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Paraguay

Multipliers of Social Protection

Product 3 - Drafting the country case studies

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Product 3

Country Case Study – Paraguay

1. Introduction

In the last two decades, Paraguay has improved its social protection system, but there is still a long way to go to guarantee social protection for all and achieve the Sustainable Development Goals (SDGs). Along with some of its South American neighbours, Paraguay took advantage of the increased policy space created by the commodities boom to improve and expand redistributive policies and foster a process of inclusive growth (on the commodities boom see Erten and Ocampo 2013 and Reinhart, Reinhart, and Trebesch 2016; on redistributive policies see Cornia 2014). Between 2002 and 2012, the number of people living in poverty fell substantially, according to different measures (Cepal 2021, World Bank 2021) – the percentage of people living in poverty according to estimates by the *Economic Commission for Latin America and the Caribbean* (ECLAC), for instance, was reduced from 35 to 13.3 per cent –, and the Gini coefficient of household per capita income declined from 0.573 to 0.476 (Sedlac 2021). An acceleration of economic growth was crucial for this process of redistribution (Giménez et al. 2017). After falling for four years in a row, GDP grew on average 4.71 per cent per year between 2003 and 2011, decelerating after the end of the commodities boom to 4.02 per cent per year, for the period between 2012 and 2018. In 2019, economic activity declined, and the pandemic brought it further down, in 2020 (World Bank 2021). With growth faltering, redistribution stalled, with poverty and inequality indices remaining mostly stable in the last decade (Cepal 2021, World Bank 2021).

In what concerns the social protection system, Ocampo and Gómez-Arteaga (2017: 8) argued that the period between 2003 and 2013 can be considered a 'golden social decade' in Latin America due to the adoption of 'innovative programmes and stronger welfare States' throughout the region (see also ILO 2017: 132-139). Also, in this regard, Paraguay is in line with the regional trend, even though the country is classified by Ocampo and Gómez-Arteaga (2017: 13) among the group of Latin American countries with the weakest social protection systems. To confront such a weakness, the Paraguayan government took advantage of the period of prosperity to increase expenditures on social protection: after a period of volatility in the early 2000s, the share of social protection expenditure in GDP more than doubled from 2.61

per cent in 2004 to 5.60 in 2013, according to the estimates used in this report.[1,2] Afterward, it went on increasing, reaching 6.36 per cent in 2019 and expanding to 7.42 in 2020, partly as a consequence of the pandemic. According to the latest available estimates from the *International Labour Organization*'s (ILO) World Social Protection Data, it should be remarked that expenditure on social protection as a share of GDP in Paraguay is still substantially below the world average and the average for Latin America and the Caribbean: depending on the estimate for Paraguay, its social protection expenditure as a share of GDP ranges from 48 to 57 per cent of the world average and from 61 to 73 per cent of the Latin American one (ILO 2021a, ILO 2021b: 278). Such a relatively low level of expenditures is reflected in below-average effective coverage. The latest estimates from the ILO indicate that Paraguay's social protection system provides effective coverage for only 31.4 per cent of the population. In contrast, the world average stands at 46.9, and the average for Latin America and the Caribbean is 56.3 (ILO 2021a).

With the adoption of the ILO's Recommendation No. 202 on national social protection floors and the subsequent publication of the *World Social Protection Reports* (ILO, 2014, 2017, 2021b), it became possible to assess in greater detail the effective coverage of social protection systems of different countries, both overall and disaggregated in its numerous functions. The aggregate figure of effective coverage for Paraguay overcasts substantial heterogeneity of coverage regarding each social protection function. The main improvement observed in Paraguay in the recent period seems to have been achieved in the coverage of social protection for persons above the retirement age, which increased from 8 to 22.2 per cent between 2000 and 2016, expanding further to 64.6 in 2020 (ILO 2021a). Such an increase was part of a more general trend, observed in many countries, of expanding coverage 'through the establishment or extension of non-contributory pension schemes which provide at least a basic level of protection for many older persons' (ILO 2017: 82, see also Lavinas 2013). In the case of Paraguay, this non-contributory pension scheme targeted to persons above the retirement age is the *Pensión Alimentaria para las Personas Adultas Mayores*, which was established in 2009 and, by 2015, covered 36.8 of the eligible population – who received a monthly transfer of a

[1] For more details on the data, see section 4, below. The series for social protection expenditure, compiled by the *Ministerio de Hacienda*, comprises expenditures related to "social promotion and action" (including social services and social assistance) and "social security".
[2] For an attempt to explain the determinants of social spending in Latin America, see Huber and Stephens (2012).

quarter of the minimum wage (see Higgins et al. 2013: 8, Giménez et al. 2017: 10, ILO 2017: 348).

The data for effective coverage for each social protection function is full of gaps, in the case of Paraguay, which hinders a more complete assessment of the recent trajectory of the social protection system. But the existing estimates suggests that coverage for most of the functions, beyond old age, is very low, substantially below the world and regional averages. Besides, in some cases, the volatility of effective coverage suggests a weak social protection system that struggles to reach the eligible population. And there is also one function for which there is no coverage whatsoever: protecting the unemployed with unemployment benefits.[3]

One of the few cases in which coverage expanded – in addition to coverage for old age – was for mothers with newborns: only 3 per cent of them were receiving maternity benefits in 2016, whereas in 2020 the share rose to 8.2 per cent. However, even this higher level is still less than a fifth of the world average and just over a quarter of the average for Latin America and the Caribbean (ILO 2021a) and such an expanded coverage is certainly incapable of changing substantially the fact, pointed out by the ILO in 2017, that Paraguay was one of the countries with highest levels of exclusion in what regards maternity benefits, 'with more than 85 per cent of all women in employment not receiving maternity cash benefits.' (ILO 2017: 134).

Two cases of volatile coverage are protection of children and persons with severe vulnerability. Concerning the first group, effective coverage in 2016 was of 32.8, close to the world average, even if below the regional one. However, in 2020, effective coverage fell to 18.6 per cent (ILO 2021a). Falling coverage for children in these last few years seems to be a worldwide trend, visible in the average coverage for the world and for Latin American and the Caribbean, but in Paraguay the decline was steeper (ILO 2021a). In what regards persons with severe vulnerability, effective coverage fell from 21.6 to 16.2 per cent, between 2016 and 2020 – the latest figure is less than half of the world average and less than a third of the regional one. Effective coverage for workers in the case of work injury, in its turn, is also below the world and regional averages, but has remained broadly stable between 2012 and 2020, around 22 per cent.

[3] The creation of unemployment insurance is currently being debated in the Paraguayan congress (ILO 2020).

This summary indicates that Paraguay seems to have, despite the improvements mentioned, a social protection system that is fragile even in comparison with the segmented and incomplete social protection system that is typical of Latin America (Lavinas 2013, Lavinas 2015, Ocampo and Gómez-Arteaga 2017) – an inheritance of the corporatist social protection systems historically restricted to the minority with formal relations of employment. Thus, by combining a contributory pension system with more recent focalised conditional cash transfers, the Paraguayan social protection system can cover more than half of older persons. However, it is still a long way from reaching universality, effectively protecting children, mothers with newborns, vulnerable persons, and the unemployed (Lavigne 2012, Casalí and Velásquez 2016). As the pandemic brought social protection to the fore, dramatically emphasising its importance and the risks posed by its gaps, its lessons seem to be particularly pertinent to countries with relatively deficient systems, like Paraguay. As recently suggested in a document published by the *Economic Commission for Latin American and the Caribbean* (ECLAC), the health crisis should be considered a renovated stimulus

> 'to build a more permanent, universal social protection floor, for the medium and long term. A broad income protection floor is necessary for both intrinsic and instrumental reasons, and will ensure that countries are better equipped to meet the next pandemic or crisis.' (Blofield et al. 2020: 11)

This report aims to show that such an expansion of the social protection system in Paraguay is not only crucial to guarantee the human right to social security but also may contribute to promote sustained and inclusive growth. The key contribution is to present estimates of the multiplier effects of social protection expenditures, that is, the impact that increases in social protection expenditures may have on aggregate economic activity (for an introduction to the concept of fiscal multipliers, see Batini et al. 2014). The main result is that one additional dollar spent on social protection leads to an increase in real GDP of 1.81 to 3.70 dollars – the cumulative impact after two and a half or three years, depending on the estimate. The findings for the multiplier effects of social protection expenditure highlight one specific dimension of the interdependence between the SDGs: the interdependence between guaranteeing social security for all, promoting sustained and inclusive growth, ending poverty, and reducing inequalities.

The focus on such an interdependence links this report with a vast literature on the connections between social protection and economic development (for a recent review, see Gongcheng and Scholz 2019; see also Barrientos 2012, Atkinson 2015, ILO 2018, Barrientos and Malerba 2020, Bhalla et al. 2021, and Carraro and Marzi 2021). The potential connections between social protection and inclusive growth are varied, and the focus of the present report resides in one of these connections: how expenditures on social protection can boost aggregate demand, bringing along with better social protection, higher incomes, higher government revenues, and higher employment. In the specific case of Paraguay, the potential for unleashing inclusive growth through the expansion of social protection seems significant, especially if higher social spending is combined with a reorientation of these expenditures. There is abundant evidence that the social protection system of Paraguay is not only incomplete but also one of the least redistributive social protection systems of Latin America (Higgins et al. 2013: 17-19, Ocampo and Gómez-Arteaga 2017: 19-23, ILO 2021b: 45). Thus, if the multiplier effects estimated with the time series of expenditures on such a system point towards the potential of these expenditures to stimulate economic growth, it would not be a surprise if an improved system with enhanced redistributive effectiveness led to larger multipliers. In other words, the quantitative expansion of the Paraguayan social protection system can contribute to achieving inclusive growth but combining such a quantitative expansion with a qualitative transformation seems to be necessary to unlock the entire potential of social protection expenditure.

This report is organised in the following way. The next section presents the recent literature on fiscal multipliers to contextualize the empirical estimates made for the present study and contribute to understanding its significance. Then, the two following section presents the methodology and database used. In the fifth section, four sets of multipliers of expenditure on social protection are presented, using different controls and different series of expenditures – to assess the robustness of the estimates. These multipliers are then compared with the multipliers of public investment, also estimated for this report. Finally, the concluding section summarises the findings and discusses the policy implications.

2. Recent empirical literature on fiscal multipliers

Since the global crisis that erupted in 2008, there has been a considerable increase in the empirical literature on fiscal multipliers. In country-specific empirical studies, following

Blanchard and Perotti (2002), the strategy of using linear VAR models (autoregressive vectors) to estimate the impact of an exogenous shock in public expenditures or government revenues on the level of economic activity has been the most common approach. When disaggregating different government expenditures, this literature usually finds that public investment has a higher and more persistent multiplier effect on aggregate output than government consumption. However, only a few studies have focused on estimating the impacts of different social expenditures on economic growth. Blanchard and Perotti (2002) and Perotti (2004) treat transfers as a component that should be subtracted from total revenue, which is a strategy followed by several authors (Peres 2006, Giordano et al. 2007, Peres and Ellery 2009, Burriel et al. 2010, Tenhofen et al. 2010, Castro and Fernandez 2011, Lozano and Rodriguez 2011, Jemec et al. 2013, Borg 2014, Skrbic and Simovic 2015, Mendonça et al. 2016, Alves 2017, Grudtner and Aragon 2017, Restrepo 2020, among others). However, such an empirical strategy has been criticized in the recent literature both for not taking into consideration government expenditures and revenues in a disaggregated way and for seldom focusing on social spending (Baum and Koester 2011, Gáldon 2013, Pereira and Wemans 2013, Gechert et al. 2018). Pereira and Wemans (2013: 10), for instance, make a case for going beyond aggregate government expenditures and revenues, given the likelihood that their components have heterogeneous multipliers:

> 'Initial studies applying the structural VAR methodology to fiscal policy adopted a very aggregate definition of budgetary variables, considering only taxes net of transfers, on the one hand, and public expenditure (fundamentally consumption and public investment), on the other. These definitions were used in a great deal of the subsequent work in this field. It is, however, plausible that the various headings that make up these aggregates have distinctive influences on economic activity.'

In their turn, Gechert et al. (2018) claim that social expenditures have not received enough attention despite the existence of numerous studies on fiscal multipliers. According to the authors, this fact represents a relative paradox in the face of the growing importance of social expenditures:

> 'In recent years there has been a tremendous surge in the literature on the size of fiscal multipliers. While many papers have focused on the effects of federal and local public procurement, employment and investment spending, and tax shocks, the impact of changes

> in social security contributions and benefits has received only limited attention. This seems surprising given the fact that social security systems have grown substantially in OECD countries after the Second World War and account for about half of the overall budget in countries like Germany.' (Gechert et al. 2018: 2)

While the implementation of the American Recovery and Reinvestment Act (ARRA) in the United States in the aftermath of the 2008 crisis has been partially justified in terms of more significant multiplier effects of income transfers by the Council of Economic Advisers (2009), only a few empirical studies have estimated the impact of this type of expenditure on aggregate output. Moreover, the set of these studies that adopt the conventional VAR approach of Blanchard and Perotti (2002) finds mixed results, as reported in Table 1 below.

Some of them find significant multiplier effects for social expenditures – impact multipliers close to one (Gáldon 2013, Adams and Wong 2018, Gechert et al. 2018) –, but, in some cases, the results suggest that the multiplier is non-persistent – the accumulated multiplier is close to zero (Adams and Wong 2018).[4] In other cases, the impact multiplier for social transfers is close to one, and the effect remains above zero in accumulated terms (Pereira and Wemans 2013). In contrast, some studies have found a negative - although non-significant – accumulated effect (Claus et al. 2006, Bruckner and Tuladhar 2010).

Various studies estimate positive but very low multipliers for social transfers. These studies usually estimate higher multipliers associated with government consumption, cuts of direct taxes, and, especially, public investment (Pereira and Wemans 2013, Silva et al. 2013, Huseyin and Ayse 2017, Sarangi and Bonin 2017, Bova and Klyviene 2019). In other cases, the multiplier for social transfers is large in absolute terms, but different types of expenditure feature a similar or higher multiplier effect on aggregate output (Fatás and Mihov 2001, Pereira and Sagalés 2009, Pereira and Wemans 2013).

Romer and Romer (2016), using a 'narrative method' based on episodes of fiscal expansion in different countries, find that permanent increases in social expenditures exert significant and substantial impacts on consumption. However, tax reductions seem to have the highest and most persistent multiplier effect, which could be explained, in the authors' view, by a more

[4] The authors find lower multipliers in the long run (accumulated) and attribute the lower output responses to rising inflation and interest rates, proposing a kind of crowding-out effect.

significant positive response of interest rates to an expansion in social expenditures. Similarly, Alesina et al. (2017) report results for a panel of OECD countries showing that fiscal consolidations based on higher taxes are more costly in terms of output than those that resort to spending cuts, whether from government consumption spending or transfers. Meanwhile, Gechert et al. (2018) employ a similar methodology for social spending in Germany and find a higher and more persistent multiplier effect for social expenditures than for decreases in the social contributions that finance them.[5] In general, according to Batini et al. (2014: 4), studies resorting to the 'narrative approach' tend to 'find larger tax multipliers than conventional VAR models do.'

Besides, some empirical studies have used panel techniques to estimate multipliers for a group of countries or states and regions within the same country via VAR or one-equation methods (Beetsma and Giuliodori 2011, Furceri and Zdzienicka 2012, Ilzetski et al. 2013, Reeves et al. 2013, Silva et al. 2013, Valencia 2015, Carrière-Swallow et al. 2018, Deleidi et al. 2019, Izquierdo et al. 2019, Konstantinou and Partheniou 2019). For social expenditures, Furceri and Zdzienicka (2012) find a positive accumulated multiplier (but smaller than one) for a group of OECD countries, emphasizing the central role of health expenditures and unemployment benefits as the components with more substantial impacts on output. Moreover, Reeves et al. (2013) estimate a positive social protection multiplier for a group of European countries[6], which reaches 3 in the baseline scenario. In their estimates, health expenditures present an even higher multiplier (near 4.9).

Table 1 presents a summary of the empirical literature on the multiplier effects of different types of expenditures – from aggregate government spending to several decompositions of it – in many countries (or panel of countries), different periods and using several alternative empirical approaches or econometric techniques.

[5] The authors offer the following possible explanation: 'Given that benefits are likely pro-poor while contributions are paid by middle- and upper-income classes, it seems plausible that benefit shocks have a stronger aggregate demand effect. Moreover, some benefits are in-kind and will have a direct GDP effect.' (Gechert et al. 2018: 19).
[6] In this article, the authors apply a panel model instead of the traditional VAR: 'Vector autoregressive models have been applied to quarterly data for small numbers of countries, but for annual data with larger numbers of countries fixed effects models are more consistent.' (Reeves et al. 2013)

Table 1 – Multiplier effects of different types of expenditures in the econometric literature for different countries and time periods

Study	Countries	Period	Type of Expenditure	Methodology	Multiplier Results
Adams and Wong (2018)	New Zealand	1990-2017	Transfers (social assistance and superannuation)	SVAR	1.53 (impact) and 0.76 (cumulative one year)
Auerbach and Gorodnichenko (2014)	Japan	1960-2012	Government spending	Direct projections (based on Auerbach and Gorodnichenko [2013])	1.74 (peak) and 2.3 (cumulative)
Auerbach and Gorodnichenko (2014)	Japan	1985-2012	Government spending	Direct projections (based on Auerbach and Gorodnichenko [2013])	0.5 (peak) and 0.44 (cumulative)
Bayoumi (2001)	Japan	1981-1998	Government spending	VAR	0.65 (short-term multiplier)
Bova and Klyviene (2019)	Portugal	1995-2017	Transfers (old age, unemployment, and disabilities transfers)	SVAR	-0.27 (impact) and 0.1 (cumulative)
Bruckner and Tuladhar (2010)	Japan	1990-2000	Local government expenditure on social assistance	One-equation methods	-0.25 (impact)
Dufrénot et al, 2016)	United States	1960-2012	Transfers (social security)	Non-linear methods (MS/TVTP)	It reaches 1.68 (in terms of consumption) and -0.02 (investment); recession
Fatas and Mihov (2001)	United States	1960-1996	Social security, other transfers, and subsidies	VAR (Choleski decomposition)	Do not estimate multipliers, but captures a positive and significative impact of transfers on GDP after eight quarters
Furceri and Zdzienicka (2012)	OECD	1980-2005	Social expenditure (old age, incapacity-related, unemployment benefits, and other expenditures)	One-equation method	Short-term multipliers: 0.6 (total expenditure), 0.9 (health), and 2.1 (unemployment benefits)

Gáldon (2013)	United States	1948-2012	Social security, unemployment benefits, and other	Non-linear methods (TVPSV-VAR)	>1 (impact and long run). Near 1.5-2 (long run) at the end of 2008/2009 crisis. Reaches almost 3 (long-run) at the end of 1950s and beginning of the 1960s
Gechert and Rannenberg (2014)	Meta-analysis (98 studies)	+1800 observations	Transfers	Meta-regression analysis	Between 2 and 3 (cumulative/recession)
Gechert et al (2018)	Germany	1974-2013	Social security	SVAR with narrative-identified shocks	0.5-1.5 (impact)
Hollmayr and Kuckuck (2018)	Germany	1993-2017	Social expenditures (pensions and unemployment)	SVAR	2 (impact), between 0.3 and 3.8 (after 5 years)
Huseyin and Ayse (2017)	Turkey	2002-2016	Transfers	SVAR	0.02-0.23 (impact)
Kanazawa (2018)	Japan	1980-2014	Public investment	Local projection (IV method)	4.95 (peak; 17th period, quarterly data)
Konstantinou and Partheniou (2019)	OECD and non-OECD countries	1991-2015	Social expenditures	Non-linear one-equation methods	0.8 (OECD countries) and 0.076 (non-OECD); cumulative in two years; recession
Kuttner and Posen (2002)	Japan	1976-1999	Government spending	SVAR	1.06 (four-year cumulative multiplier)
Mahaphan (2013)	Thailand	1988-2009	Public investment and government consumption	VECM	0.6 (peak, 2nd period) for public investment, 0.09 (peak, 1st period) for government consumption
Miyamoto, Nguyen, and Sergevev (2017)	Japan	1980-2014	Government spending	Local projection method (based on Jordà [2005])	1.48 (impact; when the nominal interest rate is near the zero-lower bound) and 0.71 (impact; otherwise)

Orair et al (2016)	Brazil	2002-2016	Social expenditure (pensions, social programmes, and unemployment benefits)	Non-linear VAR (STVAR)	1.51 (peak) and 8 (cumulative in four years); recession
Park and Lee (2019)	South Korea	2000-2018	Government spending	VAR	1.09 (impact) and 1.68 (six-period, quarterly data, cumulative)
Pereira and Sagalés (2009)	Portugal	1980-2005	Public transfers	VAR	1.88 (impact) and 1.81 (cumulative)
Pereira and Wemans (2013)	Portugal	1995-2011	Social transfers in cash	SVAR	Near 1 (peak) and 0.6 (cumulative, one year)
Reeves et al (2013)	European Union	1995-2010	Social expenditure	One-equation method	3 for social protection, near 4.9 for health
Resende (2019)	Brazil	1997-2018	Social expenditure (pensions, social programmes, and unemployment benefits)	VAR	0.72 (impact) and 4.3 (cumulative, two years)
Romer and Romer (2016)	United States	1952-1991	Social security benefits	Narrative VAR	Significant and great response of consumption (mainly in the impact) – but tax revenues had a higher effect in the analysed period
Sanches and Carvalho (2019)	Brazil	1997-2018	Social expenditure (pensions, social programmes, and unemployment benefits)	SVAR	0.75 (impact), 1.2 (peak), and near 3 (cumulative, two years)
Sarangi and Bonin (2017)	Egypt	1990-2015	Social expenditure	SVAR	0.04 (impact) and 0.17 (peak)
Silva et al (2013)	Euro Area	1998-2008	Transfers – social expenditures in cash/in kind – plus subsidies and other expenditures	VAR	-0.118 (impact) and 0.82 (cumulative, ten quarters); recession
Tang, Liu, and Cheung (2013)	Thailand	1993-2019	Government spending	SVAR	-0.37 (impact)

To the best of our knowledge, there has been no attempt to estimate the multiplier of social protection expenditures in Paraguay. However, there are a couple of studies that have adopted the VAR approaches discussed above.[7] One of them (David, 2017) was published as an IMF Working Paper, in 2017, and reports estimates for both the impact and the cumulative multipliers (see the following section for a definition of different multipliers), for current and capital expenditures. David (2017) uses quarterly data from 1998 to 2015. The impact multiplier is not significantly different from zero, for both kinds of expenditures, but the cumulative impact is: it is estimated at 0.2 and 1.4 two years after the shock for, respectively, current and capital expenditures, and 0.5 and 1.2 five years after the shock for each of the kind of expenditure.[8] This result is in line with part of the literature reviewed above, not only for finding positive and persistent multipliers but also for finding higher multipliers for government investment than for government consumption. David (2017) also estimates tax multipliers, using different methods, finding no significant impact of tax revenue shocks on output with the VAR approach, but finding a negative multiplier with the 'narrative' approach.

Another attempt along these lines was made by Aquino Aguirre (2018). Using quarterly data from 2003 to 2017 and adopting the VAR approach, the author finds similar results to the ones found by David (2017): the impact multiplier of a shock of government investment is not significantly different from zero, but its impact grows in the following quarters, remaining positive, at a 95 per cent significance level, five years after the shock. The multiplier is estimated at 0.9, after 8 quarters, and 1.1, after 12 and 20 quarters.

It is reassuring to note that the estimates presented in the current report (see section 5, below) are very similar to those of these previous empirical efforts. Even though the multiplier of social protection expenditure does not seem to have been estimated before, the multiplier of public investment was also estimated for the current report, allowing a comparison with the previous literature and with the multiplier for the other kind of government expenditure. Using quarterly data from 2000 to 2020, the public investment cumulative multiplier was found to be significantly different from zero – either at a 95 or a 68 per cent level of significance, depending

[7] IMF (2018) analyses the impact of fiscal consolidation in Latin America based on estimating fiscal multipliers for some of the region's countries, including Paraguay. They estimated the multipliers resorting to three different methods – VAR, 'narrative', and forecast errors – but results are only presented for the region as a whole, not for individual countries.

[8] The cumulative multiplier for current expenditures, after 8 quarters, is positive at a 90 per cent level of significance, whereas the other three cumulative multipliers are positive at a 95 per cent level of significance.

on the controls incorporated in the model – and present values like those obtained in the research for Paraguay reviewed above. Besides, it is interesting to note that the cumulative multiplier obtained for different series of social protection expenditure, two and a half years after the shock, are in general higher than the one obtained for public investment. Further details are provided in section 5, below.

In addition, one should not disregard the fact that there is evidence that estimates of multipliers for Latin America and the Caribbean obtained with VAR approaches could be underestimated due to endogeneity biases and measurement errors (Carriére-Swallow et al. 2018, IMF 2018). A meta-study undertaken by the *International Monetary Fund* (IMF), which reviewed 132 published estimates of multipliers for the region – most employing 'VARs or similar approaches to identify fiscal shocks' (IMF 2018: 84) –, concluded that fiscal multipliers in Latin America and the Caribbean appeared to be half as large as the average multiplier estimated for other emerging market economies and a third of the average for advanced economies. However, the IMF notes that studies focused on the region and employing the 'narrative approach' tended to find much larger multipliers, not significantly different from the average for advanced economies – as illustrated, for the Paraguayan case, by the tax multipliers estimated by David (2017).[9] This contrast indicates that the estimates reported below could be biased downwards, something that could be further investigated in future projects by comparing estimates for Paraguay based on VAR and on 'narrative' approaches. In other words, the effective multipliers of social protection expenditure may be even larger than reported below, reinforcing the contribution of this kind of expenditure for unleashing processes of inclusive growth.

3. Methodology

As seen in the previous section, most attempts to estimate the multiplier effects of different types of government expenditures use a structural VAR (or SVAR) approach. The SVAR became well known in the literature of fiscal multipliers through Blanchard and Perotti (2002). They argue that the VAR methodology is appropriate for analyzing the effects of fiscal policy due to *lags* in decision-making and implementation of government spending decisions. With high-frequency data (monthly or quarterly), they argue that the temporal coincidence of

[9] For a discussion of how VAR models may bias the results in the specific case of Paraguay, see Carriére-Swallow et al. (2018: 39-41).

unexpected shocks in output and fiscal policy reaction to these shocks can plausibly be ruled out. In other words, output does not affect public spending contemporaneously because policymakers take longer than a quarter – and much longer than a month – to notice the output shock, decide the next steps in fiscal policy, and present them to the legislature.

The purpose of the identification strategy is to isolate the exogenous shocks, recovering their structural shape, so that the impact of a variable can be measured – in technical terms, to obtain a non-recursive orthogonalization of the error terms. First, the VAR is estimated in reduced form. The vector of endogenous variables is three-dimensional, including time series of expenditures, revenues, and output. It is a VAR model, as proposed by Sims (1980), where each variable is explained by lags of itself and the other variables of the model, capturing dynamic relationships. However, the shocks of the reduced form do not have economic significance (Castro and Hernandez de Cos 2008). According to Perotti (2007), shocks of the reduced form (or 'surprise' movements) can be seen as linear combinations of three components: a) the automatic response of government spending and revenue to changes in output; b) the discretionary response due to changes in endogenous variables (Perotti gives the example of tax changes in response to a recession); c) random discretionary shocks, that is, structural shocks, which are uncorrelated and unobservable – the ones that need to be recovered. Formally:

$$u_t^g = \alpha_{gy} u_t^y + \beta_{gt} e_t^t + e_t^g \quad (1)$$

$$u_t^t = \alpha_{ty} u_t^y + \beta_{tg} e_t^g + e_t^t \quad (2)$$

$$u_t^y = \gamma_{yt} u_t^t + \gamma_{yg} u_t^g + e_t^y \quad (3)$$

The unexpected movements in the expenditure, revenue, and output variables are, respectively, denoted by u_t^g, u_t^t, and u_t^y. These 'surprise' movements are the residuals in the reduced form, as it is the part of the data that the VAR does not explain. Also, e_t^g, e_t^t, and e_t^y are the structural shocks that are not correlated with each other by assumption and reflect the part of the surprise movements that is exogenous: it does not depend on policies and 'normal' economic evolution (Coudret 2013). The coefficients α_{ij} reflect the response of variable i to variable j – the components (a) and (b) listed above are captured by the coefficients α. While β_{ij} measures the

contemporaneous response of variable i to a structural shock in variable j – that is, component (c) (Perotti 2007).

As discussed by Vdovychenko (2018), coefficients α_{gy}, α_{ty}, γ_{yt}, and γ_{yg} cannot be estimated without bias due to the instantaneous mutual relationship between output, expenditures, and revenues. Two steps are necessary to solve this. First, considering the identification hypothesis discussed above, component (b) is removed, and coefficients α are made to reflect only the first component – the response of the automatic stabilizer. As Perotti (2007: 176) argues: 'it typically takes longer than a quarter for discretionary fiscal policy to respond to, say, an output shock.' Following Perotti (2007), the second step is to use external information to the model to estimate the coefficients α_{gy} and α_{ty}.

Coefficient α_{gy} reflects the contemporary elasticity of expenditure to output, and α_{ty} is the contemporary elasticity of revenues to output. These coefficients measure both the discretionary and the automatic responses of fiscal variables to unexpected changes in economic activity (Jemec et al. 2013). Due to the identification hypothesis, the discretionary response of fiscal variables to output is disregarded so that these elasticities reflect only the automatic stabilizer. Consequently, the following elasticity is used:

$$\alpha_{gy} = 0 \tag{4}$$

The elasticity of revenue to output, in its turn, was estimated based on the 'IMF method,' as in Andreis (2014) and Maciel (2006), which is a regression using dummy variables for periods, outliers, and a trend control.

Since u_t^t and u_t^g are correlated, from these separate estimations of the exogenous elasticities, the cyclically adjusted residuals, $u_t^{g,ca}$ and $u_t^{t,ca}$, are obtained – which are the shocks without the effects of the cycle to eliminate the automatic stabilizer. Thus, component (a) is removed, guaranteeing exogeneity:

$$u_t^{g,ca} = u_t^g - \alpha_{gy} u_t^y = \beta_{gt} e_t^t + e_t^g \tag{5}$$

$$u_t^{t,ca} = u_t^t - \alpha_{ty} u_t^y = \beta_{tg} e_t^g + e_t^t \tag{6}$$

The structural shocks, e_t^g and e_t^t, can be obtained from the assumption of the ordering of the variables. Blanchard and Perotti (2002) claim that there is no reason to choose $\beta_{gt} = 0$ or $\beta_{tg} = 0$ *a priori*. Regarding shocks in spending and revenue, there is no theoretical or empirical basis to decide which variable will react first. As the correlation between adjusted residuals is small, Perotti (2007) points out that the order does not change the result. $\beta_{gt} = 0$ was then assumed, and the regression of the adjusted revenue residuals on the residuals of the structural form of expenditures was estimated by ordinary least squares (OLS) to obtain β_{tg} in equation (6) (Burriel et al. 2010). [10] The purpose of this regression is to obtain the estimates of e_t^g and e_t^t. These shocks are 'isolated' from the influence of output because the automatic response component has been removed. It, therefore, becomes possible to make the shocks exogenous by removing the (a) and (b) components mentioned above.

From equation (5), it is possible to recover e_t^g, using it to estimate equation (6) by OLS (Burriel et al. 2010). We then obtain instrumental variables, the structural shocks e_t^t and e_t^g in equation 3, since the regressors (residuals of the reduced form) are correlated with the error term (structural shock). Those structural shocks of expenditure and revenue are used as instruments since the correlation between them and the structural shock of output, e_t^y, is low. The last step is estimating the impulse-response functions using the estimated coefficients.

The basic model is estimated using the vector of endogenous variables, in real terms: the logarithms of social expenditures, total primary revenue, and output.[11] Dynamic effects of public spending can also be analyzed using a three-dimensional SVAR by replacing total social expenditures with its different components and the aggregate GDP by household consumption and private investment (Burriel et al. 2010, Çebi 2015).

[10] Models were also estimated assuming $\beta_{tg} = 0$, that is, that decisions relating to revenue occur before those relating to expenditure. This procedure indicated the robustness of the results to different specifications, with minor variation in impulse response functions, as is usual in the literature.

[11] The variables used in this work are not stationary. Therefore, their first difference was used (they are integrated of order 1), including the control variables, as suggested by different tests (Dickey-Fuller, Phillips and Perron, KPSS). Thus, the exercises are performed in terms of growth rate. We used the cumulative impulse-response function to obtain the responses in terms of levels. The number of lags is chosen based on the information criteria and the autocorrelation LM test (Matteo et al. 2018). When several information methods are used together, the literature recommends choosing that lag most methods point to as more appropriate (Lopes et al. 2012). Tests for autocorrelation (LM) and heteroscedasticity (White) pointed to the absence of these problems in most models. All models showed stability. The results of the tests are provided in the appendix.

The key goal of this report is to estimate the multipliers of social protection expenditures. As framed by Spilimbergo et al. (2009), there are four types of multipliers: a) the impact multiplier, for the analysis of a short-run period, $\frac{\Delta Y(t)}{\Delta G(t)}$; b) the horizon multiplier, for calculating the multiplier for a specific period, $\frac{\Delta Y(t+n)}{\Delta G(t)}$; c) the peak multiplier, which represents the highest value in the period under analysis, $max\frac{\Delta Y(t+n)}{\Delta G(t)}$; d) the accumulated multiplier, which adds the total effect over a more extended period, $\frac{\sum_{i=1}^{n}\Delta Y(t+i)}{\sum_{i=1}^{n}\Delta G(t+i)}$.

The importance of calculating the impact multiplier is that it provides an assessment of fiscal policy in terms of the immediate output response to a shock in the fiscal variable – when the government aims to deal with a crisis, for example. Accumulated (or cumulative) multipliers, in turn, are important to verify the impact of a random discretionary shock since the economy requires a certain amount of time to absorb the initial shock (Ilzetzki et al. 2013). The accumulated multiplier is equal to the ratio between the accumulated response of output and the accumulated response of the fiscal variable subject to the shock. It measures the cumulative change in economic activity after a cumulative change in the government spending over a given time horizon (Burriel et al. 2010, Tenhofen et al. 2010, Lozano and Rodriguez 2011, Borg 2014, Restrepo, 2020). Cumulative multipliers are also called integral multipliers, and they may offer a better depiction of the dynamic interaction 'when the effects of fiscal policy build over time.' (Restrepo 2020, see also Spilimbergo et al. 2009).

To calculate multipliers, we need to divide the elasticity of the response by the average share of social expenditures in output (or its components). As the variables are in logarithmic form, impulse-response functions provide the elasticity of output (Y) to the fiscal variable (X):

$$\xi_{Y,X} = \frac{\frac{\Delta Y}{Y}}{\frac{\Delta X}{X}} = \frac{\Delta Y}{Y}\frac{X}{\Delta X} = \frac{\Delta Y}{\Delta X}\frac{X}{Y} \tag{7}$$

According to Pires (2014), since $\frac{\Delta Y}{\Delta X}$ is the definition of the multiplier, which reflects a change in output given an increase of one unit in the fiscal variable, we have that:

$$\frac{\Delta Y}{\Delta X} = \frac{\xi_{Y,X}}{\frac{X}{Y}} \tag{8}$$

To estimate the cumulative multiplier, we justify the number of periods based on Garcia et al. (2013: 11): 'The long-run multiplier is defined as the cumulative multiplier when $\rightarrow \infty$, but in practice is used the number of periods needed for the multiplier to stabilize at its long-run value.' When the impact of social expenditures on GDP is more persistent, the cumulative multiplier is calculated for a more extended period.

In summary, for this report, the multiplier effects of social protection expenditures were estimated for Paraguay through this three-dimensional structural linear VAR. Based on the estimations, cumulative impulse response functions were generated to obtain the dynamic impact of social protection expenditures on the level of real GDP. Then these functions were used to get the elasticities of GDP in response to a shock in social spending and, finally, the multipliers.

4. Data

Beginning with social protection expenditure, quarterly data from the *Ministerio de Hacienda*, covering the period between 2000 and 2020, was used. The series included expenditure on 'social promotion and action' and on social security. The first category comprises expenditure on assistance to persons with special needs, social action services, state and municipal-level social services, social services for agrarian reform, among other items. The social security component, in its turn, includes varied benefits (old age, survivors, sickness, etc.). The latter does not include spending from contributory funds, just government expenditure (including government contributions to the government and military workers social security scheme).[12]

To check the robustness of the estimates, another series for social protection expenditure is also used: a series published by ECLAC. It is available at an annual frequency, from 2000 to 2018, and refers to the central government. Such a series is part of a database on expenses, published by ECLAC, which compiles data provided by the national governments dividing social expenditure into six different functions: (i) environmental protection, (ii) housing and community amenities, (iii) health, (iv) recreation, culture, and religion, (v) education, and (vi)

[12] According to the *Ministerio de Hacienda*, the data for 2020 does include government contributions to the general social security scheme as it was instrumental in paying pandemic-relief benefits.

social protection. Only the expenditure related to this last function is considered in the present report. As can be seen in Figure 1, below, the ECLAC series presents a similar trajectory to the series from *Ministerio de Hacienda*, but the values are a little lower, probably because it does not incorporate expenditure by subnational governments. To transform such an annual series into a quarterly one, total government expenditures – available at quarterly frequency from *Ministerio de Hacienda* – was used as an indicator in the Denton-Chollete temporal disaggregation method (available in the R Package 'tempdisagg').

As mentioned before, the multipliers of public investment were also estimated, to provide a basis of comparison for the multipliers of social protection expenditure. The quarterly data on public investment, from 2000 to 2020, was also provided by *Ministerio de Hacienda*, as well as total tax revenues. Real GDP and its implicit deflator, in their turn, were obtained, in a quarterly frequency, from the *Banco Central del Paraguay*. Finally, the consumer price index (CPI) was obtained from the IMF. All series were seasonally adjusted using the X13 Arima Method, available in Eviews.

Figure 1, below, shows the three expenditure series in real terms, whereas Figure 2 shows them as a share of GDP. As already stated in the introduction, the increase in spending in social protection is noteworthy, both in real terms and as a share of GDP, contrasting to the trajectory of public investment, which presents a slightly declining trend as a share of GDP. Such an increase in social protection expenditure is observable throughout the whole period, in the two series – in the case of the series from *Ministerio de Hacienda*, the expansion becomes clear after an initial period of volatility. Paraguay's social protection expenditure rose from a relatively very low base in the last two decades but remain substantially below the regional and world averages.

Figure 1 - Social Protection Expenditure and Public Investment (in millions of guaraníes, in 2019 prices, seasonally adjusted)

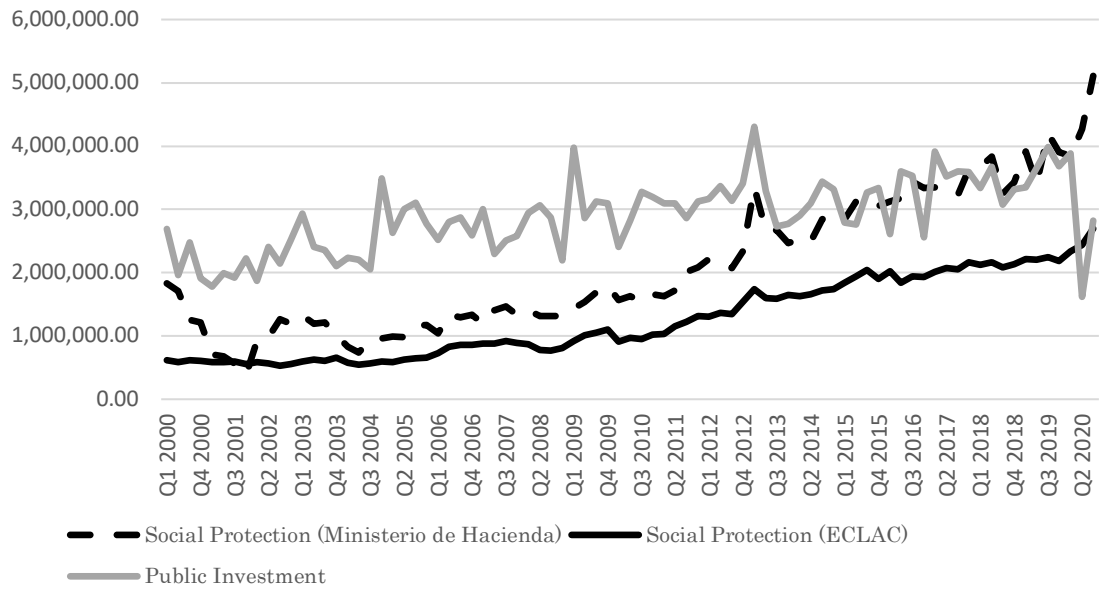
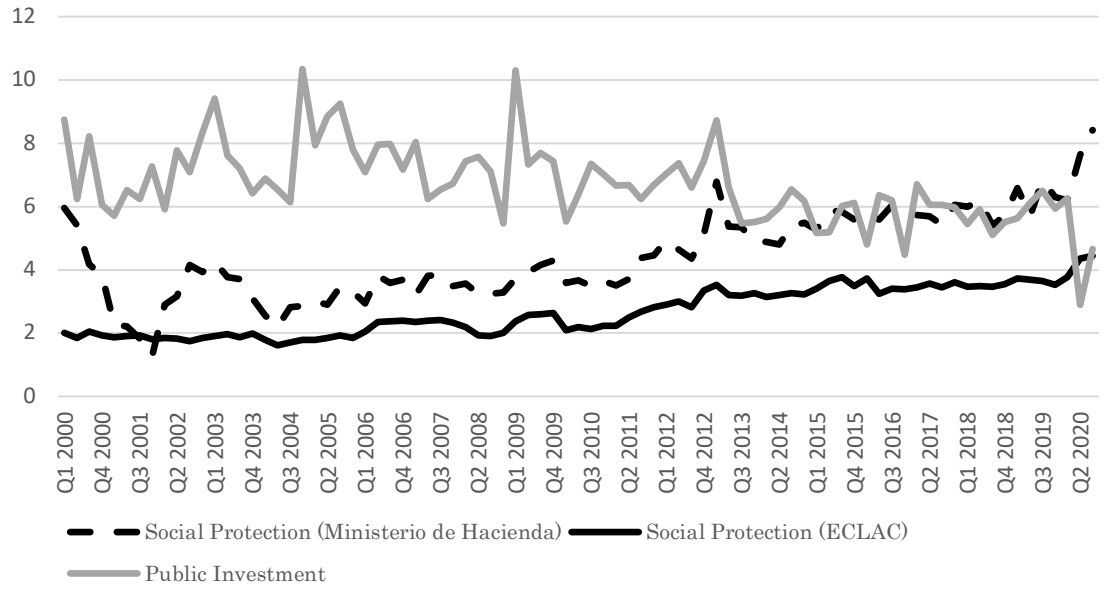


Figure 2 - Social Protection Expenditure and Public Investment (as a share of GDP)



5. Estimation results

Following the procedures described above, different VAR models were used for estimating the multipliers of social protection expenditure and public investment, always resorting to the

following variables in logarithmic form: expenditures (either social protection or public investment), tax revenues, and GDP. The first difference of each variable was used to avoid spurious relationships as all series are integrated of first order according to stationary tests (ADF, PP, and KPSS). For each model, different specifications were tried, using different control variables, two different deflators, and many time dummies. The specification chosen in the end was the one that performed better in terms of significance and robustness (free of heteroscedasticity, autocorrelation, and non-stability problems, according to LM and White tests).

Two control variables were tested: an index of effective exchange rate (in first difference) obtained from the IMF as well as a real interest rate accumulated in a quarter. The exchange rate control did not show significance. In what concerns the real interest rate, data for 'Financial, Interest Rate, Money Market, Percent per annum' from the IMF was used. This rate was transformed into quarterly frequency and deflated using the CPI index. However, as this interest rate is only available from the beginning of our sample to the first quarter of 2020, it was not used in the chosen specifications, since they included the second and the third quarters of 2020. Besides, although this variable had a negative impact on GDP, it was not significant at 10 per cent. Regarding time dummies, the following were tested: Dum08 and Dum09 control for international crises (for the years of 2008 and 2009, respectively); Dum20 is a control for the first quarter of 2020; Dum202 is a control for the second quarter of 2020; Dum203 is a control for the third quarter of 2020; and Dum2023 is a control for the second and third quarters of 2020. These last controls were adopted in some models, to reduce the likelihood that the pandemic period bias the results.

The impact, peak, and accumulated multipliers were obtained. Both the impulse response functions and the corresponding multipliers are presented in the following three subsections. In their turn, diagnostic tests and estimated coefficients are reported in the appendix.

5.1. Effects of social protection expenditure on output (data from Ministerio de Hacienda)

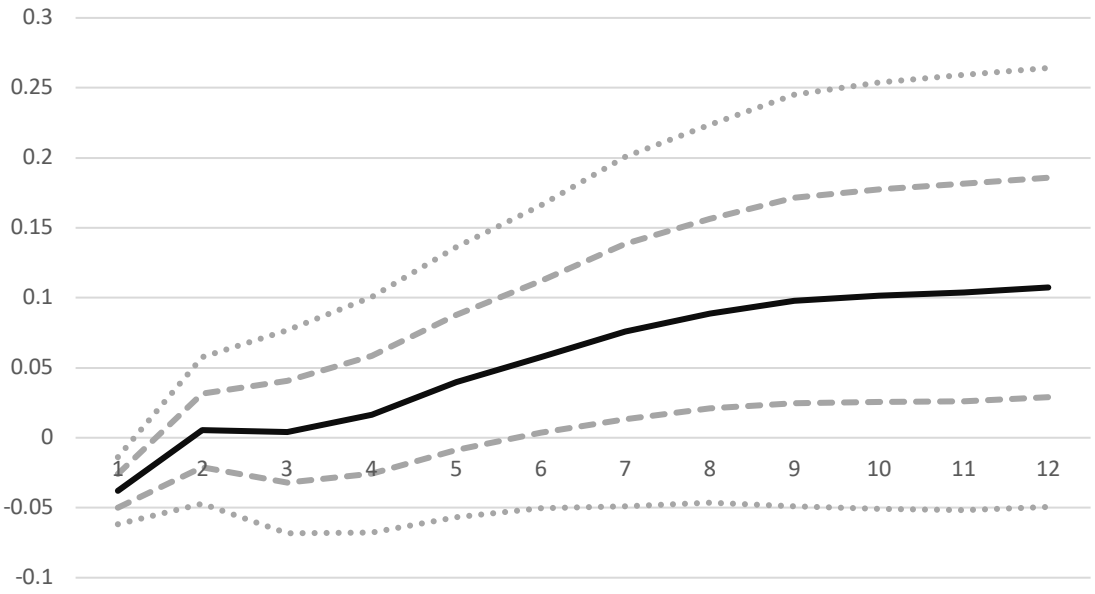
5.1.1. First specification

The first model (VAR 1) was estimated using the series of social protection expenditure from the *Ministerio de Hacienda*. This series and the one on total tax revenues were deflated by the CPI, whereas real GDP was deflated by the GDP deflator. The specification chosen included

seven lags but no time dummies. Although some autocorrelation was detected in lags two and five, the exercise did not show heteroscedasticity. Moreover, VAR 1 is stable.

Figure 3 shows the accumulated impulse-response function of GDP to a shock in social protection expenditure. Dotted lines represent a confidence interval of 95 per cent (two standard deviations). Dashed lines show a confidence interval of 68 per cent (one standard deviation). The exercise points to a positive effect of social protection expenditure on GDP at a 68 per cent confidence interval, one year and a half after the shock.

Figure 3 - Accumulated Response of GDP to a Shock in Social Protection Expenditure (*Ministerio de Hacienda*)



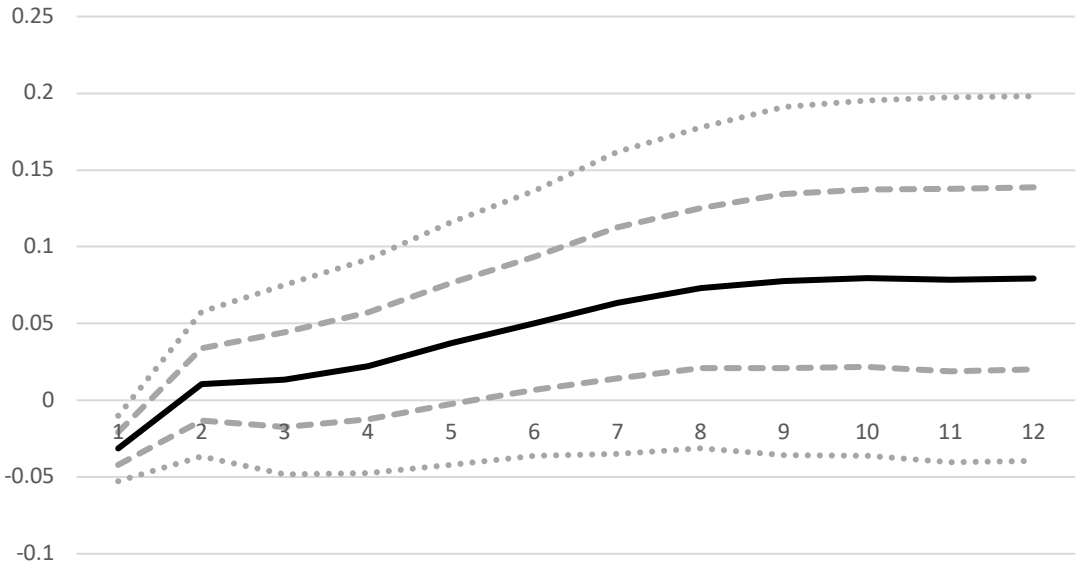
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

After having a negative immediate impact on output – statistically significant at a 95 per cent confidence interval –, an increase in social protection expenditure has no statistically significant cumulative impact on economic activity for the following year. Then, its expansionary impact starts to show and, in the seventh quarter after the shock, such an impact become statistically different from zero. The estimated size of the impact multiplier is -0.86 and the peak multiplier, attained in the fifth quarter, is 1.9. Finally, the accumulated multiplier after three years (twelve quarters) is 2.44: each additional guaraní spent in social protection has a persistent expansionary impact of 2.44 guaraníes on GDP.

5.1.2. Second specification

The second model (VAR 2) is very similar to the first one: it uses the same series, deflators, and lags. The only difference is that it incorporates time dummy Dum2023. The results obtained are also, qualitative and quantitatively, very similar to the ones obtained with VAR 1. The size of the impact multiplier is estimated as -0.71 and, again, is statistically different from zero at a 95 per cent confidence interval. The peak multiplier, in its turn, is attained in the eight quarter and has an estimated size of 1.48. Finally, as before, an increase in social protection expenditure has a persistent positive impact on output, as indicated by the fact that the accumulated multiplier after three years is positive at a 68 per cent confidence interval and has an estimated size of 1.81. Figure 4 shows the response of GDP to a shock in social protection expenditure.

Figure 4 - Accumulated Response of GDP to a Shock in Social Protection Expenditure (*Ministerio de Hacienda*)



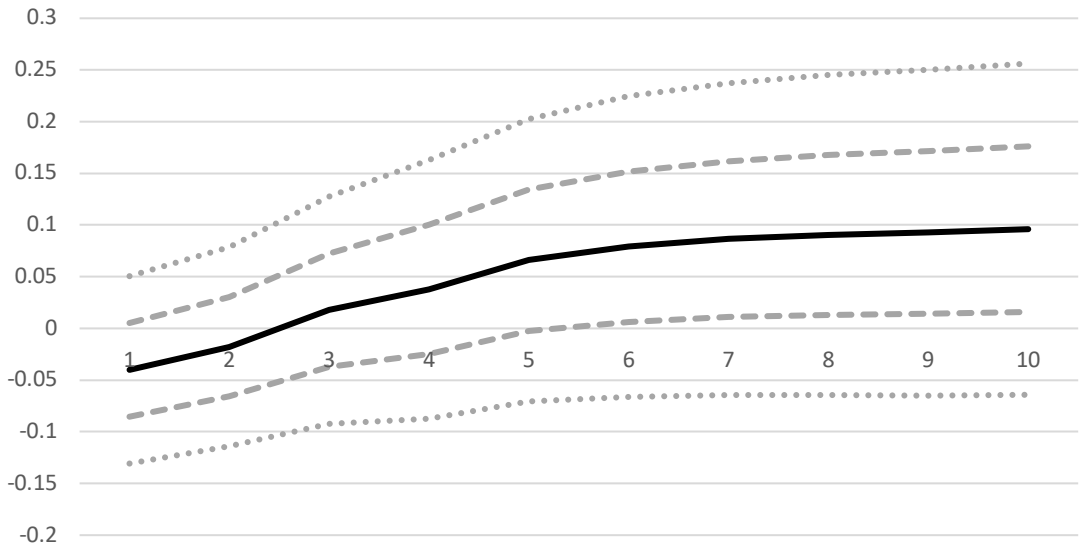
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

5.2. Effects of social protection expenditure on output (data from ECLAC)

5.2.1. First specification

To assess the robustness of the previous estimations, the series of social protection expenditure published by ECLAC is used as an alternative to the one from *Ministerio de Hacienda*. Although the ECLAC series ranges from 2000 to 2018, R Package provides an estimation for the following two years (2019 and 2020), using the total government expenditure series, which is available from 2000 to 2020. The third mode (VAR 3) uses the same deflators as the previous two, that is, the CPI for social protection expenditure and total tax revenues and the GDP deflator for GDP. Also, four lags are included but no time dummy. VAR 3 was carried out from 2000 to the second quarter of 2020, and it is stable and free of heteroscedasticity and autocorrelation issues. Figure 5 shows the response of GDP to a shock in social protection expenditure.

Figure 5 - Accumulated Response of GDP to a Shock in Social Protection Expenditure (ECLAC)



Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

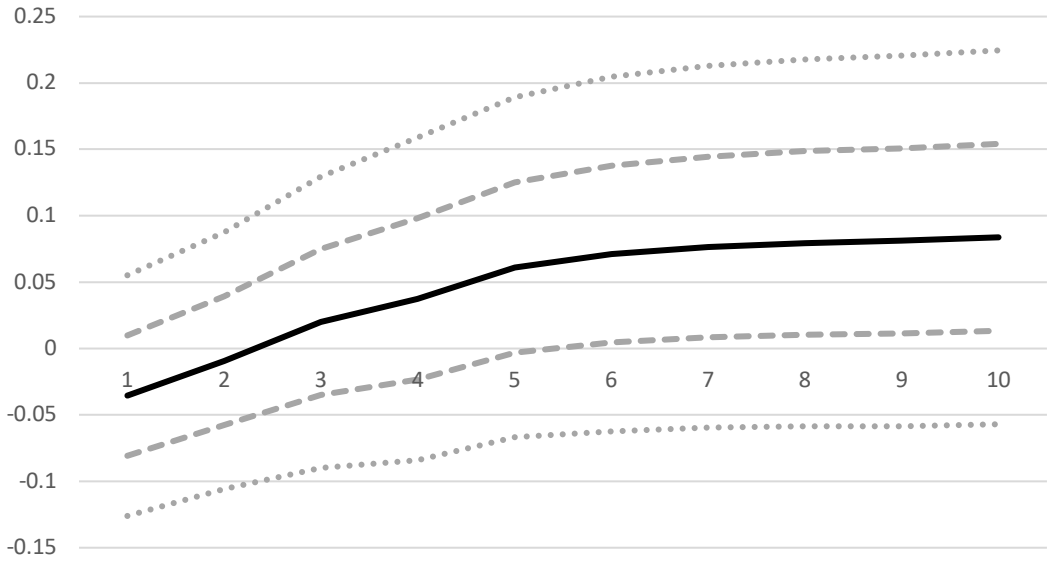
The results obtained are similar to the one from the two previous models, which resorted to the data from *Ministerio de Hacienda*, but the size of the estimated multipliers is larger. As before, the immediate impact is negative (-1.48), but now it is not statistically significant. Already in the third quarter after the shock, the cumulative multiplier becomes positive, and one year and a half after the shock such an expansionary impact becomes statistically different from zero at a 68 per cent confidence interval. The peak multiplier is attained in the fifth quarter and has an estimated value of 5.45. Finally, the accumulated multiplier after two years and half is estimated

as 3.70, indicating a persistent positive impact of social protection expenditures, in line with the result obtained in the previous two models. Now, each additional guaraní spent on social protection increases real GDP in 3.70 guaraníes.

5.2.2. Second specification

The fourth model (VAR 4) is very similar to the third one: it uses the same series, deflators, and lags. The only difference is that it incorporates time dummy Dum202. VAR 4 is stable, did not show heteroscedasticity, but presented autocorrelation. The results obtained are also, qualitative and quantitatively, very similar to the ones obtained with VAR 3. The size of the impact multiplier is estimated as -1.31 and, again, is not statistically different from zero. The peak multiplier, in its turn, is attained in the fifth quarter, as before, and has an estimated size of 4.70. Finally, an increase in social protection expenditure has, once more, a persistent positive impact on output, as indicated by the fact that the accumulated multiplier after two years and a half is positive at a 68 per cent confidence interval and has an estimated size of 3.10. Figure 6, below, shows the response of GDP to a shock in social protection expenditure.

Figure 6 - Accumulated Response of GDP to a shock in Social Protection Expenditure (ECLAC)



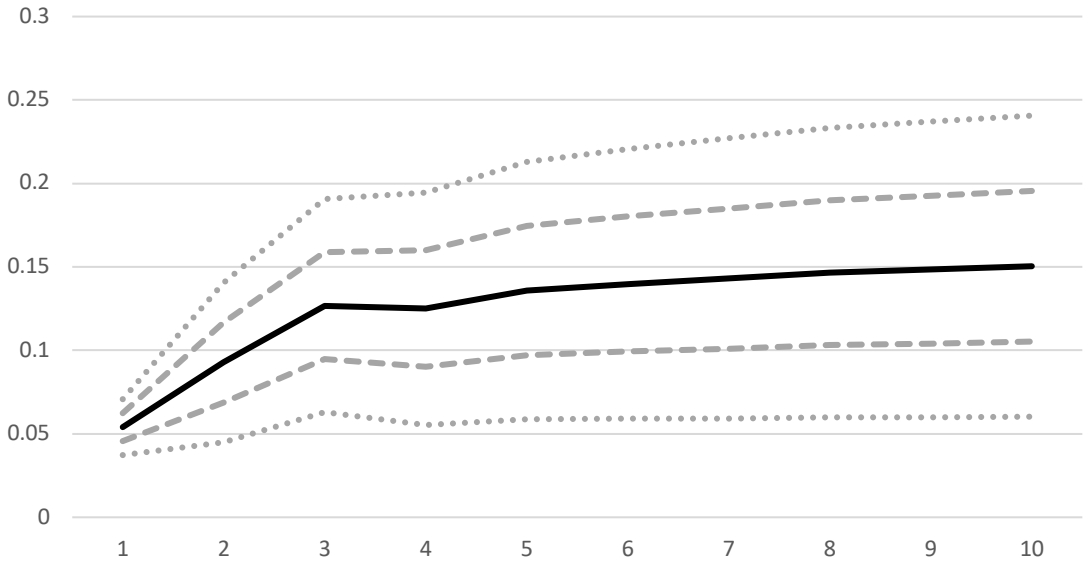
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

5.3. Effects of public investment on output

5.3.1. First specification

As mentioned above, the multipliers of public investment were also estimated to provide a basis of comparison for the social protection expenditure multipliers and to relate more directly the estimates for the current report with the ones obtained by previous empirical efforts (David 2017, Aquino Aguirre 2018). The first model using the series for public investment – that is, the fifth model presented in this report (VAR 5) – is very similar to the four previous models, substituting public investment for social protection expenditure, but not altering the other variables and resorting to the same deflators: public investment (as social protection expenditure before) is deflated by the CPI. VAR 5 includes three lags and time dummy Dum203. Besides, it is stable and free of heteroscedasticity and autocorrelation issues. Figure 7, below, shows the impulse-response function of GDP to a shock in public investment. The effect is positive and significant at a 95 per cent confidence interval.

Figure 7 - Accumulated Response of GDP to a Shock in Public Investment



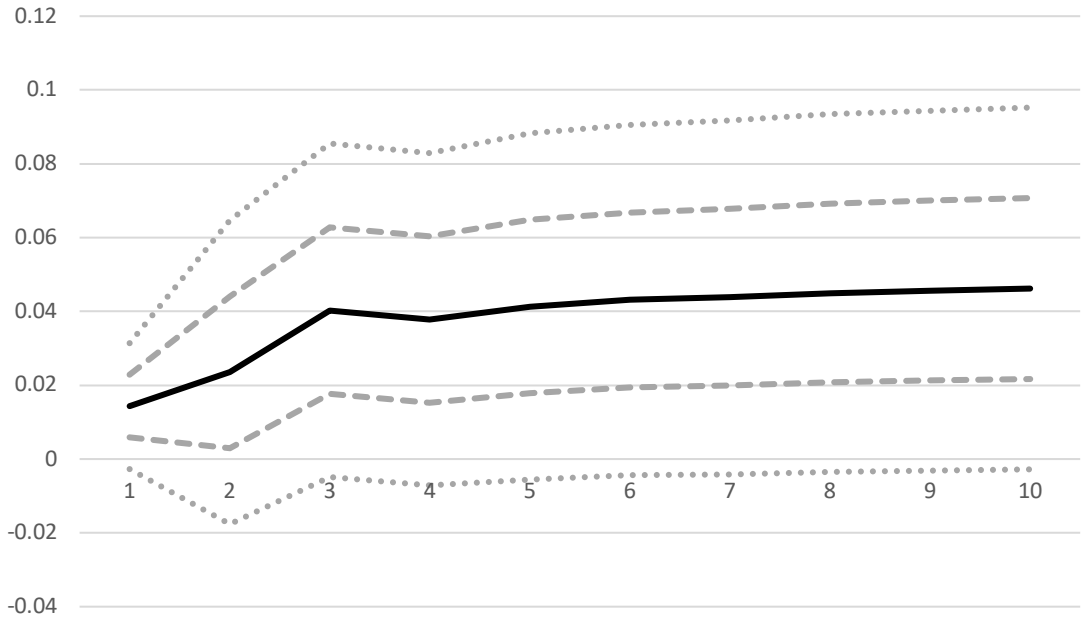
Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

The immediate impact of an increase in public investment is positive and statistically significant at a 95 per cent confidence interval. The impact multiplier has an estimated size of 0.60. In the following quarters, the expansionary impact is intensified and the peak multiplier, of 1.21, is attained in the third quarter after the shock. From then on, the accumulated impact increases slightly, indicating a persistent positive impact of public investment on GDP. The accumulated multiplier over ten quarters is estimated as 2.24: each additional guaraní spent in public investment increases real GDP in 2.24 guaraníes.

5.3.2. Second specification

The sixth model presented in this report (VAR 6) is very similar to the fifth one: it uses the same series and deflators. The only difference is that it incorporates two lags, rather than three, and time dummy Dum20, rather than Dum203. VAR 6 is also stable and free of heteroscedasticity and autocorrelation issues. The results obtained are also similar to the ones obtained with VAR 5, but weaker: the positive impact of a shock of public investment in GDP is statistically significant at a 68 per cent confidence interval, no longer at a 95 per cent one. The size of the impact multiplier is estimated as 0.23, and the peak multiplier is attained in the third quarter and has an estimated size of 0.65. Finally, an increase in public investment has, once more, a persistent positive impact on output, as indicated by the fact that the accumulated multiplier after two years and a half is positive at a 68 per cent confidence interval and has an estimated size of 0.8. Figure 8, below, shows the response of GDP to a shock in public investment.

Figure 8 - Accumulated Response of GDP to a Shock in Public Investment



Dotted lines represent a confidence interval of 95% (two standard deviations). Dashed lines show a confidence interval of 68% (one standard deviation). Accumulated response of GDP was divided by the accumulated shock in social expenditure.

5.4. Summary of results

Table 2, below, summarises all the multipliers estimated for the current report. Beginning with the first four models, the relative similarity of the results obtained suggests that they are robust.[13] More concretely, it is possible to claim that increases in social protection expenditure have medium-run expansionary impact on output, leading to more than proportional increases in real GDP. After about a year and a half, the cumulative expansionary impact becomes significantly different from zero, at a 68 per cent confidence interval, and the accumulated impact over ten to twelve quarters ranges from 1.81 to 3.70. Regarding the short-run impact of social protection expenditure, the models diverge. However, even if a negative impact takes place (as suggested by the first two models with a 5 per cent level of significance), there is little doubt that such an impact is reversed after a few quarters.

[13] The fact that both peak and accumulated multipliers are higher for the series published by ECLAC may be because it disregards expenditure from subnational governments. It might be the case that this expenditure has lower multipliers, pushing downward the average multiplier estimated for the series from *Ministerio de Hacienda*, which incorporates both central and subnational governments.

Table 2: Social protection and public investment multipliers for each model

Model	Category of expenditure	Impact Multiplier	Peak Multiplier (quarter)	Accumulated Multiplier (quarters)
VAR 1	Social protection (*Ministerio de Hacienda*)	-0.86	1.90 (fifth quarter)	2.44 (over twelve quarters)
VAR 2	Social protection (*Ministerio de Hacienda*)	-0.71	1.48 (eight quarter)	1.81 (over twelve quarters)
VAR 3	Social protection (ECLAC)	-1.48	5.45 (fifth quarter)	3.70 (over ten quarters)
VAR 4	Social protection (ECLAC)	-1.31	4.70 (fifth quarter)	3.10 (over ten quarters)
VAR 5	Public investment	0.60	1.21 (third quarter)	2.24 (over ten quarters)
VAR 6	Public investment	0.23	0.65 (third quarter)	0.80 (over ten quarters)

These results, taken together, have several implications. First, as argued before, they point toward a crucial dimension of the interdependence of the SDGs, as expansion of social protection expenditure not only contributes to guaranteeing the human right of social security for all but also is instrumental to sustaining processes of inclusive growth and, in this way, reducing poverty and inequality. The medium-run positive multiplier of social protection expenditure indicates that growth and redistribution can be combined by resorting to increases in this specific component of government expenditure. Second, it is crucial for policymakers to take into consideration the potential contrast between the short- and medium-run impacts of increases in social protection expenditure, to devise an adequate policy mix that prevents the initial contractionary impact of expanding social protection from corroding the legitimacy of the overall policy.

Regarding the public investment multipliers, obtained with models VAR 5 and 6, the estimates are very similar to the ones obtained in previous efforts, both in terms of the magnitude of the accumulated multipliers and in terms of the temporal trajectory of the expansionary impact (David 2017, Aquino Aguirre 2018). The accumulated multiplier over eight quarters, obtained in the previous literature, ranges from 0.9 (Aquino Aguirre 2018) to 1.4 (David 2017), whereas the models here reported found an accumulated multiplier ranging from 0.80 to 2.24, over ten quarters. Besides, in the previous literature, the accumulated multiplier tends to increase as the

time horizon is expanded: according to Aquino Aguirre (2018), it rises from 0.9 to 1.1, when it is estimated over twelve rather than eight quarters; and according to David (2017), it rises from 1.4 to 2.1, when it is estimated over twenty rather than eight quarters. A similar result can be observed in the estimates made for the current report, given that the accumulated multipliers shown in the impulse-response functions (Figures 7 and 8) go on expanding until the end of the period considered (ten quarters). It is plausible to suppose, thus, that the multiplier would be larger if a longer horizon was considered, in line with previous results.

For the purposes of the present report, two main implications can be derived from these estimates of public investment multipliers. First, it seems plausible to conclude that, however large and significant are the multipliers of public investment, the multipliers of social protection expenditure are even larger. If our results confirm the finding commonly report in this literature, that public investment has a stronger expansionary impact than government consumption, it suggests that the expansionary impact of social protection expenditure are even stronger. Second, the fact that the public investment multipliers are very similar to the ones obtained in the previous literature indicates that the current estimates are robust, also boosting the confidence on the other results obtained for the present report – that is, the multipliers for social protection expenditure.

6. Concluding remarks

The current report presented estimates of fiscal multipliers for Paraguay, resorting to the SVAR approach pioneered by Blanchard and Perotti (2002). Using data both from *Ministerio de Hacienda* and ECLAC, ranging from 2000 to 2020, it estimated a positive and persistent impact of shocks in social protection expenditure on GDP: over ten to twelve quarters, the accumulated multiplier is statistically significant and ranges from 1.81 to 3.70. This result means that each additional guaraní spent on social protection leads to an increase in real GDP, two and half to three years after the shock, of 1.81 to 3.70 guaraníes. Moreover, the current report also presented public investment multipliers, to compare these findings with those of the previous literature and to assess the relative strength of the impact on GDP of different components of government expenditure. In this regard, the findings indicate that the medium-run expansionary impact of increases in social protection expenditure is higher than the one of increases in public investment.

The present empirical investigation contributes to the existing research in some dimensions. First, it takes forward the extant effort to estimate fiscal multipliers in a more disaggregate way, the importance of which has been maintained by Pereira and Wemans (2013). Also, it helps filling the gap in this empirical literature regarding social protection expenditures – which, as Gechert et al. (2018) argued, represent a substantial share of government spending in several countries but has seldom been investigated by the literature on fiscal multipliers. The findings here reported confirm the need to study fiscal multipliers in a disaggregate way to provide a more precise estimate of the consequences of different policy options, given that social protection expenditure and public investment were found to have different multipliers, in the case of Paraguay. In addition, these findings also highlight the expansionary potential of social protection expenditure, as they indicate that its accumulated multiplier is higher than the one for public investments, reinforcing the case that this kind of expenditure should play a leading part on the research on fiscal multipliers.

A second dimension of the contribution of the research done for this report is emphasising the interdependence of several SDGs. Improving social protection systems are an end in itself and play a crucial part in ending poverty and reducing inequality. In the specific case of Paraguay, the scope for such an improvement is vast. But this interdependence can be taken further. Such an improvement in social protection should not be thought of as a policy disconnected from the more general development strategy of the country and the prospects of sustaining inclusive growth. In fact, the multipliers estimated for the present report suggest that building more robust social protection systems also has a potential to unleash a virtuous economic dynamic, in which higher expenditure in social protection leads to higher incomes, employment, and tax revenues. Besides, a growth process sustained by improvements in the social protection system has a higher likelihood of distributing its fruits more evenly than one that disregards the importance of social protection. In the case of Paraguay, the relatively low redistributive effectiveness of social spending points to the need to not only expand but also improve the social protection system – an improvement that could increase the multipliers reported above and enhance the expansionary potential of guaranteeing social protection for all.

References

ADAMS, A.; WONG, M. Quantifying fiscal multipliers in New Zealand: the evidence from SVAR Models. *Reserve Bank of New Zealand Analytical Note Series*, 2018.

ALESINA, A.; BARBIERO, O.; FAVERO, C.; GIAVAZZI, F.; PARADISI, M. The effects of fiscal consolidations: theory and evidence. *NBER Working Paper*, n.23385, 2017.

ALVES, R. O impacto da política fiscal sobre a atividade econômica ao longo do ciclo econômico: evidências para o Brasil. *Master Thesis*. Instituto de Pesquisas Econômicas. Universidade de São Paulo, 2017.

ANDREIS, A. Balanço orçamentário estrutural no Brasil: a política fiscal no Brasil é pró- ou anticíclica no período pós-Plano Real? *Finanças Públicas, XIX Prêmio Tesouro Nacional*, 2014.

ATKINSON, A. *Inequality: what can be done?* Cambridge, Mass.: Harvard University Press, 2015.

AUERBACH, A.; GORODNICHENKO, Y. Fiscal multipliers in recession and wxpansion, in A. Alesina and F. Giavazzi, eds., *Fiscal Policy after the Financial Crisis*. Chicago: University of Chicago Press, 63-98, 2013.

AUERBACH, A.; GORODNICHENKO, Y. Fiscal Multipliers in Japan, Technical Report, *National Bureau of Economic Research*, 2014.

BARRIENTOS, A. Social transfers and growth: what do we know? What do we need to find out? *World Development*, 40 (1), 11-20, 2012.

BARRIENTOS, A.; MALERBA, D. Social assistance and inclusive growth. *International Social Security Review*, 73, 33-53, 2020.

BATINI, N.; EYRAUD, L.; FORNI, L.; WEBER, A. Fiscal multipliers: size, determinants, and use in macroeconomic projections. *IMF Technical Notes and Manuals*, 14/04, 2014.

BAUM, A.; KOESTER, G. The impact of fiscal policy on economic activity over the business cycle – evidence from a threshold VAR analysis. *Discussion Paper Series Economic Studies - Deutsche Bundesbank*, n. 3, 2011.

BAYOUMI, T. The morning after: explaining the slowdown in Japanese growth in the 1990s. *Journal of International Economics*, 53(2): 241-259, 2001.

BEETSMA, R.; GIULIODORI, M. The effects of government purchases shocks: review and estimates for the EU. *The Economic Journal*, 121, 4-32, 2011.

BHALLA, G.; KANGASNIEMI, M.; WINDER ROSSI, N. The effects of social protection on economic development. In: E. Schüring and M. Loewe, eds., *Handbook on Social Protection Systems*. Cheltenham: Edward Elgar, 621-635, 2021.

BLANCHARD, O.; PEROTTI, R. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *Quarterly Journal of Economics*, 117 (4), 1329–1368, 2002.

BLOFIELD, M.; GIAMBRUNO, C.; FILGUEIRA, F. Policy expansion in compressed time: assessing the speed, breadth and sufficiency of post-COVID-19 social protection measures in 10 Latin American countries. *Social Policy series*, n. 235. Santiago: ECLAC, 2020.

BORG, I. Fiscal Multipliers in Malta. *Central Bank of Malta Working Papers*, n. 06, 2014.

BOVA, E.; KLYVIENE, V. Macroeconomic effects of fiscal shocks in Portugal. *European Economy Discussion Paper*, n.096, 2019.

BRUCKNER, M.; TULADHAR, A. Public Investment as a Fiscal Stimulus: Evidence from Japan's Regional Spending During the 1990s. *IMF Working Paper*, n. 110, 2010.

BURRIEL, P.; CASTRO, F.; GARROTE, D.; GORDO, E.; PAREDES, J.; PEREZ, J. Fiscal policy shocks in the euro area and the US an empirical assessment. *Fiscal Studies*, 31 (2), 251-285, 2010.

BUSSO, M.; CAMACHO, J.; MESSINA, J.; MONTENEGRO, G. Social protection and informality in Latin America during the COVID-19 pandemic. *IDB Working Paper Series*, n. 1171, Inter-American Development Bank, 2020

CARRARO, L.; MARZI, M. Effects of social protection on poverty and inequality. In: E. Schüring and M. Loewe, eds., *Handbook on Social Protection Systems*. Cheltenham: Edward Elgar, 582-595, 2021.

CARRIÈRE-SWALLOW, Y.; DAVID, A.; LEIGH, D. The macroeconomic effects of fiscal consolidation in emerging economies: evidence from Latin America. International Monetary Fund. *IMF Working Papers*, n.142, 2018.

CASALÍ, P.; VELÁSQUEZ, M. *Paraguay, Panorama de la Protección Social: diseño, cobertura y financiamento*. Santiago: ILO, 2016.

CASTRO, F.; FERNANDEZ, L. The Effects of fiscal shocks on the exchange rate in Spain. *Documentos de Trabajo - Bank of Spain*, n. 1121, 2011.

CASTRO, F.; HERNANDEZ DE COS, P. The economic effects of fiscal policy: the case of Spain. *Journal of Macroeconomics*, 30 (3), 1005-1028, 2008.

ÇEBI, C. Government spending multiplier in Turkey. *Central Bank of the Republic of Turkey (Turkiyes Cumhuriyet Merkez Bankasi) Working Paper*, n.15, 2015.

CEPAL. *Cepalstat*, 2021. Accessible at: https://estadisticas.cepal.org/cepalstat/Perfil_Nacional_Economico.html?pais=PRY&idioma=english.

CLAUS, I.; GILL, A.; LEE, B.; MCLELLAN, N. An empirical investigation of fiscal policy in New Zealand. *New Zealand Working Paper*, n. 06/08, 2006.

CORNIA, G. Income inequality in Latin America: recent decline and prospects for its further reduction. *ECLAC Macroeconomics of Development Series*, n. 149, 2014.

COUDRET, N. Fiscal multipliers in the Netherlands: a structural VAR approach. *Master Thesis in Policy Economics. Erasmus School of Economics*, 2013.

COUNCIL ECONOMICS ADVISERS. Estimates of job creation from the American Recovery and Reinvestment Act of 2009, 2009.

DAVID, A. Fiscal policy effectiveness in a small open economy: estimates of tax and spending multipliers in Paraguay. *IMF Working Paper*, WP/17/63, 2017.

DELEIDI, M.; IAFRATE, F.; LEVRERO, E. Public investment fiscal multipliers: an empirical assessment for European countries. *Structural Change and Economic Dynamics*, 52, 354-365, 2019.

DUFRÉNOT, G.; JAMBOIS, A.; JAMBOIS, L.; KHAYAT, G. Regime-Dependent Fiscal Multipliers in the United States. *Open Economies Review*, 27 (5), 2016.

ERTEN, B.; OCAMPO, J. A. Super cycles of commodity prices since the mid-nineteenth century. *World Development*, 44, 14-30, 2013.

FATAS, A.; MIHOV, I. The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence. *Centre for Economic Policy Research (London). CEPR Discussion Paper*, n. 2760, 2001.

FURCERI, D.; ZDZIENICKA, A. The Effects of Social Spending on Economic Activity: Empirical Evidence from a Panel of OECD Countries. *Fiscal Studies*, 33 (1), 129-152, 2012.

GALDÓN, C. Are Fiscal Multipliers larger during recessions? *Columbia University*, 2013.

GARCIA, J.; LEMUS, A.; MRKAIC, M. Fiscal Multipliers in the ECCU. *IMF Working Paper*, WP/13/117, 2013.

GECHERT, S.; RANNENBERG, A. Are Fiscal Multipliers Regime-Dependent? A Meta Regression Analysis. *IMK Working Paper*, n. 139, 2014.

GECHERT, S.; PAETZ, C.; VILLANUEVA, P. The macroeconomic effects of social security contributions and benefits: evidence from Germany. *Macroeconomic Policy Institute (IMK)*, 2018.

GIMÉNEZ, L.; LUGO, M. A.; MARTÍNEZ, S.; COLMAN, H.; GALEANO, J. J.; FARFÁN, G. Paraguay: análisis del sistema fiscal y su impacto en la pobreza y la equidad. *CEQ Working Paper Series*, n. 74, 2017.

GIORDANO, R.; MOMIGLIANO, S.; NERI, S.; PEROTTI, R. The effects of fiscal policy in Italy: Evidence from a VAR model. *European Journal of Political Economy*, 23, 707-733, 2007.

GONGCHENG, Z.; SCHOLZ, W. Global social security and economic development: retrospect and prospect. *ILO Asia-Pacific Working Paper Series*. ILO, 2019

GRUDTNER, V.; ARAGON, E. Multiplicador dos gastos do governo em períodos de expansão e recessão: evidências empíricas para o Brasil. *Revista Brasileira de Economia*, 71 (3), 321-345, 2017.

HIGGINS, S.; LUSTIG, N.; RAMIREZ, J.; SWANSON, W. Social spending, taxes and income redistribution in Paraguay. *CEQ Working Paper Series*, n. 11, 2013.

HOLLMAYR, J.; KUCKUCK, J. Fiscal multipliers of central, state and local government and of the social security funds in Germany: evidence of a SVAR. *Deutsche Bundesbank Discussion Paper*, n. 28, 2018.

HUBER, E.; STEPHENS, J. *Democracy and the Left: social policy and inequality in Latin America*. Chicago: University of Chicago Press, 2012.

HUSEYIN, S.; KAYA, A. How large are fiscal multipliers in Turkey? *ZBW – Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz Information Centre for Economics*, 2017.

ILO. *World Social Protection Report 2014/15: building economic recovery, inclusive development and social justice*. Geneva: ILO, 2014.

ILO. *World Social Protection Report 2017-19: universal social protection to achieve the Sustainable Development Goals*. Geneva: ILO, 2017.

ILO. Developmental impacts of expanding social protection. *ILO Brief*, 2018.

ILO. Paraguay: impacts of Covid-19 on employment and income generation. *ILO Brief*, 2020.

ILO. *World Social Protection Database*, 2021a. Accessible at: https://ilostat.ilo.org/topics/social-protection/.

ILO. *World Social Protection Report 2020-22: social protection at the crossroads, in pursuit of a better future*. Geneva: ILO, 2021b.

ILZETZKI, E.; MENDOZA, E.; VEGH, C. How Big (Small?) Are Fiscal Multipliers? *Journal of Monetary Economics*, 60, 239-254, 2013.

IMF. *Regional Economic Outlook, Western Hemisphere Region: seizing the momentum*. New York: IMF, 2018.

IZQUIERDO, A.; LAMA, R.; MEDINA, J.; PUIG, J.; RIERA-CRICHTON, D.; VEGH, C.; VULETIN, G. Is the public investment multiplier higher in developing countries? An empirical investigation. *National Bureau of Economic Research Working Paper Series*, n. 26478, 2019.

JEMEC, N.; KASTELEC, A.; DELAKORDA, A. How do fiscal shocks affect the macroeconomic dynamics in the Slovenian economy? *Delovni Zvezki Banke Slovenije Banck of Slovenia Working Paper*, 2013.

KANAZAWA, N. The public investment multipliers: evidence from stock returns of narrowly defined industry in Japan. *Discussion Paper Series*, Hitotsubashi Institute for Advanced Study, HIAS-E-66, 2018.

KONSTANTINOU, P.; PARTHENIOU, A. The effects of government spending over the business cycle: a disaggregated analysis for OECD and non-OECD countries. *Quarterly Review of Economics and Finance*, 2019.

KUTTNER, K.; POSEN, A. Fiscal policy effectiveness in japan. *Journal of the Japanese and International Economies*, 16(4), 536–558, 2002.

LAVIGNE, M. Social protection systems in Latin America and the Caribbean: Paraguay. *ECLAC Project Document*. Santiago, ECLAC, 2012.

LAVINAS, L. 21st century welfare. *New Left Review*, n. 84, 5-40, 2013.

LAVINAS, L. Latin America: anti-poverty schemes instead of social protection. *Contemporary Readings in Law and Social Justice*, 7 (1), 112-171, 2015.

LOPES, M.; MOLLO, M.; COLBANO, F. Metas de inflação, regra de Taylor e neutralidade da moeda: uma crítica pós-keynesiana. *Revista de Economia Política*, 32 (2), 282-304, 2012.

LOZANO, I.; RODRIGUEZ, K. Assessing the macroeconomic effects of fiscal policy in Colombia. *Journal of Financial Economic Policy*, 3 (3), 206-228, 2011.

MACIEL, P. Proposta à regra fiscal brasileira: orientação pelos ciclos econômicos. *XI Prêmio do Tesouro Nacional*, 2006.

MAHAPHAN, K. Fiscal policy and macroeconomic variables: the case of Thailand. *PhD Thesis*, Lincoln University, New Zealand, 2013.

MATTEO, D.; VINCENZO, D.; MAZZUCATO, M.; AGNOLUCCI. Fiscal Multipliers: a SVAR approach for the US. *Associazione Italiana per la Storia dell'Economia Politica (STOREP)*, 2018.

MENDONÇA, D.; MARÇAL, E.; HOLLAND, M. Is fiscal policy effective in Brazil? An empirical analysis. *Working Paper Series, São Paulo School of Economics*, 2016.

MIYAMOTO, W.; NGUYEN, T.; SERGEYEV, D. Government spending multipliers under the zero lower bound: Evidence from Japan, 2017.

OCAMPO, J. A.; GÓMEZ-ARTEAGA, N. Social protection systems, redistribution and growth in Latin America. *CEPAL Review*, n. 122, 7-30, 2017.

ORAIR, R.; SIQUEIRA, F.; GOBETTI, S. Política fiscal e ciclo econômico: uma análise baseada em multiplicadores do gasto público. *XXI Prêmio do Tesouro Nacional*, 2016.

PARK, K.; LEE, E. Identifying government spending shocks and multipliers in Korea. *Bank of Korea WP*, 2019-22, 2019. Available at http://dx.doi.org/10.2139/ssrn.3454291.

PEREIRA, A.; SAGALÉS, O. Long-term effects of fiscal policies in Portugal. *College of William and Mary - Working Paper*, n.35, 2009.

PEREIRA, M.; WEMANS, L. Output effects of fiscal policy in Portugal: a structural VAR approach. *Banco de Portugal Economic Bulletin*, 2013.

PERES, M. Os efeitos dinâmicos da política fiscal sobre a atividade econômica: um estudo para o caso brasileiro. *Dissertação de Mestrado,* Universidade de Brasília, 2006.

PERES, M.; ELLERY, R. Efeitos dinâmicos dos choques fiscais do governo central no PIB. *Pesquisa e Planejamento Econômico*, 39 (2), 159-206, 2009.

PEROTTI, R. Estimating the effects of fiscal policy in OECD countries. *IGIER Working Paper*, n. 276, 2004.

PEROTTI, R. In search of the transmission mechanism of fiscal policy. *NBER Macroeconomics Annual*, v. 22, 2007.

PIRES, M. Política fiscal e ciclos econômicos no Brasil. *Economia Aplicada*, 18(1), 69-90, 2014.

RAMEY, V.; ZUBAIRY, S. Government spending multipliers in good times and in bad: evidence from us historical data. *Journal of Political Economy*, 126(2), 850-901, 2018.

REEVES, A.; BASU, S.; MCKEE, M.; MEISSNER, C.; STUCKLER, D. Does investment in the health sector promote or inhibit economic growth? *Globalization and Health*, 43(9), 2013.

REINHART, C., REINHART, V., TREBESCH, C. Global cycles: capital flows, commodities, and sovereign defaults, 1815-2015. *American Economic Review*, 106 (5), 574-580, 2016.

RESENDE, C. Impulso fiscal: uma abordagem de multiplicadores fiscais com aplicação para a economia brasileira. *Dissertação de Mestrado.* Escola de Economia de São Paulo. Fundação Getulio Vargas, 2019.

RESTREPO, J. How big are fiscal multipliers in Latin America? *IMF Working Paper*, n. 17, 2020.

ROMER, C.; ROMER, D. Transfer payments and the macroeconomy: the effects of social security benefit increases, 1952-1991. *American Economic Journal: Macroeconomics*, 8 (4), 1-42, 2016.

SANCHES, M.; CARVALHO, L. A contribuição da política fiscal para a crise brasileira recente: uma análise baseada em multiplicadores de despesas primárias do governo central no período 1997-2018. *Working Paper FEA/USP*, n. 35, 2019.

SARANGI, N.; BONIN, J. Fiscal policy on public social spending and human development in Arab countries. *Economic and Social Commission for Western Asia Technical paper*, n. 13, 2017.

SEDLAC. *Socio-Economic Database for Latin America and the Caribbean (CEDLAS and The World Bank)*, February 2021. Accessible at: https://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/.

SILVA, R.; CARVALHO, V.; RIBEIRO, A. How large are fiscal multipliers? A panel-data VAR approach for the Euro area. *FEP Working Papers*, n. 500, 2013.

SIMS, C. Macroeconomics and reality. *Econometrica*, n. 48, 1-48, 1980.

SKRBIC, M.; SIMOVIC, H. The size and determinants of fiscal multipliers in Western Balkans: comparing Croatia, Slovenia and Serbia. *EFZG Working Paper Series*, n. 15-10, 2015.

SPILIMBERGO, A.; SYMANSKI, S.; SCHINDLER, M. Fiscal multipliers. Technical report. *IMF Staff Position Note*, IMF, 2009.

TANG, H.; LIU, P; CHEUNG, E. Changing impact of fiscal policy on selected ASEAN countries. *Journal of Asian Economics*, 24, 103-116, 2013.

TENHOFEN, J.; WOLFF, G.; HEPPKE-FALK, K. The macroeconomic effects of exogenous fiscal policy shocks in Germany: a disaggregated SVAR Analysis. *Journal of Economics and Statistics (Jahrbuecher fuer Nationaloekonomie und Statistik)*, 230 (3), 328-355, 2010.

VALENCIA, F. Fiscal multipliers in Mexico. IMF Mexico Selected Issues. *IMF Country Report*, n.15/314, 4-9, 2015.

VDOVYCHENKO, A. How does fiscal policy affect GDP and inflation in Ukraine? *Visnyk of the National Bank of Ukraine*, n. 244, 25-43, 2018.

WORLD BANK. *World Bank Data*, 2021. Accessible at: https://data.worldbank.org/country/paraguay.

APPENDIX

**** 1% / *** 5% (two standard-deviation bands) / **10% / *30% (one standard- deviation bands)

VAR 1

	SAS Equation	Revenue Equation	GDP Equation
SAS (0)			0.011387
SAS (-1)	-0.343549***	0.018684	0.068210***
SAS (-2)	-0.237038*	0.074569	0.034867*
SAS (-3)	-0.264263***	0.062221	0.042200*
SAS (-4)	-0.178287**	0.211155****	0.091494****
SAS (-5)	-0.186122**	0.068082*	0.043754**
SAS (-6)	-0.265698****	0.089003*	0.021133*
SAS (-7)	-0.084534	0.185353****	0.040256**
Revenue (0)			-0.122109****
Revenue (-1)	-0.456460*	-0.640005****	-0.025009
Revenue (-2)	-0.235206	0.253638	0.175616***
Revenue (-3)	-0.429448*	0.285875*	0.127055**
Revenue (-4)	-0.142815	0.252877*	0.100775*
Revenue (-5)	-0.298487*	-0.207098*	-0.083306*
Revenue (-6)	0.119416	0.072277	0.039678
Revenue (-7)	0.070764	0.215994***	0.058010**
GDP (-1)	-0.219020	0.249865	-0.302827*
GDP (-2)	0.542394	-0.318881	-0.059860
GDP (-3)	-0.659984	-0.699437*	-0.235773*
GDP (-4)	-0.956921*	-0.068957	-0.281568*
GDP (-5)	0.015596	0.686801*	0.210178*
GDP (-6)	1.147843*	-0.068032	0.122846
GDP (-7)	-0.629987	-0.012579	0.048208
C	0.083662***	-0.002934	-9.01E-05

White Heteroscedasticity test

0.2477

LM Autocorrelation test

0.6031
0.0042
0.4111
0.0433
0.0161
0.9330
0.0825
0.3649

Stability test (VAR roots)

0.939704
0.939704
0.903161
0.903161
0.869827
0.869827
0.865266
0.865266
0.846125
0.846125
0.779230
0.779230
0.709817
0.709817
0.704763
0.704763
0.697211
0.697211
0.685609
0.685609
0.286534

VAR 2

	SAS Equation	Revenue	GDP Equation
SAS (0)			0.012384
SAS (-1)	-0.325458***	-0.032282	0.054103**
SAS (-2)	-0.209077*	-0.004206	0.013062
SAS (-3)	-0.246908***	0.013330	0.028667*
SAS (-4)	-0.160089*	0.159886***	0.077303****
SAS (-5)	-0.184944**	0.064764*	0.042836***
SAS (-6)	-0.270030****	0.101208**	0.024512*
SAS (-7)	-0.079475	0.171102****	0.036311**
Revenue (0)			-0.097729***
Revenue (-1)	-0.383791*	-0.844734****	-0.081679*

Revenue (-2)	-0.178887	0.094971	0.131696*
Revenue (-3)	-0.379888*	0.146249	0.088406*
Revenue (-4)	-0.112888	0.168564	0.077437*
Revenue (-5)	-0.315840*	-0.158210	-0.069773*
Revenue (-6)	0.134580	0.029555	0.027853
Revenue (-7)	0.086454	0.171791**	0.045775*
GDP (-1)	-0.151308	0.059100	-0.355632***
GDP (-1)	0.563238	-0.377603	-0.076114
GDP (-1)	-0.703193	-0.577704*	-0.202077*
GDP (-1)	-0.975654*	-0.016182	-0.266960**
GDP (-1)	0.156588	0.289585	0.100227
GDP (-1)	1.250103**	-0.356129	0.043100
GDP (-1)	-0.578417	-0.157866	0.007993
C	0.074170***	0.023810*	0.007313*
Dum2023	0.063429	-0.178699****	-0.049465***

White Heteroscedasticity test

0.1227

LM Autocorrelation test

0.1037
0.0068
0.9048
0.0651
0.0465
0.9278
0.1738
0.2236

Stability test (VAR roots)

0.960257
0.960257
0.879298
0.879298
0.877790
0.877790
0.851317
0.851317
0.834619
0.834619
0.761666

0.761666
0.708104
0.708104
0.705764
0.705764
0.685809
0.685809
0.651172
0.651172
0.276949

VAR 3

	Cepal Expend.	Revenue	GDP
Cepal Expend (0)			0.033503*
Cepal Expend (-1)	-0.128723*	-0.096428	0.038887
Cepal Expend (-2)	0.027981	0.124394	0.087819**
Cepal Expend (-3)	-0.164067*	0.171274*	0.034254
Cepal Expend (-4)	-0.111204	0.099495	0.069994*
Revenue (0)			-0.108965***
Revenue (-1)	0.004835	-0.317834*	-0.019869
Revenue (-2)	-0.157904*	0.082546	0.068713*
Revenue (-3)	-0.095052	0.022304	0.039997*
Revenue (-4)	0.023750	0.043257	0.009669
GDP (-1)	-0.198705	0.686054*	-0.168234*
GDP (-2)	0.490934*	0.006857	-0.062688
GDP (-3)	0.212380	-0.016397	-0.142796
GDP (-4)	0.333590*	0.298859	-0.181825*
Dum09	0.071362***	0.034866	-0.001205
Dum08	-0.052250**	0.014073	0.017888*
Trend	0.000349**	-0.000167	9.02E-05*

White Heteroscedasticity test

0.4694

LM Autocorrelation test

0.2537
0.3505
0.5307
0.0234
0.1346

0.7862
0.8341

Stability test (VAR roots)

0.756353
0.756353
0.676115
0.673780
0.673780
0.570341
0.570341
0.543172
0.543172
0.491447
0.491447
0.466127

VAR 4

	Cepal Expend.	Revenue	GDP
Cepal Expend (0)			0.031685
Cepal Expend (-1)	-0.129292*	-0.073610	0.045194*
Cepal Expend (-2)	0.029201	0.075456	0.074294**
Cepal Expend (-3)	-0.163571*	0.151415*	0.034254
Cepal Expend (-4)	-0.109469	0.029948	0.050773*
Revenue (0)			-0.081704**
Revenue (-1)	0.001734	-0.193514*	0.014490
Revenue (-2)	-0.155841	-0.000215	0.045840
Revenue (-3)	-0.092920*	-0.063166	0.016376
Revenue (-4)	0.024692	0.005512	-0.000763
GDP (-1)	-0.191564	0.399731*	-0.247364**
GDP (-2)	0.489097*	0.080536	-0.042325
GDP (-3)	0.204266	0.308979	-0.052873
GDP (-4)	0.109853	0.266757	-0.190697*
Dum09	0.071537***	0.027821	-0.003152
Dum08	-0.051977**	0.003123	0.014862*
Trend	0.000344**	2.47E-05	0.000143**
Dum202	0.010425	-0.418046****	-0.115534*****

White Heteroscedasticity test

0.2689

LM Autocorrelation test

0.0512
0.0564
0.3737
0.0204
0.3926
0.7688
0.8891

Stability test (VAR roots)

0.732163
0.732163
0.699970
0.699970
0.571576
0.571576
0.538901
0.538901
0.502423
0.449619
0.449619
0.211368

VAR 5

	Public Invest	Revenue	GDP
Public Invest (0)			-0.036220****
Public Invest (-1)	-0.703264****	0.018749	0.008109
Public Invest (-2)	-0.329998***	0.039325	0.030479**
Revenue (0)			-0.113549****
Revenue (-1)	-0.193919*	-0.532769****	0.030719*
Revenue (-2)	-0.174236*	-0.077998*	0.016399
GDP (-1)	-1.600151**	1.019558****	-0.213239**
GDP (-2)	-1.364916*	0.335939	0.002670
C	0.035675*	0.001946	0.008428***
Dum203	-0.316253*	0.299703****	0.068915***

White Heteroscedasticity test

0.9994

LM Autocorrelation test

0.5241
0.6798
0.8691
0.3422
0.2417
0.5460
0.7659
0.5020

Stability test (VAR roots)

0.568867
0.568867
0.335589
0.335589
0.331459
0.331459

VAR 6

	Public Invest	Revenue	GDP
Public Invest (0)			-0.025024**
Public Invest (-1)	-0.686254****	0.008916	0.006029
Public Invest (-2)	-0.350701****	0.032272	0.025945**
Revenue (0)			-0.126608****
Revenue (-1)	-0.190701**	-0.511350****	0.030440**
Revenue (-2)	-0.180260**	-0.087632**	0.016130*
GDP (-1)	-1.678339***	1.129565****	-0.253960***
GDP (-2)	-1.356350**	0.350644	-0.011075
C	0.044569***	0.000663	0.010817****
Dum20	0.041215	0.023217	-0.010012
Interest rate	0.856952*	-0.166262	-0.107300

White Heteroscedasticity test

0.3723

LM Autocorrelation test

0.1426
0.9119
0.9745
0.0260
0.4136
0.6958
0.9311
0.2297

Stability test (VAR roots)

0.559811
0.559811
0.351679
0.351679
0.315208
0.315208