programs have on the macroeconomic indicators in the theoretical front. This paper differs from the heterogeneous agent models and general equilibrium frameworks traditionally used to assess the effectiveness of (conditional) cash transfers in the long run, and provides a more comprehensive analysis

of the impact that it could have on income, consumption, investment, and economic growth.

3.- Theoretical Model

3.1: Structure of the model

We model a closed economy with perfect competition. We have Ricardian and non-Ricardian households, firms, and the government. The distinction between the two types of households is incorporated to account for the poorer portions of a population, who generally have limited or no access to financial intermediation, or savings. The representative agent's objective in the Ricardian case is to choose a path for consumption and asset holdings to maximize

$$\sum_{t=0}^{\infty} \beta^t U(C_t^R, L_t^R) \tag{1}$$

where C^R is real consumption and L^R is leisure hours. We normalize the time endowment to unity, so leisure is given by $L_t^R = 1 - H_t^R$ where H^R is worked hours of the Ricardian households. We specify a utility function assuming logarithmic preferences on consumption and leisure to facilitate calibration of our model:

$$U(C_t^R, L_t^R) = \gamma \log C_t^R + (1-\gamma) \log L_t^R \tag{2}$$

Here γ is the relative weight of leisure in the above utility function. Households can consume or save in this case, and savings are achieved through investment in physical capital. The Ricardian's household budget constraint is consequently given by:

$$(1+tc)\omega C_t^R + \omega S_t \leq (1-tl) w_t \omega H_t^R + (1-tk) r_t \omega K_t^R \tag{3}$$

At time *t* the Ricardian household determines consumption of C_t^R, and labor supply H^R. Household income is determined by the real wage w_t and the return from capital

investment is determined by the interest rate r_t. Note that *tc*, *tl*, and *tk* are the tax rates for consumption, income, and investment, respectively, and ω is the weight that determines the proportion of Ricardian and non-Ricardian households. Implicit in our specification is the fact that savings is giving by the investment of Ricardian households ($S_t = I_t^R$). Private physical capital evolves according to

$$K_{t+1}^R = (1-\delta)K_t^R - \frac{\psi}{2}(K_{t+1}^R - K_t^R)^2 + I_t^R \tag{4}$$

where δ is the (constant) depreciation rate of private capital, and the capital adjustment cost is scaled by the parameter ψ. Government capital evolves in a similar fashion, but without experiencing adjustment costs – for simplicity. Government capital depreciates according to δ_G, and its dynamics are given by

$$K_{t+1}^G = (1-\delta_G)K_t^G + I_t^G \tag{5}$$

For its part, the representative agent's objective in the non-Ricardian case chooses a path for consumption and asset holdings to maximize

$$\sum_{t=0}^{\infty} \beta^t U(C_t^{NR}, L_t^{NR}) \tag{6}$$

where C^{NR} is real consumption and L^{NR} is leisure hours. We also normalize their time endowment to unity, so leisure is given by $L_t^{NR} = 1 - H_t^{NR}$ where H^{NR} is worked hours of the non-Ricardian households. We use a similar utility function for these households:

$$U(C_t^{NR}, L_t^{NR}) = \gamma \log C_t^{NR} + (1-\gamma)\log L_t^{NR} \tag{7}$$

Household in this case can only consume, since they are assumed to lack access to financial markets (to savings in this case). The non-Ricardian's household budget constraint is consequently given by:

$$(1+tc)(1-\omega)C_t^{NR} \leq w_t(1-\omega)H_t^{NR} + Transfer_t \quad (8)$$

Notice that in the non-Ricardian case households only pay consumption taxes, and no income taxes – to mimic tax treatments that exclude the poor from effective taxation and the prevalent participation of poor segments in informal economic activities. Non-Ricardian households are the recipients of the governmental cash transfer, which is the main focus of our study. These transfers are targeted to the poorest portion of the population, the non-Ricardian households in our specification, to improve their wellbeing.

The First Order Conditions for both households are given by:

$$\gamma(1-tl)w_t(1-H_t^R) = (1-\gamma)(1+tc)C_t^R \quad (9)$$

$$\frac{(1+tc)C_{t+1}^R}{(1+tc)C_t^R} = \frac{\beta[(1-tk)(r_t-\delta)+1-\omega\psi(K_{t+1}^R - K_t^R)]}{[1-\omega\psi(K_t^R - K_{t-1}^R)]} \quad (10)$$

$$\gamma w_t(1-H_t^{NR}) = (1-\gamma)(1+tc)C_t^{NR} \quad (11)$$

Government tax revenues come from consumption taxes, income taxes, and capital taxes, and is given by the following expression:

$$TR_t = tc\,\omega C_t^R + tc(1-\omega)C_t^{NR} + tlw_t\omega H_t^R + tkr_t\omega K_t^R - tk\delta\omega K_t^R \quad (12)$$

Notice that the last term in the right-hand side acknowledges that some capital depreciates by the time that capital taxes are collected. The government in this model is assumed to use its tax revenues to finance government investment, which affects the production of goods (more on this when the production function is specified), and cash transfers to the poorest portion of the population (the non-Rinardian households in our setting).

$$TR_t = Transfer_t + I_t^G \quad (13)$$

Where $Transfer_t$ is specified as a percentage of GDP, being given by

$$Transfer_t = B_t\theta Y_t \quad (14)$$

The aggregation of consumption, labor, capital, and investment is given by:

$$C_t = \omega C_t^R + (1-\omega) C_t^{NR} \tag{15}$$

$$L_t = \omega L_t^R + (1-\omega) L_t^{NR} \tag{16}$$

$$K_t = \omega K_t^R \tag{17}$$

$$I_t = \omega I_t^R \tag{18}$$

We specify the firm's production technology using a parametric, Cobb-Douglas functional form:

$$Y_t = A_t (K_t^R)^{\alpha 1} (K_t^G)^{\alpha 2} (H_t)^{\alpha 3} \tag{19}$$

where K^R is private physical capital and K^G is public physical capital. Constant returns to scale imply that ($\alpha 1 + \alpha 2 + \alpha 3 = 1$). This type of production function allows for public capital to affect the productivity of the firm, but does not affect the compensation of factors of production, whose proportion of total income are still determined by α, with $0 < \alpha < 1$.

The firm's objective is to maximize its profits, and the first order necessary conditions for the household's choice of labor and capital take the form:

$$w_t = (1-\alpha)\frac{Y_t}{H_t} \tag{20}$$

$$r_t = \alpha \frac{Y_t}{K_t} \tag{21}$$

The productivity shock A_t is specified as commonly done in the literature:

$$\log(A_{t+1}) = (1-\rho_A)\log(\overline{A}) + \rho_A \log(A_t) + \varepsilon_{A,t+1} \tag{22}$$

We also define B_t as the shock to the cash transfers, which evolves according to the first order autoregressive process:

$$\log(B_{t+1}) = (1-\rho_B)\log(\overline{B}) + \rho_B \log(B_t) + \varepsilon_{B,t+1} \tag{23}$$

Here $\varepsilon_{A,t+1}$ and $\varepsilon_{B,t+1}$ are white noise innovations with variance σ_A^2 and σ_B^2, respectively.

Market equilibrium in this model is given by

$$Y_t = C_t + I_t + I_t^G \tag{24}$$

3.3: Calibration and steady state equilibrium

The calibration of the model uses standard values for the capital share, α, the subjective discount factor, β, and the depreciation rate of capital, δ, but since our production function also accounts for government investment (public capital), α_1, α_2, and α_3 are set at conservative levels that allow for public investment to contribute to overall production (public investment can be envisioned as the roads, energy, institutional strengths, etc. that the government provides in our economies). We set the parameter γ such that the weigh for leisure in the utility function is 40 percent and that the parameter ω represents 70 percent of Ricardian households in the total population, reflecting the average poverty rates in the region (29 percent of the population, as of 2015). The adjustment cost of capital, ψ, is set to 0.015 to smooth capital adjustment.

Table 1: Model Calibration Values

$\alpha = 0.35$	$\gamma = 0.4$	$\psi = 0.015$	$tl = 0.14$	$\rho_A = 0.95$
$\alpha 1 = 0.315$	$\theta = 0.01$	$\delta = 0.025$	$tk = 0.08$	$\sigma_A = 0.00816$
$\alpha 2 = 0.1$	$\beta = 0.988$	$\delta_G = 0.02$	$tc = 0.14$	$\rho_B = 0.999$
$\alpha 3 = 0.585$	$\omega = 0.7$			$\sigma_B = 0.00194$

Taxes for labor (*tl*) and consumption (*tc*) are assumed to be 14 percent, and taxes for capital (*tk*) are assumed to be 8 percent. These rates produce tax revenues of approximately 18 percent of GDP (slightly higher than the actual tax revenues for the region, which is 15 percent of GDP), from where 55 percent is collected from consumption,

38 percent is collected from income, and 6 percent is collected from capital (just like the regional averages). The depreciation of public capital (δ_G) is set to 0.02, slightly lower than the depreciation rate of private capital

We also set our initial value of θ at 0.01 to allow for *Transfers* to be 1 percent of GDP, a slightly higher percentage than in the region. While the parameters describing the technological shock are standard (ρ_A and σ_A), we take a bit of an *ad hoc* approach with the calibration of the persistence coefficient of the cash transfers, ρ_B, which is set at its highest value to mimic permanent shocks – with the standard deviation, σ_B, set at conservative level.

Table 2 – Steady State Values

	Mimicking Poverty Rates (29%)	Percent of Output
Output	2.22306	1.00
Weight of Ricardian/Non-Ricardian	0.7	-
Consumption	1.38502	0.62
Ricardian Consumption	1.35433	-
Non-Ricardian Consumption	1.45662	-
Investment	0.50918	0.22
Ricardian Investment	0.72740	-
Public Investment	0.32885	-
Physical Capital	20.3672	-
Ricardian Capital	29.0960	-
Public Capital	16.4425	-
Hours Worked	0.35440	-
Ricardian Hours Worked	0.33953	-
Non-Ricardian Hours Worked	0.38909	-
Real Wages	4.07728	-
Real Interest Rate	0.03820	-
Tax Revenues	0.35108	-
Cash Transfers	0.02223	-

These parameters produce steady state values that are in accord with the existing literature, and are described in Table 2 above. Consumption is 62 percent of GDP and investment represents 22 percent of GDP. The real interest rate in the economy is 3.8 percent. Physical capital in this economy is 9 times its GDP, and people spend working approximately 35 percent of their time (approximately 59 hours per week without considering paid leave time).

4.- Results

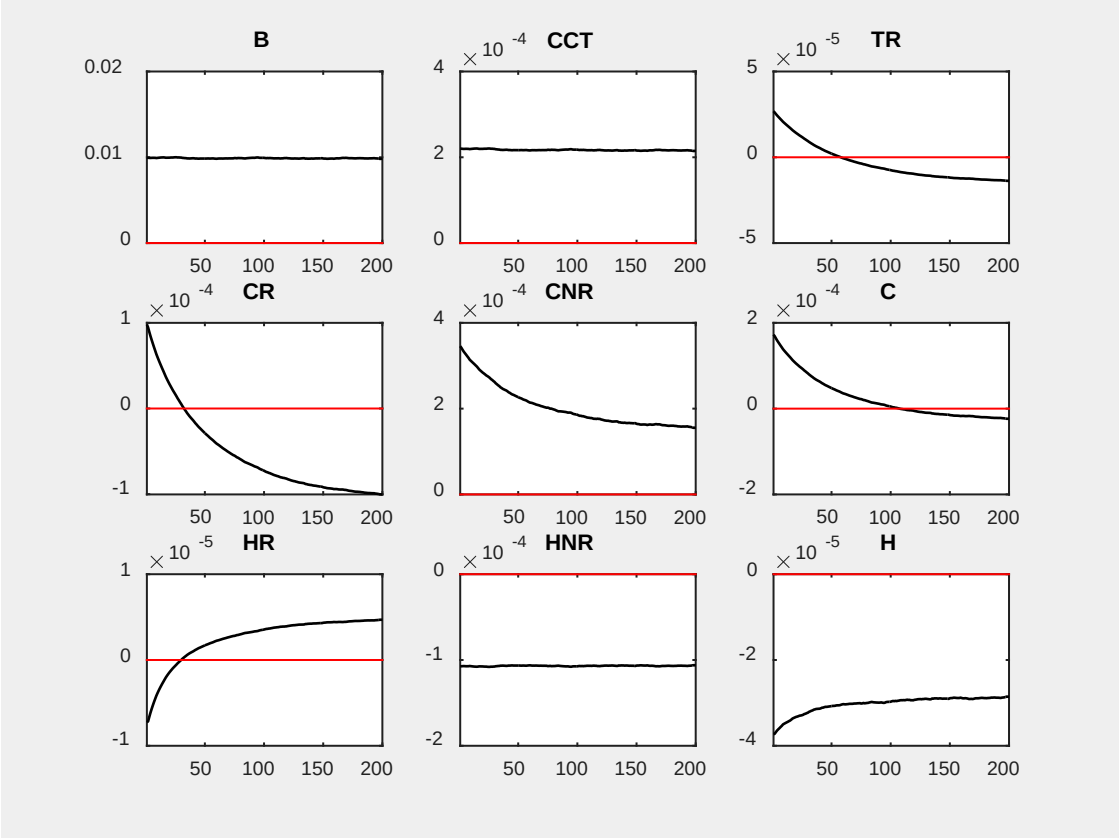
The model generates dynamics from technology shocks that are in accord with the stylized facts. A positive technological shock increases the interest rate on impact and pushes the real wage upwards, causing an instantaneous increase in work effort in the Ricardian households but lower work effort in non-Ricardian households, since transfers are temporarily higher (tax revenues increase as output expands, allowing for higher levels of transfers). Overall work effort increases, which combines with higher levels of capital, because of higher levels of private and public investment, to produce a prolonged increase in output, as commonly documented in the literature.[2]

The effect of a permanent increase in cash transfers of the economy is presented below in Figures 3 and 4, through impulse response functions. The "permanent" 1 percent shock on cash transfers raises the amount that is transferred to the non-Ricardian households by almost 0.02 percent and tax revenues by 0.003 percent on impact, fueled by a relatively larger initial increase in consumption taxes than the decline in labor income taxes. The additional resources allow the non-Ricardian households to increase their consumption in a permanent way, but it also allows the Ricardian households to increase

[2] The dynamics for this shock are available in the appendix (later in the author's web page).

their consumption above the steady state momentarily. The cash transfer exerts a wealth effect on non-Ricardian households, allowing them to reduce their hours worked by 0.01 percent permanently, which pushes wager above their initial level and serves as an incentive for Ricardian households to also reduce their supply of labor, or hours worked, initially. This higher income is what allows the Ricardian households to increase consumption initially, resulting in an increase in consumption in the economy.

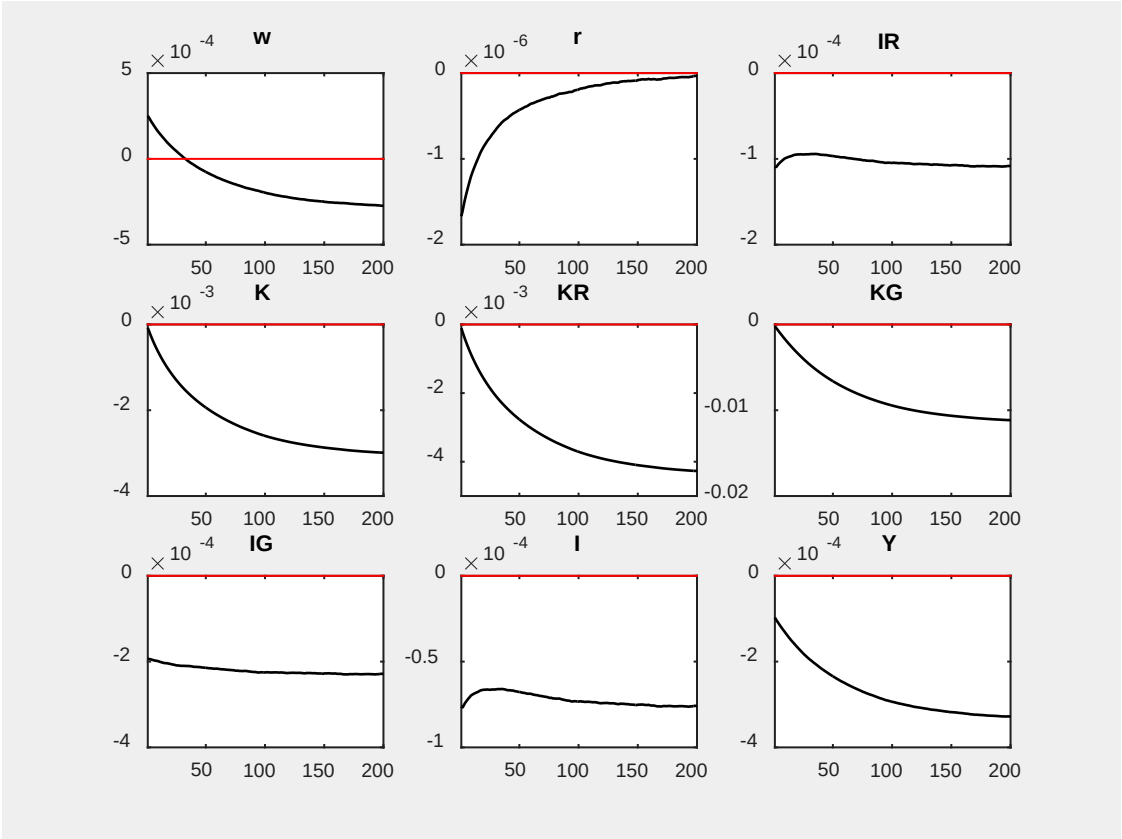
Figure 3: IRF's from a 1 percent permanent shock on Cash Transfers



However, since the increase in cash transfers mean a reduction in public investment, and the productivity of the firm becomes compromised, the wage rate starts to decline in the second period, forcing the Ricardian households to slowly increase their

hours worked. Overall worked hours never recover to its initial steady state level, and the income of the Ricardian households declines continuously to levels below the initial level, causing a constant decline in Ricardian consumption that in the long term precludes these households from consuming at pre-shock levels – something that is not the case for the non-Ricardian households. The "permanent" increase in cash transfers reduce the consumption of the Riacrdian households even if they work more hours, but non-Ricardian households are able to consume more even when they reduce their work effort.

Figure 4: IRF's from a 1 percent permanent shock on Cash Transfers



Because the cash transfers mean a reassignment of public funds, from public investment towards non-Ricardian households, public investment declines by almost 0.02

percent on impact and then continue to decline through time a little bit more because of the decline in tax revenues caused by the reduction in economic activity. Even if the interest rate falls slightly on impact, the negative effect on productivity and subsequent increase in the interest rate reduce the amount of private investment that lowers the amount of private capital monotonically. Since both private and public capital contract, and labor does not recover to pre-shock levels, output falls on impact by almost 0.01 percent and continues to fall to a level almost 0.035 percent below its initial level through time.

While the "permanent" increase in cash transfers is beneficial for the non-Ricardian households, as it increases its consumption and leisure time, it is detrimental for the Ricardian households who experience a decline in their steady state consumption even when they are forced to work longer hours. The overall economy is also affected negatively since steady state output is lowered to levels below its initial steady state production. This change is consequently detrimental for overall welfare, at least theoretically.

5.- Empirical Estimation

Conditional cash transfers are perceived as one of the most important anti-poverty policies in place, suggesting that it effect on poverty levels should be able to reduce the percentage of non-Ricardian households in our setting, something that our specification initially prevents – the share of poor households if fixed by design. The literature also finds that cash transfers are used for educational purposes, which should raise the productivity of the country and improve economic activity in the long-run. Some findings also suggest that recipients embark on entrepreneurial activities, with resources allowing the recipients to invest in productive capacity, through the direct use of those resources or by guaranteeing a permanent source of income that allows them to undertake riskier activities.

We turn our attention to the empirical evidence to try to gain some insight in these areas by examining the effect that cash transfers can have of poverty, inequality, and economic growth.

We use data for *Conditional Cash Transfers* and for disbursements to Non-Contributory Pension schemes from the Economic Commission for Latin America and the Caribbean (ECLAC), for 17 Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Uruguay. The data is from actual expenditures, but uses budgeted figures when actual expenditures are missing. We also extrapolate transfers when less than two years are missing, using the simple average of the figures that are available.[3] The data for the remainder measures used in the estimation come from the World Development Indicators database and from individual Central Banks for remittances. While there is only yearly data for our measures, and our theoretical model uses quarterly figures for its calibration, the importance of this estimation is to get some insight into its relevance in determining poverty and productivity linkages.

The specification for poverty and inequality extends the one used by Vacaflores (2017), incorporating cash transfers to the explanatory variables, and retains a similar structure for output to make it comparable to the two previous specifications. The high persistence of poverty, inequality, and output are modelled through the following dynamic panel data specifications:

$$Y_{i,t} = \alpha_1 Y_{i,t-1} + \alpha_2 GDPgr_{i,t} + \alpha_3 GDPpc_{i,t} + \alpha_4 Un_{i,t} + \alpha_5 LFPR_{i,t} + \alpha_6 Health_{i,t} + \alpha_7 Aid_{i,t} + \alpha_8 REM_{i,t-1} + \alpha_9 Transfer_{i,t-2} + \varepsilon_{i,t}$$

[3] Extrapolation represents less than 3 percent of our cash transfer data.

where *Y* is the variable of interest in country *i* during year *t*. Poverty (like inequality and GDP growth) are postulated to be a function of its previous level, real GDP growth (except in the growth specification), the level of development (real GDP per capita), the unemployment rate, the labor force participation rate, healthcare access, foreign development aid, international remittances, and governmental cash transfers. Notice that remittances are specified as having a lagged effect and the cash transfers as having a two-year lag, since it takes time for these monetary transfers to affect the welfare of the population. The error term follows the standard one-way error specification:

$$\varepsilon_{i,t} = \mu_i + \nu_{i,t}$$

where μ_i denotes the unobservable country specific effect and $\nu_{i,t}$ denotes the remainder disturbance, i.i.d. over the whole sample with variance σ_ν^2.

Table 3 below present the results, for the impact of *Conditional Cash transfers* as a percentage of GDP, non-contributory transfers as a percentage of GDP, and for all cash transfers as a percentage of GDP on economic growth, poverty, and inequality.[4] The estimates of the growth specification show that only non-contributory transfers have a statistically significant effect on real GDP per capita, indicating that a one percentage point increase in these transfers leads to a 0.1 unit decline in real GDP per capita – approximately $100 dollars in purchasing power parity. *Conditional Cash Transfers* and Total Cash Transfers are found to have a muted – no statistically significant effect – on economic growth. The middle results indicate that cash transfers, irrespective of their measurement, have a negative and statistically significant effect on poverty in Latin America, suggesting

[4] Complete results are available in the Appendix not for publication and will be made available in the author's web page. All estimations use the Arellano and Bond (1991) and Arellano and Bover (1995) methodology

that a one percentage point increase in cash transfers as a percentage of GDP leads to a 3-5 percentage point decline in the poverty rate in the region. The effect that cash transfers have on income inequality are less conclusive but suggest that these cash transfers are still important in the region, with *Conditional Cash Transfers* and Total Cash Transfers exerting a negative and statistically significant effect on the Gini coefficient.

Table 3: Empirical Findings

	Conditional Cash Transfers	Other Monetary Transfers	Total cash transfers
Growth Specification			
L2.cct	0.045		
	(0.093)		
L2.other		-0.113*	
		(0.068)	
L2.transfer			-0.013
			(0.063)
Poverty Specification			
L2.cct	-4.865***		
	(1.438)		
L2.other		-2.599**	
		(1.174)	
L2.transfer			-3.368***
			(0.934)
Inequality Specification			
L2.cct	-3.016**		
	(1.127)		
L2.other		-1.247	
		(0.836)	
L2.transfer			-1.943**
			(0.700)

*Note: Standard errors are in parenthesis. Statistical significance is given by * for 10% significance level, ** for 5% significance level, and *** for 1% significance level.*

These results suggest that cash transfers are helping reduce poverty and income inequality in the region, but their impact on economic growth is muted and even negative. Our theoretical results of reduction in output are in line with the effect that non-contributory cash transfers have on economic growth, but they are silent on the impact that they can have on poverty and inequality – measured by our proportion of Ricardian and non-Ricardian households.

However, since these cash transfers have a multi-dimensional effect on education, healthcare, income, and even entrepreneurship, all which could potentially affect productivity and future economic performance, we adjust our model to account for the impact the they could have on income but also on productivity. The literature emphasizes the greater school attendance achieved through these programs, allowing recipients to participate more efficiently in labor markets, while healthcare access and nutritional supplements ensures a healthier population that should exert a more optimal work effort. The effect that these programs have on entrepreneurship and investment also suggest broader implication for technology. We incorporate these potential effects on poverty and production through two changes in our model.

To account for the effect that cash transfers could have on poverty, the proportion of "wealthier" households – ω – is endogenized. We assume that cash transfer to the "poor" and changes in the income of these recipients affect the proportion of "poor" – and consequently "wealthier" – people in the economy, with a lag of two years. The parameter η calibrates such influence. We model this impact through the following equation:

$$\omega_t = \eta Transfers_{t-8} + \eta w_{t-8} H_{t-8}^{NR} \qquad (22)$$

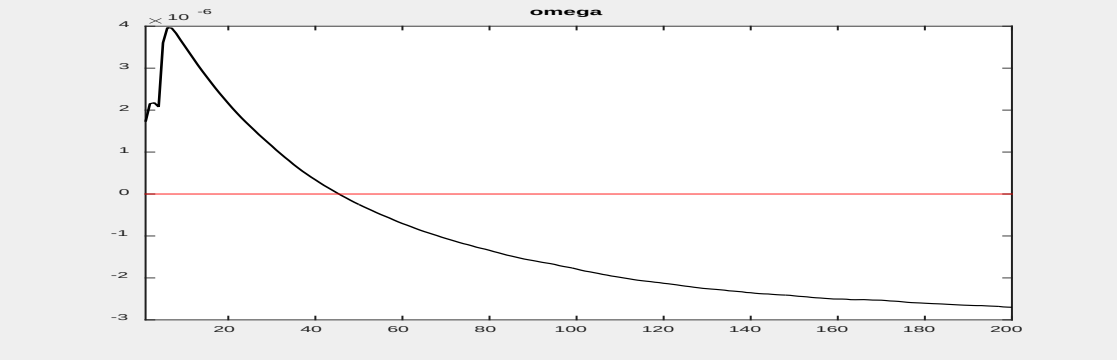
The presumed effect of cash transfers of productivity is incorporated in the model through the productivity parameter. We update the productivity shock A_t to allow for improvements in human capital, entrepreneurship, and other dimensions to affect the skill of its population, and consequently the productivity of the country in the following manner:

$$\log(A_{t+1}) = (1-\rho_A)\log(\overline{A}) + \rho_A \log(A_t) + \rho_{AB} \log(B_{t-16}) + \varepsilon_{A,t+1} \qquad (23)$$

where the parameter ρ_{AB} calibrates the influence of the cash transfers in future productivity. Cash transfers affect the technology of the country 4 years after this assistance is increased, assuming that it takes time for human capital and entrepreneurship to improve.

The endogeneization of the parameter measuring the proportion of "wealthier" households generate the expected dynamics in the short run, leading to an increase in the proportion of Ricardian households for the first 10 years. However, when only this change is introduced in the model, the remaining variables remain very stable, which means that the "permanent" shock on cash transfers continues to reduce output in the long term, exerting a downward pressure on wages. Consequently, labor income for non-Ricardian decline through time, because of lower labor market participation and declining wages, compromising the welfare of the population and increasing the proportion of "wealthier" households in society to levels below their initial level. Figure 5 below presents these particular dynamics for the proportion of "wealthier" households.

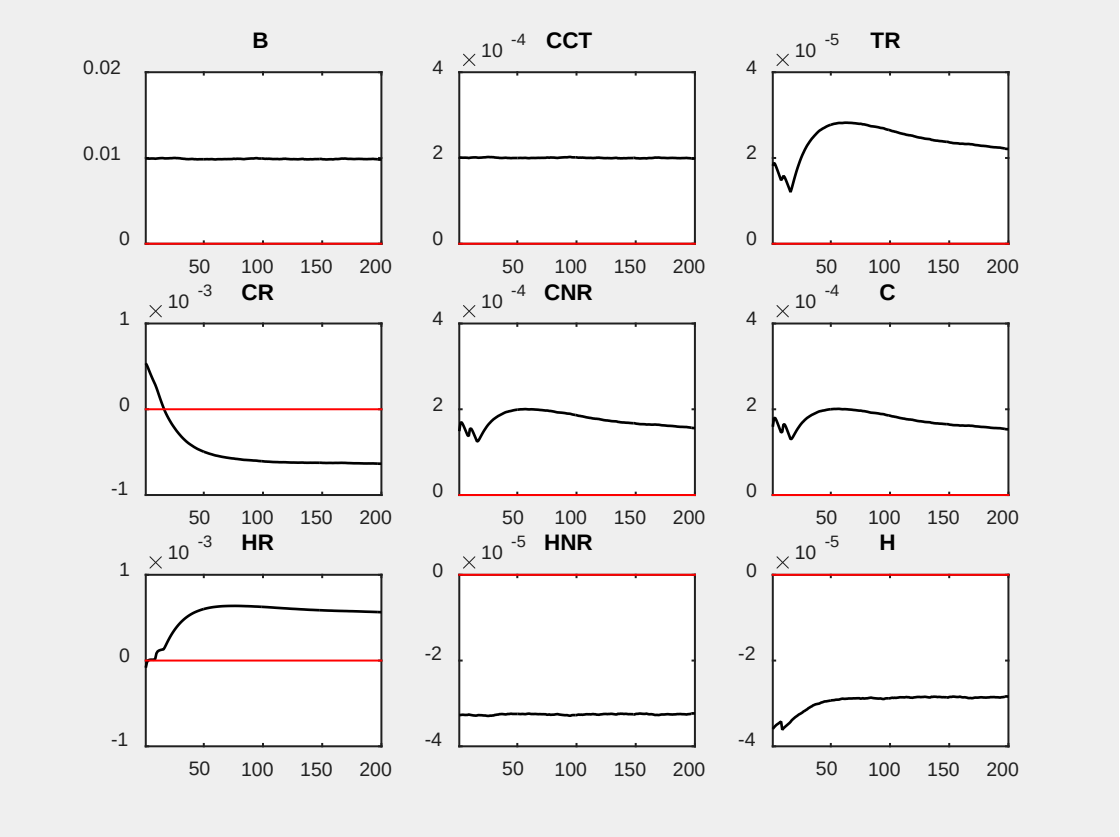
Figure 5: IRF's from a 1 percent permanent shock on Cash Transfers when only the proportion of "wealthier" households is endogenized



After verifying the reasonable dynamics of the parameter that determines the proportion of Ricardian and non-Ricardian households, we incorporate the improvements

in technology that cash transfers are supposed to have through human capital and entrepreneurship in Figures 6 and 7. While calibration of the correlation parameter that determines how much of the cash transfer would propagate to the technology dynamics produces arbitrary recoveries of output, we present in the IRFs below partial recovery, to be consistent with the empirical findings discussed before.[5]

Figure 6: IRF's from a 1 percent permanent shock on Cash Transfers

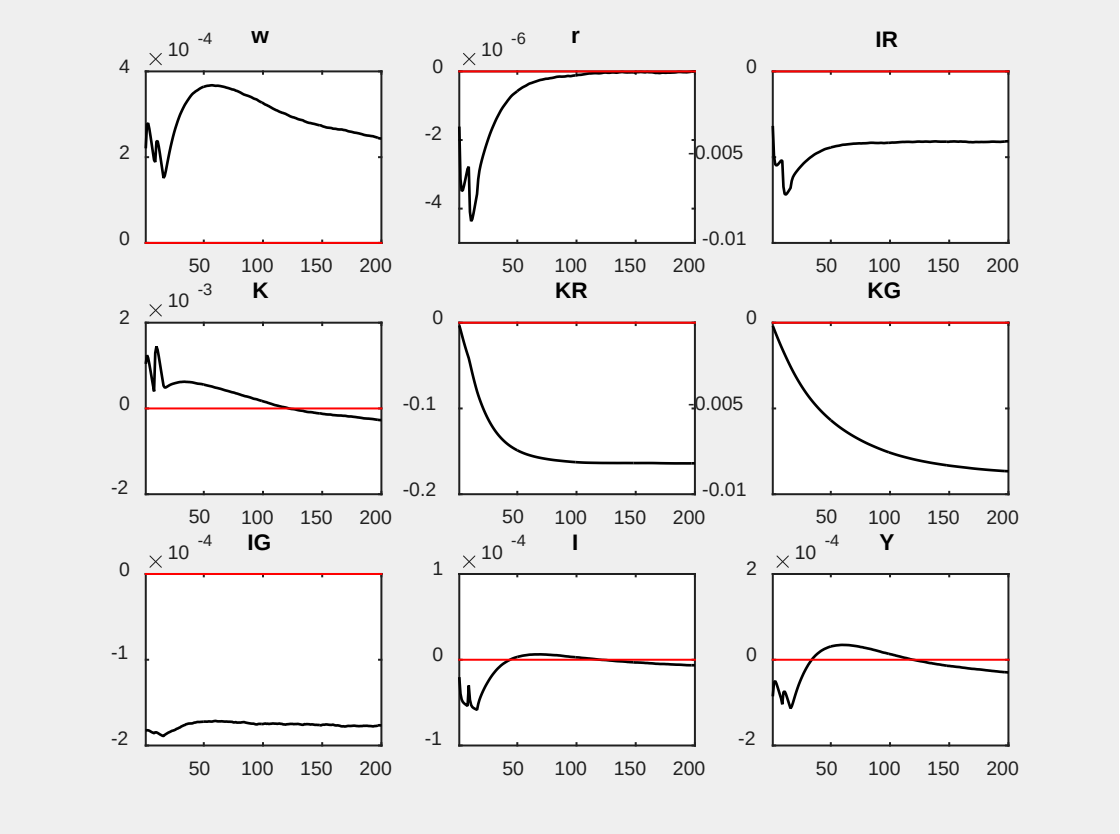


As it can be observed, the "permanent" cash transfer shock continues to present the same initial dynamics, with the transfer increasing consumption for non-Ricardian households and lowering their work effort, while Ricardian households increase their

[5] Complete dynamics for alternative levels of correlations are available in the author's web page, for the case of exogenous determination of the proportion of "wealthier" households.

consumption – due to higher income – but experience a smaller decline in work effort. The reallocation of public funds towards the transfers reduce public investment, giving way to a continuous decline in public capital, and even if the interest rate is pushed downwards, on impact the negative effect on production gives way to a lowering in private capital as well. The overall decline in work effort reduces output on impact, and the subsequent decline in capital – both private and public – keep output below its initial level in the short term, just like in our baseline scenario.

Figure 7: IRF's from a 1 percent permanent shock on Cash Transfers



The subsequent decline in wages compounds with labor participation to reduce the income of the non-Ricardian workers to reduce somewhat their consumption. At the same time, the higher proportion of "wealthier" households experiencing higher labor income

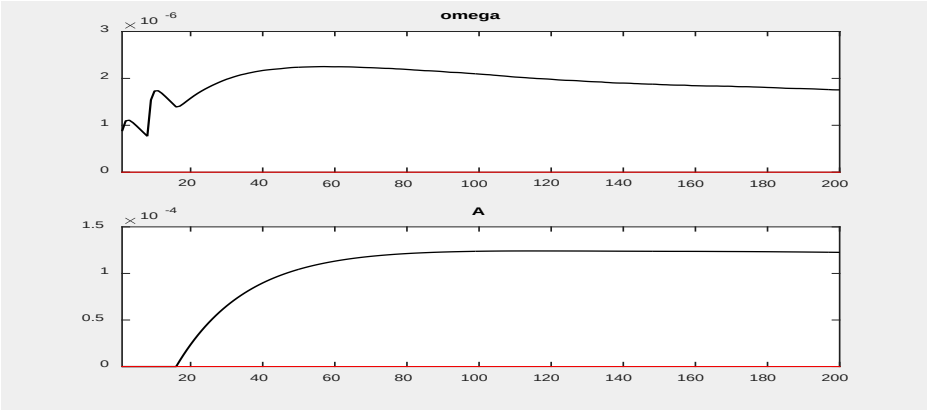
but declining savings (in capital) reduce their overall income and leads to a smooth decline in their consumption – consumption dynamics for these households are largely unaffected by the extension of the model. However, when the cash transfer starts to affect the proportion of "wealthier" households, the fall in wages is halted, allowing the non-Ricardian households to keep a relatively similar level of consumption. The improvement in labor participation of Ricardian households raise somewhat labor supply, which lower output slightly, although still below the initial level because of the decline in capital.

In the sixteen period, the cash transfers start to improve the productivity of the economy, which starts to exert an upward pressure on both the interest rate and wages, further incentivizing Ricardian households to increase their work effort and their investment in capital. The trickledown effect on technology is strong enough to raise output to the initial level even if capital is still falling. The technological improvement ends approximately 20 years after the change in cash transfers, when private capital also stabilizes – although at a lower level than the initial amount. Allowing for cash transfers to affect poverty rates (the proportion of Ricardian and non-Ricardian households) and eventually raise human capital and entrepreneurship (the technological level) are effective in permanently raising the proportion of "wealthier" households and bringing output to levels close to their initial level.

Figure 8 below shows the behavior of the parameter that determines the proportion of "wealthier" households and the evolution of the productivity shock. As it can be observed in the top graph, the "permanent" increase in cash transfers raises the proportion of wealthier households on impact, but such beneficial impact is reinforced by the effect on poverty and subsequent impact that productivity improvements have on overall income,

making the reduction in poverty permanent. The behavior of the productivity parameter is also reasonable, as it improves productivity but only to a point, as it levels off after 20 years. The effect of the cash transfer on productivity has a level effect.

Figure 8: Behavior of the poverty parameter and productivity



Our results emanating from this more comprehensive modeling indicate that output will recover, or would not fall as much, if there is some influence of these cash transfer on the productivity of the economy. Of course, the long-term effect depends on how efficient are cash transfers (*Conditional Cash Transfers* in particular) in improving human capital. To gage the model accuracy, I report the volatility, autocorrelation, and correlation with respect to output for the main macroeconomic aggregates in Table 4. The upper portion of Table 4 shows the unconditional moments of the model simulation while the bottom portion present the behavior of the actual data, expressed in growth rates. As it can be observed, cash transfers are almost four times more volatile than output for our sample of Latin American countries, like consumption. The remaining variables are less volatile. Cash transfers also present a low and negative correlation (-0.13) with output in this sample.

Table 5: Unconditional Moments (quarterly changes)

Model	St. Dev.	Relative St. Dev.	Autocorrelation	Corr w/ output
Output	0.000265	1.00	0.890	1.00
Cash Transfers	0.001059	3.99	0.969	-0.1281
Labor	0.000166	0.62	0.962	0.2061
Interest Rate	0.000012	0.04	0.960	0.6165
Investment	0.000147	0.55	0.939	0.8215
Consumption	0.000989	3.73	0.976	-0.0236
Data				
Output	0.0389	1.00	0.255	1.0000
Cash Transfers	0.0051	1.13	0.939	-0.0367
Labor (LFPR)	0.0131	0.33	0.442	0.0771
Interest Rate	0.1222	3.14	0.767	0.2370
Investment	0.1232	3.16	0.176	0.8235
Consumption	0.0394	1.11	0.281	0.8096

Note: Variables were transformed to growth rates (ΔlnX) in the data estimation, using the 17 countries of the sample. Model estimates are obtained using H-P simulations.

In terms of the behavior of the actual data, the volatilities of cash transfers and consumption remains higher than the volatility of output, but are much smaller. The interest rate and investment behave more volatile than the observed in the model. The correlation of cash transfers with respect to output remains negative but it is a quarter of the one observed in the model, and the correlations of labor, the interest rate, and investment with respect to output remain positive but are smaller than in the model. While the model captures most of the autocorrelation observed in the data, it fails to match the correlation of consumption with respect to output. Overall, the model seems to capture the moments emanating from the data relatively well.

6.- Conclusions

This paper examines the macroeconomic impact that increases in cash transfers can have on economies that expand their allocation of funds into these programs, and investigates the long-term impact that these social assistance programs can have on

economic growth, and hopefully on reducing poverty and income inequality. Our results indicate that cash transfers generate a direct benefit for the recipients in terms of consumption and leisure time, but have an adverse effect on output, which falls on impact. However, since it has a long-term negative impact on output, which recovers only slowly, it becomes detrimental for the economy. Of course, the long-term effect depends on how efficient are cash transfers (c*onditional cash transfers* in particular) in improving human capital, which can ameliorate the negative impact and even overturn it if the effect on productivity is large enough.

Cash transfers, as a percentage of GDP, are not large in most developing countries, and the deficient coverage of the extremely poor limit the true impact that can have on poverty alleviation. In many cases the extreme poor are hard to reach, because of geography or lack of documentation. Some studies estimate that 70 percent of all government transfers actually ended up benefiting the top 40 percent of the population (in Europe they usually receive their respective share, around 40 percent), a disproportional share of public spending on social programs. Part of the leakages could be solved by a more efficient process of recertification or the implementation of exit mechanisms to free funds as recipients improve their income generation. While cash transfer programs seem to be working, in terms of school attendance, poverty reduction, and decreases in inequality for example, there is still a need for research to measure how the implementation of successful programs in one country affect the implementation of similar programs in another country.

Combating poverty and alleviating poverty in fact requires a multifaceted approach that combines social assistance programs with programs that promote equality of opportunities for the new generations to be able to insert themselves effectively into the

labor force. Improving economic opportunities and training programs for the poor requires funding, like for skill training programs, forcing governments to make budgetary decision that require a thoughtful understanding of the long-term impact of cash transfer programs. For governments to direct more resources to these cash transfer programs, the recipients have to show that such assistance is leading to higher educational achievement and improved productivity (at least in some countries), to affect the economic performance of the country. These social programs have to create synergies conducive of better income-generating capabilities for the intergenerational transmission of poverty to be broken.

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Appendix

A.1. List of Variables

C_t, C_t^R, C_t^{NR}, Y_t, H_t, H_t^R, H_t^{NR}, w_t, r_t, I_t, I_t^R, I_t^G, K_t, K_t^R, K_t^G, A_t, B_t, TR_t, $Transfer_t$

A.2. System of Equations

(A1) $\gamma(1-tl)w_t(1-H_t^R) = (1-\gamma)(1+tc)C_t^R$

(A2) $$\frac{(1+tc)C_{t+1}^R}{(1+tc)C_t^R} = \frac{\beta[(1-tk)(r_t-\delta)+1-\omega\psi(K_{t+1}^R-K_t^R)]}{[1-\omega\psi(K_t^R-K_{t-1}^R)]}$$

(A3) $\gamma w_t(1-H_t^{NR}) = (1-\gamma)(1+tc)C_t^{NR}$

(A4) $(1+tc)\omega C_t^R + \omega I_t^R = (1-tl)w_t\omega H_t^R + (1-tk)r_t\omega K_t^R$

(A5) $(1+tc)(1-\omega)C_t^{NR} = w_t(1-\omega)H_t^{NR} + Transfer_t$

(A6) $C_t = \omega C_t^R + (1-\omega)C_t^{NR}$

(A7) $H_t = \omega H_t^R + (1-\omega)H_t^{NR}$

(A8) $K_t = \omega K_t^R$

(A9) $I_t = \omega I_t^R$

(A10) $TR_t = tc\omega C_t^R + tc(1-\omega)C_t^{NR} + tlw_t\omega H_t^R + tkr_t\omega K_t^R - tk\delta\omega K_t^R$

(A11) $TR_t = Transfer_t + I_t^G$

(A12) $Transfer_t = B_t\theta Y_t$

(A13) $Y_t = A_t(K_t^R)^{\alpha 1}(K_t^G)^{\alpha 2}(H_t)^{\alpha 3}$

(A14) $$K_{t+1}^R = (1-\delta)K_t^R - \frac{\psi}{2}(K_{t+1}^R - K_t^R)^2 + I_t^R$$

(A15) $K_{t+1}^G = (1-\delta_G)K_t^G + I_t^G$

(A16) $$w_t = (1-\alpha)\frac{Y_t}{H_t}$$

(A17) $$r_t = \alpha\frac{Y_t}{K_t}$$

(A18) $\log(A_{t+1}) = \rho_A \log(A_t) + \varepsilon_{A,t+1}$

(A19) $\log(B_{t+1}) = \rho_B \log(B_t) + \varepsilon_{B,t+1}$

Appendix (Not for publication but available in the author's web page)

Figure A1: IRF's from a 1 percent technological shock

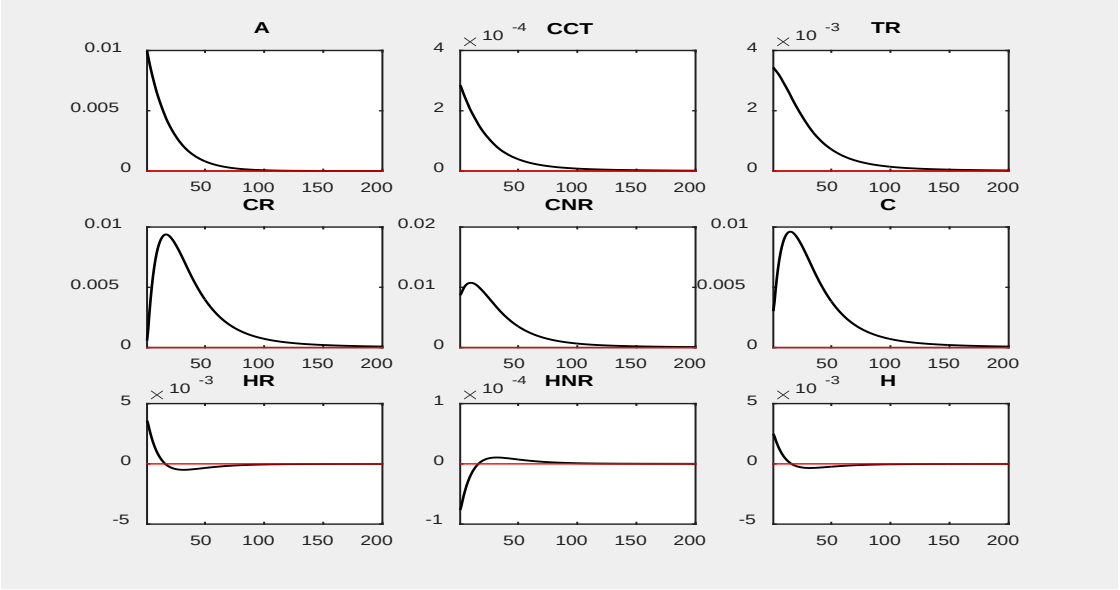

Figure A2: IRF's from a 1 percent technological shock

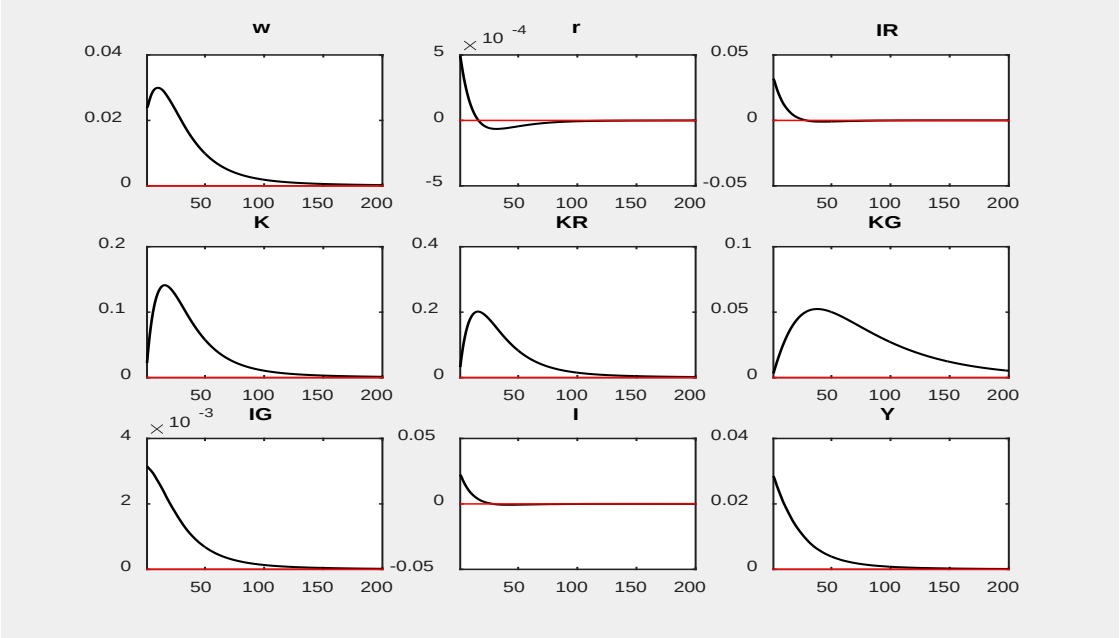

Figure A3: IRF's from a 1 percent permanent shock on Cash Transfers when the proportion of "poor" is endogenized

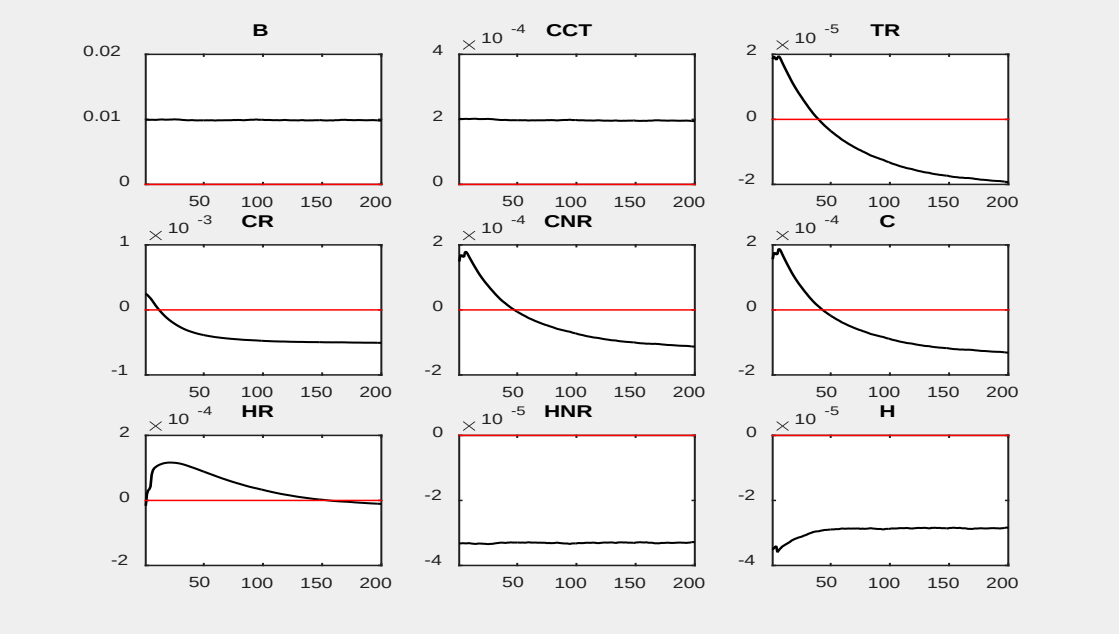

Figure A4: IRF's from a 1 percent permanent shock on Cash Transfers when the proportion of "poor" is endogenized

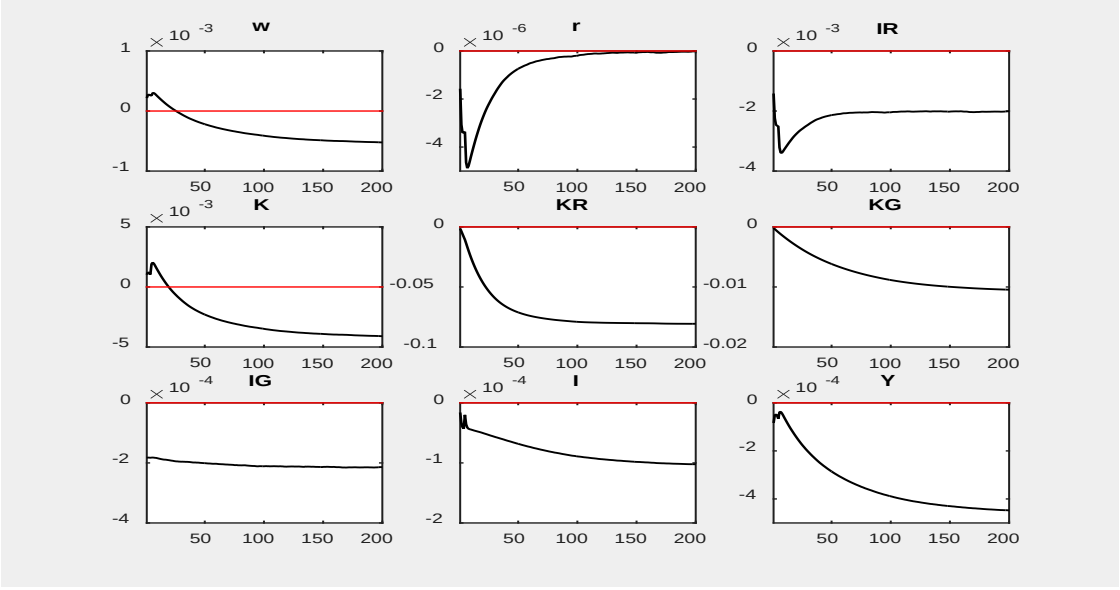

Table A1: Growth Specification

	Conditional Cash Transfers	Non-Contributory Transfers	Total Cash transfers
L.rgdppcppp	0.985***	1.023***	1.012***
	(0.015)	(0.009)	(0.012)
L.rrempcppp	0.041	-0.408	0.123
	(0.212)	(0.264)	(0.225)
un	-0.031**	-0.015*	-0.022**
	(0.013)	(0.008)	(0.011)
lfpr	0.038**	0.014	0.025**
	(0.012)	(0.012)	(0.011)
rgdpgr	0.096***	0.107***	0.100***
	(0.004)	(0.003)	(0.003)
health	-0.017	-0.009	-0.010
	(0.017)	(0.011)	(0.012)
aid	-0.027	0.003	-0.003
	(0.025)	(0.014)	(0.019)
L2.cct	0.045		
	(0.093)		
L2.other		-0.113*	
		(0.068)	
L2.transfer			-0.013
			(0.063)
Observations	126	97	148
Number of code	17	13	17
Serial correlation	-2.40	-1.55	-2.52
Serial correlation (p-value)	0.12	0.16	0.11
Sargan	100.09	98.84	110.42
Sargan (p-value)	0.20	0.18	0.06

*Note: Standard errors are in parenthesis. Statistical significance is given by * for 10% significance level, ** for 5% significance level, and *** for 1% significance level.*

Table A2: Poverty Specification

	Conditional Cash Transfers	Other Monetary Transfers	Total Cash Transfers
L.pov40	0.643***	0.694***	0.666***
	(0.061)	(0.047)	(0.054)
L.rrempcppp	-3.710	-10.749**	-11.386***
	(2.767)	(4.498)	(3.254)
rgdppcppp	-0.539	-0.763***	-0.407*
	(0.349)	(0.190)	(0.239)
un	0.662***	0.383**	0.274
	(0.193)	(0.156)	(0.173)
lfpr	-0.119	-0.044	-0.047
	(0.201)	(0.213)	(0.180)
rgdpgr	-0.046	-0.196**	-0.085
	(0.050)	(0.060)	(0.052)
health	-0.472*	-0.716***	-0.504**
	(0.252)	(0.198)	(0.203)
aid	0.238	0.273	-0.166
	(0.325)	(0.244)	(0.273)
L2.cct	-4.865***		
	(1.438)		
L2.other		-2.599**	
		(1.174)	
L2.transfer			-3.368***
			(0.934)
Observations	125	96	147
Number of code	17	13	17
Serial correlation	1.37	0.48	1.82
Serial correlation (p-value)	0.17	0.63	0.12
Sargan	100.71	87.15	85.71
Sargan (p-value)	0.19	0.48	0.58

*Note: Standard errors are in parenthesis. Statistical significance is given by * for 10% significance level, ** for 5% significance level, and *** for 1% significance level.*

Table A3: Income Inequality Specification

	Conditional Cash Transfers	Non-Contributory Transfers	Total Cash Transfers
L.gini	0.406***	0.616***	0.470***
	(0.080)	(0.067)	(0.078)
L.rrempcppp	-2.260	-4.908	-5.493**
	(1.976)	(3.238)	(2.100)
rgdppcppp	-0.145	-0.222*	0.029
	(0.216)	(0.117)	(0.148)
un	0.107	0.166	0.106
	(0.143)	(0.116)	(0.125)
lfpr	-0.302**	-0.045	-0.296**
	(0.141)	(0.149)	(0.122)
rgdpgr	0.028	0.002	0.015
	(0.038)	(0.039)	(0.036)
health	-0.059	0.027	-0.074
	(0.200)	(0.139)	(0.152)
aid	0.481**	0.300*	0.201
	(0.245)	(0.175)	(0.175)
L2.cct	-3.016**		
	(1.127)		
L2.other		-1.247	
		(0.836)	
L2.transfer			-1.943**
			(0.700)
Observations	125	96	147
Number of code	17	13	17
Serial correlation	-1.53	-0.93	-1.52
Serial correlation (p-value)	0.13	0.35	0.13
Sargan	99.11	102.42	100.14
Sargan (p-value)	0.22	0.11	0.20

*Note: Standard errors are in parenthesis. Statistical significance is given by * for 10% significance level, ** for 5% significance level, and *** for 1% significance level.*