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Saving in Latin America and the Caribbean: Performance and Policies

by Francesco Grigoli, Alexander Herman, and Klaus Schmidt-Hebbel

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Saving in Latin America and the Caribbean: Performance and Policies[1]

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Abstract

This paper analyzes saving patterns and determinants in Latin America and the Caribbean (LAC), including key policy variables and regimes. The review of previous empirical studies on LAC saving reveals contradictions and omissions. This paper presents empirical results of an extensive search of determinants of private and public saving rates, adding previously neglected variables (including different measures of key external prices and macroeconomic policy regimes), in linear form and in interactions with other saving determinants. It analyzes statistical differences in saving determinants between LAC and the rest of the world in a nested econometric framework, and discusses differences across three country subgroups within LAC. The results highlight commonalities and differences in saving behavior between LAC and other world regions, as well as within LAC, identifying the role of key policy variables and regimes.

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I. INTRODUCTION

The well-documented correlation between saving and growth performance has been long known and supported by many empirical studies. Latin America and the Caribbean (LAC) exhibits much lower private saving rates than the average for the world. However this hides some heterogeneity, as saving is particularly low in smaller countries and volatile in countries subject to exogenous shocks, such as natural disasters or commodity price fluctuations. What policies are most effective in raising saving, especially in LAC, remains an open question.

Some research discusses the importance of terms of trade (TOT) in determining saving in LAC (Adler and Magud, 2013; Gruss, 2014). After a decade of rapid growth, international commodity prices have started to fall since 2011. Recent developments saw an important decline especially in the price of oil, as well as other commodities, which call for a renewed analysis of the impact of TOT shocks on saving. Since LAC is highly dependent on commodities, a region-specific analysis is warranted. Moreover, the region went through many institutional and macroeconomic reforms in the last three decades. In particular, the adoption of fiscal rules, inflation targeting, and floating exchange rate regimes has become more common, but remains unclear the extent to which these reforms spurred private saving.

While the literature on saving determinants is vast, results are far from conclusive, even for LAC. The range of behavioral assumptions, model specifications, econometric techniques, and data samples is very large, and this contributes to somewhat contradictory results and large variations in reported estimates. At the same time, recent theoretical developments provide new testable hypotheses that are still unexplored.

The contribution of this paper to the existing literature is threefold. First, it reviews extensively previous empirical research on private saving in LAC, summarizing its results and identifying contradictions and omissions. Second, this paper presents empirical results of an extensive search of determinants of private and public saving rates, adding previously neglected variables (different measures of TOT and commodity-price shocks and macroeconomic policy regimes, including fiscal rules, monetary regimes, and exchange-rate regimes), in linear form and in interactions with other saving determinants. Third, it analyzes statistical differences in saving determinants between LAC and the rest of the world in a nested econometric framework, and discusses differences within three country subgroups in LAC .

The results suggest that our nested baseline private saving estimation is generally robust across regional groups, and that the coefficients for the LAC region do not exhibit much difference from the rest of the world. Thus, LAC private saving is fundamentally explained by its own lag, real GPDI per capita, the TOT, the share of urban population, and the old-age dependency ratio. By examining public saving determinants, we find that increased income growth reduces public saving, possibly reflecting the procyclical behavior of fiscal policy, and increased private sector credit raises public saving, suggesting some crowding out. However, these results differ across

LAC subgroups, with larger countries showing signs of countercyclical fiscal policy and less sensitivity to old-age dependency.

We also find that TOT and commodity price volatility and accelerations as well as their temporary components raise private saving in both LAC and the rest of the world. Finally, our findings suggest that adopting fiscal rules and floating exchange rate regimes do not affect private saving behavior. However, the adoption of the inflation targeting reduces private saving irrespective of the negative effects of inflation on saving.

The paper is structured as follows. Section II summarizes the literature on the determinants of private saving in LAC. Section III discusses the data sources and construction and presents some stylized facts. Section IV outlines the empirical strategy and describes the results. Section V concludes.

II. PREVIOUS EMPIRICAL LITERATURE FOR LAC

Most empirical research on saving (and consumption) is based on general specifications that encompass a selective (and typically small) number of determinants. While the functional form of the saving (or consumption) equation subject to empirical testing is normally not derived from first principles, it encompasses a number of drivers — mostly in linear form— that are identified by consumption theories.

Table 1 identifies categories of saving determinants, specific saving drivers in each category, expected signs of their saving effects according to consumption theories, and their empirical counterparts reported in saving studies for LAC. Regarding categories of saving determinants and individual variables in each category, as well as their expected signs, we follow in part Grigoli et al. (2014), who discuss consumption theories and their relation to saving determinants found in world saving studies based on aggregate panel data.[3]

Here we do not discuss the relation between consumption theories and individual determinants—we refer the interested reader to the references listed in Table 1 and to Grigoli et al. (2014).[4] In Table 1, each saving determinant is listed only once, under the variable category to which it is most closely related by theory. However, both the expected sign and the signs reported in the empirical literature reflect the combined effects on saving predicted by different theoretical hypotheses. The last column of Table 1 identifies the sign of the estimated coefficients of saving

[3] Previous surveys of consumption theories and their relation to empirical research include Schmidt-Hebbel and Servén (1997), Loayza et al. (2000), Attanasio and Weber (2010), and Grigoli et al. (2014).

[4] We only include saving determinants found in the empirical literature for LAC. A more comprehensive set of potential saving determinants, with or without empirical counterparts in the literature on saving studies based on macroeconomic and microeconomic data, is reviewed in the surveys listed in the preceding footnote.

determinants reported in 26 empirical studies on saving for the LAC region or individual LAC countries.

Table 1. Determinants of Private Saving in Previous Studies on LAC

Variable Category	Specific Variable	Expected Sign	Empirical Findings
Income	Income level: current	Ambiguous	+ (1, 2, 3, 8, 10, 17, 26); 0 (21); − (16)
	Income level: estimated temporary/permanent	(+)/0 or (+)	+ (5); 0 (16) / 0(16)
	Income growth: current	Ambiguous	+ (10, 19); 0 (5); − (2)
	World income growth	Ambiguous	+ (16); − (3)
Wealth	Total Wealth	Ambiguous	0 (26)
Rates of return on financial assets	Real interest rate	Ambiguous	+ (3, 5, 11, 22); 0 (1)
Relative prices	CPI inflation: current	(+)	+ (10); 0 (1)
	CPI inflation volatility	Ambiguous	− (2)
	Terms of trade: current	0 or (+)	+ (2, 16)
Domestic borrowing constraints	Current credit flows, current money flows	(−)	+ (1); 0 (4)
	Financial access	(−)	0 (4); − (3, 16, 17, 25)
Foreign borrowing constraints	Foreign saving	(−)	− (1, 8, 10, 11)
	Capital flow restrictions	(+)	+ (3, 5)
Financial depth	Bank credit stock	Ambiguous	- (3)
	Broad money stock	Ambiguous	+ (1, 2, 10); − (3)
Demographics	Old-age dependency	(−)	0 (17, 18); − (1, 8, 10)
	Young-age dependency	(−)	− (16, 17, 18)
	Dependency	(−)	+ (3, 26); − (2, 16, 17, 19)
	Younger cohorts	Ambiguous	+ (23, 24)
	Urbanization	Ambiguous	+ (23); 0 (16); − (1, 17)
Poverty and distribution	Income concentration	Ambiguous	0 (1); − (10)
	Labor income share	Ambiguous	0 (22)
Labor market informality	Probability of future employement informality	Ambiguous	− (16, 25)
	Informal employment status	Ambiguous	0 (20); − (16, 18, 25)
	Entry costs to formal sector	(+)	+ (22)
Fiscal policy	Public sector saving	(−)	− (1, 3, 5, 7, 8, 9, 11, 12, 13, 14, 16, 19); 0(15)
	Public sector budget balance	0 or (−)	− (2, 10)
	Public consumption	Ambiguous	+ (20)
Government spending components	Pensions payments	Ambiguous	− (2)
	Education and health payments	Ambiguous	− (17)
	Cash transfers	Ambiguous	− (16, 17)
Taxes	Corporate profit tax rate	Ambiguous	− (3, 16, 19, 22)
	Capital tax rate	Ambiguous	− (20)
	Personal income tax	Ambiguous	− (19)
	Consumption tax rate	Ambiguous	0 (20)
	Labor tax rate	Ambiguous	0 (22); − (3)
Pension system	Pay-as-you-go pension transfers to old	Ambiguous	− (1)
	Mandatory fully-funded pension system	0 or (+)	+ (7, 12, 13, 14, 15)
Household structure	Female household head	Ambiguous	+ (4); − (16, 17, 18, 25)
	Homeownership, durable goods	Ambiguous	+ (4, 16, 17, 18)
	Household age	Ambiguous	− (4)
	Formal head	(+)	+ (17)
	Number of members	Ambiguous	+ (16); − (6, 26)
	Number of members under 18	(−)	− (4, 16, 25)
	Number of income-earning members	(+)	+ (18)
	Presence of a spouse	Ambiguous	+ (6, 18)
	Household head retired	Ambiguous	0 (4, 18)
	Household head education	Ambiguous	+ (16, 25); 0 (17)
Micro characteristics of households or individuals	Age	Ambiguous	+(26); 0 (17, 25); −(23)
	Education	Ambiguous	+ (4, 16, 21, 23); − (17, 18)
	Risk aversion coefficient	(+)	+ (22)
	Discount factor	(+)	+ (22)
Micro characteristics of firms	Short term debt	(+)	0 (16)
	Productivity	(+)	+ (22)
	Volatility of productivity process	(+)	+ (22)
	Size of firm	(+)	+ (25); 0 (16)
	Cash flow sensivity, access to loans	(+)	+ (16, 25)
	Future marginal productivity of capital	(+)	+ (19)

Notes: The qualitative results listed in the last column of this table summarize signs of saving regressors reported in 26 panel studies of private saving. "+" and "-" signs correspond to statistically significant coefficient estimates, while "0" denotes coefficient estimates that are not significantly different from zero. The sources are the corresponding tables and specific columns, rows, or regressions of the following studies: 1. Edwards (1996) (table 2, column 5); 2. Dayal-Ghulati and Thimann (1997) (table 6); 3. Bennett, Loayza, and Schmidt-Hebbel (2001) (table 3, column 6, tables 4 to 6); 4. Butelmann and Gallego (2000) (tables 7 to 11); 5. Vergara (2001) (table 4); 6. Montes and Villagómez (2002) (figures 9 to 13); 7. Corbo and Schmidt-Hebbel (2003) (table 4); 8. Bulír and Swiston (2006) (table 5); 9. Cermeño, Roth, and Villagómez (2008); 10. Gutiérrez (2007) (table 5, regression 9); 11. Hernández and Villagómez (2009) (table 3); 12. Fuentes (2013); 13. Secada, Cusato, and Zapata (2013); 14. Antón and Villagómez (2013); 15. Malagón, Ruiz, Vaca, and Villar (2013); 16. Andrade and Guillen (2014) (table 2to 5, and table 9 column 1); 17. Bebczuk and Gasparini (2014) (tables 3.1 - 3.6); 18. Caggia and Schclarek Curutchet (2014) (tables 1-3); 19. Cerda, Fuentes, García, and LLodrá (2014) (tables 5.2 and 5.3); 20. Espino and Gonzalez-Rozada (2014); 21. Gandelman (2014) (tables 2-9); 22. Granda and Hamann (2014); 23. Hernani-Limarino, Jiménez, and Mena (2014) (panels 9-10 and figure 10); 24. Madeira (2014); 25. Karver, Mendoza, and Székely (2014) (table 5, 11, and 13); 26.Tovar and Urrutia (2014) (table 5).

There are large variations in saving measures, methodologies, specifications, and data samples across studies. The 26 papers comprise models for different saving measures: national, private, household, individual, and corporate saving rates, among which those for private and household saving rates dominate in numbers. Specifications differ strongly between macroeconomic models applied to aggregate data (developed in 18 papers) and microeconomic models applied to survey data (reported in 11 papers). Most research is based on single-equation econometric estimations,

with and without simulations. Six macroeconomic papers develop either general equilibrium models or smaller models for a set of sector saving equations. Finally, there are also large differences in sample coverage and size. Fourteen macroeconomic data studies range from 20 to 624 observations for single-country estimations, and two panel studies range from 99 to 128 observations. Eleven microeconomic studies based on survey data—for cross-section and synthetic-cohort panels—range from 1,762 to 392,263 observations.

We briefly review the key results reported by the empirical literature for LAC, focusing first on consumption determinants that are not directly related to policy variables. While the income level and its growth rate have theoretically ambiguous effects on private saving rates, the number of studies (most of them on aggregate data) reporting positive effects dominates the number of those reporting zero or negative effects. TOT raise private saving according to two studies.

Many macroeconomic studies report significant effects of demographic variables. Among them, the age dependency ratios—either separately or jointly for old and young age—tend to reduce private saving rates, as predicted by theory. However, in studies based on microeconomic data, younger cohorts tend to save more. Urbanization has either sign, which is consistent with its theoretical ambiguity. The few studies that include poverty-related and distributional aggregate variables do not report conclusive results.

Many other potential non-policy saving determinants are included in microeconomic studies for households or individuals and for firms. The theoretical ambiguity of many variables that reflect household structure (ranging from a female household head to the household head's retirement status) is borne by several studies that report zero, positive, or negative signs for the latter variables. However, in the case of three household structure variables where expected signs are unambiguous, i.e., formal head, number of under-age members, and number of income-earning members, the empirical findings are consistent with theory.

Micro studies also report empirical evidence of saving effects of micro characteristics of households or individuals and of firms. Age has an ambiguous effect on saving, which is consistent with the non-monotonicity predicted by the life-cycle hypothesis. Risk aversion and the discount factor raise saving, as expected. Finally, several potential firm saving determinants are found to raise corporate saving, ranging from corporate debt to the productivity of capital.

Next we discuss the findings related to the saving effects of variables that reflect directly or closely policies and policy reforms. Fiscal policy affects private saving directly, as documented in 16 macroeconomic saving studies. Higher public saving (or a larger fiscal balance) reduces private saving significantly, by offset coefficients that range from zero (in one study only) to a maximum of 0.75. The 14 studies that report an offset coefficient different from zero present point estimates that are significantly different from both zero and one, i.e., full Ricardian equivalence is rejected. One study documents a significant complementarity between private and public consumption.

Regarding government social spending, there is evidence that government pension payments reduce private saving and government transfers reduce household saving. Most of the evidence about taxes affecting firms—corporate profit tax rates, capital tax rates, and labor tax rates—suggests that they reduce corporate saving. The personal income tax rate lowers private saving in one study.

Monetary policy affects private saving through the real interest rate and inflation. The theoretical ambiguity of the real interest rate effect is borne by the few results on its sign: four of them positive and one not significantly different from zero. The scarce evidence on the level of inflation shows positive saving effects, consistent with theory.

Financial liberalization effects on saving are identified by using different proxies of domestic and foreign borrowing constraints. The scarce macroeconomic evidence on credit and monetary flows is not consistent with their expected negative sign, possibly because of the inability of the variables to proxy financial liberalization. However, most of the microeconomic evidence on the effect of financial access measures is consistent with the expected negative sign. Foreign saving inflows tend to partially offset aggregate private saving. Restrictions on capital flows raise aggregate private saving.

Development of financial, real-estate, and home-durable markets could also change private saving. While the effects of ownership of homes and consumer durables are theoretically ambiguous, the micro evidence shows that higher home ownership and larger holdings of consumer durables raise household saving. Financial deepening affects private savers by changing their holdings of bank debt, financial assets, and monetary assets. The theoretical ambiguity of the saving effects of the latter stocks is confirmed by the empirical literature, which reports coefficients of the opposite sign.

Labor market policies can affect the extent of employment formality and hence saving. The expected effect of informality is ambiguous. The available evidence for LAC—which is rich in comparison to other regions, due to the high prevalence of informality in LAC—tends to confirm this ambiguity. The effects of current employment informality on household saving have different signs in different studies, a higher probability of future employment informality reduces saving, and higher entry costs to the formal sector raise saving.

Education has theoretically ambiguous effects on saving. This is confirmed by the microeconomic evidence, which shows that the saving effect of educational attainment of the household head or the average household member can have either sign.

Pension reform can affect private and national saving through different channels. A pension reform that gradually substitutes a pay-as-you-go system with a fully-funded pension regime leads to a public pension transition deficit that may be partly offset through long-term fiscal

adjustment. Household (and private) saving reacts to lower public saving, as discussed above. Pension reform forces active workers to do mandatory pension saving, which is partly or at most totally offset by lower voluntary household saving. Five country studies for Latin American pension reforms investigate the final net effect of pension reform on private and on national (i.e., private plus public) saving. They find that mandatory fully-funded pension system contributions have raised the national saving rate since the start of the corresponding reform and through the end of the corresponding sample period by 2.3-2.7 percentage points (pp) in Chile, 1.5 pp in Colombia, 1.0 pp in Mexico, and 0.3 pp in Peru.[5]

We conclude that there is a growing empirical literature on the behavior of private (and household and corporate) saving in LAC, based on both macroeconomic and microeconomic data. Our short survey of results points to the following conclusions. First, the range of behavioral assumptions, model specifications, econometric techniques, and data samples is very large, which is behind the large variation in reported results. A divide separates macroeconomic from microeconomic studies. Limited by availability or relevance of data at the aggregate and the micro survey level, specifications of macro and micro saving equations share few saving determinants.

Second, many studies report coefficient signs for individual saving determinants that contradict those reported by others. Moreover, the dispersion of parameter point estimates (and their confidence intervals) is very large including those that are consistent with theory— as exemplified by private-public saving offset coefficient estimates.

Third, most studies include only a small number of potential saving determinants, are based on mostly linear specifications, and do not include interaction effects between policy and economic outcome variables that could affect private saving. Fourth, few macroeconomic studies include non-standard variables like temporary/permanent components of income flows, TOT, income distribution, financial assets, government spending components, and pension-system variables.

Finally, completely absent from previous macroeconomic studies for LAC saving are: (i) private saving determinants, including terms-of-trade and commodity-price shocks; (ii) policy regimes that may affect saving, including fiscal rules, monetary regimes, and exchange-rate regimes; and (iii) identification of differences between saving in LAC and other world regions, as well as within LAC subgroups.

The following sections develop a model and report statistical evidence for saving in LAC. This attempts to take on board the omissions and challenges present in the previous literature.

[5] These are point estimates, based on ranges reported in the corresponding studies. The simulation model for these simulations is based on Corbo and Schmidt-Hebbel (2003), which also presents the first result mentioned here for Chile. The second result for Chile is reported by Fuentes (2013). The latter findings and those results for Colombia, Mexico, and Peru are also summarized in Malagón et al. (2013).

III. DATA AND STYLIZED FACTS

A. Data Sources and Construction

We employ the dataset developed in Grigoli et al. (2014) to investigate saving behavior in LAC vis-à-vis the rest of the world. The dataset is, to our knowledge, the most comprehensive and recent data on saving aggregates (as well as their determinants), containing 4,137 observations and spanning 32 years for 165 countries.[6] Private saving rates are defined as the ratio of gross private saving to gross private disposable income (GPDI) and the public saving rate as the ratio of gross public saving to GPDI.[7]

To investigate the effects of commodity price shocks on saving, we incorporate additional data on country-specific commodity price indices, as developed by Gruss (2014). In particular, we use the net commodity price index (NCPI), which is calculated as $NCPI_{i,t} = \sum_{j=1}^{J} P_{j,t}\, \tau_{i,j,t}$ where $P_{j,t}$ is the price of commodity j at time t, $\tau_{i,j,t}$ is the j's commodity weight at time t for country i. The weights are calculated as:

$$\tau_{i,j,t} = \frac{x_{i,j,t-1} - m_{i,j,t-1}}{\sum_{j=1}^{J} x_{i,j,t-1} + \sum_{j=1}^{J} m_{i,j,t-1}} \qquad (1)$$

where $x_{i,j,t-1}$ ($m_{i,j,t-1}$) denotes the average exports (imports) value of commodity j by country i between $t-1$ and $t-3$ (in U.S. dollars).[8] The data is gathered at monthly frequency, from which we calculate annual averages. We then construct the permanent and temporary components of this series by applying the Hodrick-Prescott (HP) filter to the log of the index.[9]

Additionally, we include dummy variables for selected macroeconomic regimes. We collect fiscal rules data from the IMF Fiscal Rules Dataset and inflation targeting framework data from IMF Finance & Development[10], while discrete categorical exchange rate data is compiled from the IMF Annual Report on Exchange Arrangements and Exchange Restrictions at the monthly level and collapsed using annual modes. Thus, we generate dummy variables taking value one if

[6] Slight revisions to data from national authorities result in the loss of 12 observations when compared with Grigoli et al. (2014).

[7] See Grigoli et al. (2014) for more details on concept construction, variable generation, data replacement, augmentation, and data cleaning.

[8] See Gruss (2014) for more details.

[9] We set the smoothing parameter lambda to 6.25.

[10] See Roger (2010).

the country has, alternatively, a fiscal rule (expenditure, budget balance, debt, or any of the formers), an inflation targeting framework, and a *de jure* flexible exchange rate regime, and zero otherwise.

Finally, we classify regions according to IMF regional departments, and separate LAC countries by the size of their economies into three subgroups: the seven largest LAC economies (LAC7); other South American countries, Central America, and the Dominican Republic (Middle LAC); and small Caribbean economies, Belize, and Guyana (Small LAC).[11]

B. Stylized Facts about Saving

Private saving rates differ across regions. Based on an unbalanced panel of 164 countries from 1981 to 2012, we find that Africa and LAC exhibit much lower saving rates than the average for the world and other regions, as shown in Table 2. However, when we break down LAC into subgroups we observe some interesting features. The average private saving rate in LAC7 (20 percent of GPDI) is in line with that of the world. Conversely, the average private saving rates for Small LAC (13.1 percent of GPDI) and Middle LAC (15.1 percent of GPDI) are much lower and similar to those of African countries.

The volatility of private saving rates is highest in the regions most exposed to exogenous shocks, i.e. Africa and Middle East and Central Asia. LAC's standard deviation and coefficient of variations are below those for the world. However, Small LAC countries are almost as volatile as African countries. While the volatility in rates among Small LAC could be due to faulty or poor data, Small LAC is much more susceptible to idiosyncratic shocks e.g., hurricanes, drought, and other natural disasters, which could cause saving rates to fluctuate regardless of data quality. Table 2 also reports the autocorrelation coefficient of the first lag of private saving rates. While all regions and subgroups display high coefficients, private saving in LAC7, Asia and Pacific, and European countries exhibit more inertia than other regions after one year.

[11] See Appendix I for a complete list of countries in each group and subgroup.

Table 2. Descriptive Statistics of Private Saving
(Percent of GPDI)

Region	Countries	Mean	Median	Std. Dev.	Coefficient of Variation	AC1
World	164	20.4	20.5	13.2	0.65	0.59
Africa	43	13.4	11.8	15.0	1.12	0.53
Asia and Pacific	22	26.7	26.8	10.2	0.38	0.67
Europe	41	24.4	25.7	7.8	0.32	0.62
Middle East and Central Asia	27	26.1	23.3	15.2	0.58	0.56
Western Hemisphere	31	16.4	16.8	9.1	0.55	0.61
LAC	29	15.6	15.7	9.1	0.58	0.59
LAC7	7	20.0	20.4	5.5	0.28	0.71
Middle LAC	12	15.1	14.7	5.2	0.34	0.52
Small LAC	10	13.1	11.9	12.8	0.98	0.58

Source: Authors' calculations.

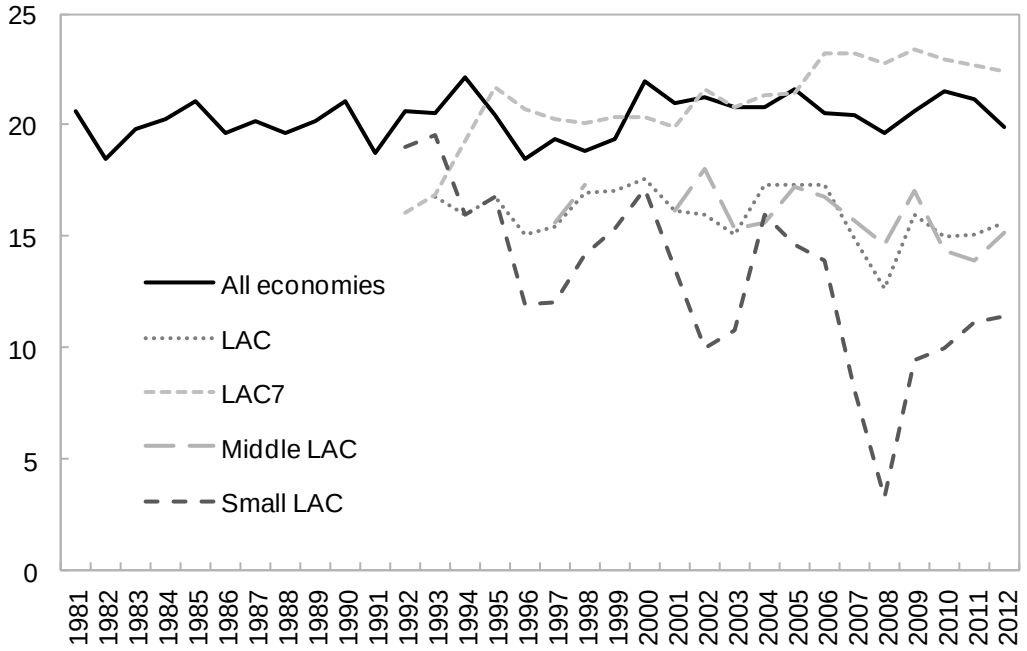
Figure 1 presents trends in private and public saving rates across the world as well as in each LAC subgroup over the sample period 1981-2012.[12] As shown in panel (a), private saving rates across the world remained remarkably stable around 20 percent of GPDI. Although private saving in LAC has been broadly stable as well, rates on average have been 4.5 pp lower. LAC7 saving rates remained strong in the wake of the Global Financial Crisis, exceeding average global private saving rates by about 2.4 percent since 2006. On the other hand, private saving in Small LAC was significantly affected during the crisis, dropping from 8.1 to 3.3 percent of GPDI in 2008 and then rebounding to 9.5 percent of GPDI in 2009. Despite moderate fluctuations, private saving rates in Middle LAC remained stable at roughly 15.8 percent of GPDI between 2001 and 2012.

Panel (b) of Figure 1 shows average public saving rates during the sample period. Overall, public saving rates display more volatility but remain in the 3.5-7 percent of GPDI range. Public saving rates surged during the mid 2000s, jumping from 4.4 percent of GPDI in 2002 to 10.3 percent of GPDI in 2006. Rates then bottomed out with the eruption of the Global Financial Crisis in 2009 and increased in 2012. LAC7 rates followed a similar pattern. Although public saving rates in Middle LAC and Small LAC were more or less in line with the rest of the world prior to 2002, rates in these subgroups did not spike between 2002 and 2005 as in the case of LAC7. Curiously, Middle LAC rates rose between 2005 and 2007, just as public saving in LAC7 and the rest of the world began to decline. Likewise, public saving in Small LAC rose in the same period before falling and then slowly increasing to 2.2 percent of GPDI in 2012.

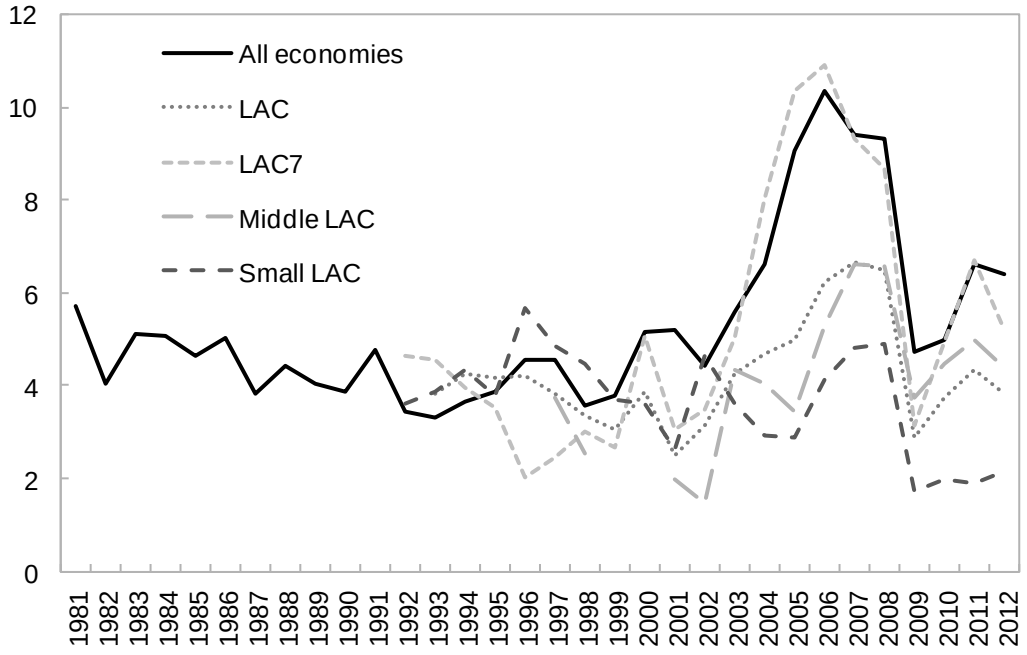
[12] Figures 1-4 are based on the unbalanced panel of 165 countries to provide the most comprehensive picture of saving trends in LAC. To avoid bias in average saving rates for each LAC subgroup, Figures 1-2 show saving rates calculated only when observations for two-thirds of the countries in each subgroup are present.

Figure 1. Average Saving Rates
(Percent of GPDI)

(a) Average private saving rates



(b) Average public saving rates



Source: Authors' calculations.

Figures 2, 3, and 4 present private and public saving for each country in the three LAC subgroups as well as household and corporate saving for eight LAC countries. Private saving rates in most of LAC7 show an upward trend since the mid 90s. However, in very recent years most commodity exporters show declining saving rates as the commodity "super-cycle" that started in the early 2000s ran its course. Mexico's saving rate started to decline in 1998 after booming in the early 90s and recently stabilized at 10 pp less than at its peak.

On the other hand, private saving in Middle LAC and Small LAC has been much more volatile. In the Dominican Republic, for example, private saving peaked at 19.6 percent of GDPI in 1998 and stabilized around 9 percent of GPDI since 2007. In El Salvador, Honduras, Panama, Paraguay, and Nicaragua, rates have varied dramatically from year to year, resulting in standard deviations exceeding 4 percent of GPDI in Honduras, Panama, and Paraguay. Antigua and Barbuda experienced booming saving rates in the late 90s and early 2000s of more than 35 percent of GPDI before plummeting to 4.5 percent of GPDI during the Global Financial Crisis, while saving rates in Barbados and Belize followed an opposite pattern in this period. Grenada also experienced spikes in private saving leading up to the crisis, with saving rates falling below zero from 2010 to 2012. Lastly, private saving in St. Vincent and the Grenadines collapsed dramatically in the wake of the crisis, bottoming out at -19.3 percent of GPDI in 2008. By 2012, rates were still below -10 percent of GPDI.

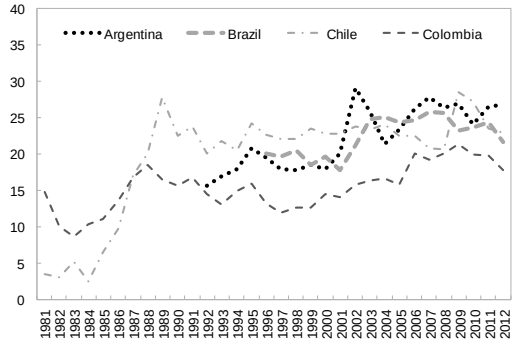
Data on household and corporate saving for LAC countries are scarcer and common patterns are not present. Household saving remained relatively stable at around 5 to 8 percent of GPDI in Chile, Colombia and the Dominican Republic, while there are large fluctuations in Guatemala and Honduras ranging from 0 to 10 percent of GPDI, and in Mexico from 11 to 18 percent of GPDI. In Bolivia, household saving remained negative for most of the period for which data are available. Corporate saving rates are generally higher (except for Bolivia and Mexico) and more volatile than household saving rates.

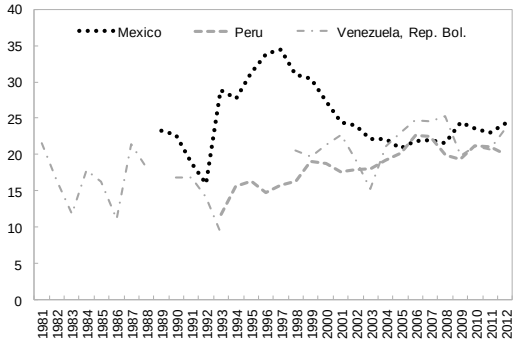
In most countries public saving rates increased during the mid to late 2000s. Most notably, Venezuela saw massive spikes in public saving rates between 1999 and 2008, reaching nearly 44 percent of GPDI in 2005 and then falling to about 15 percent of GPDI in 2012. Bolivia, Ecuador, and Panama experienced steadily increasing public saving rates in the latter half of the 2000s, while Barbados and Honduras saw spikes in public saving in the early 2000s before collapsing to below zero and approximately zero, respectively. Belize and Panama experienced anomalous shocks in the late 80s, where public saving rose to more than 20 percent of GPDI in Belize and fell to less than -7 percent of GPDI in Panama. With the exception of 1996, 1997, and 2010, public saving rates in Antigua and Barbuda were negative throughout the entire sample period, averaging about -3.3 percent of GPDI during 1992-2012.

Figure 2. Private Saving Rates in LAC Subgroups

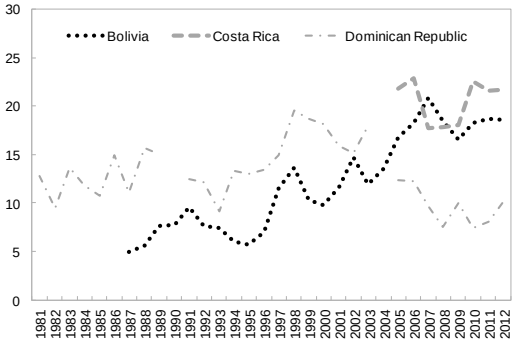
(Percent of GPDI)

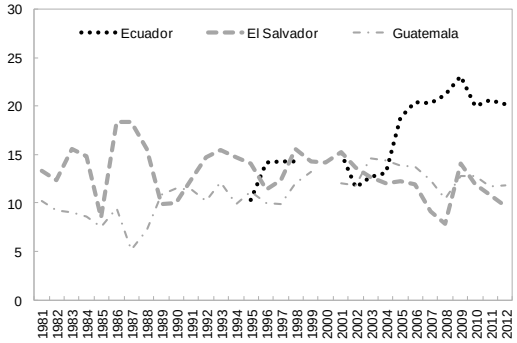
(a) LAC7

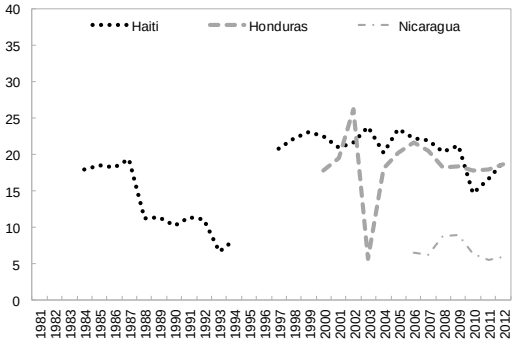


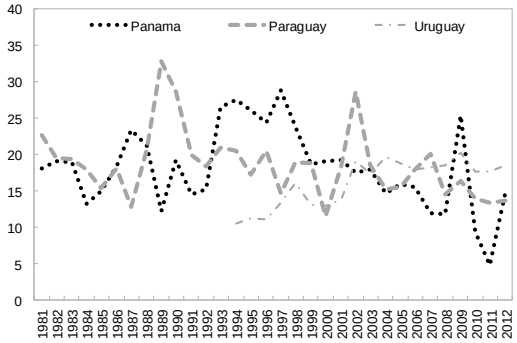


(b) Middle LAC

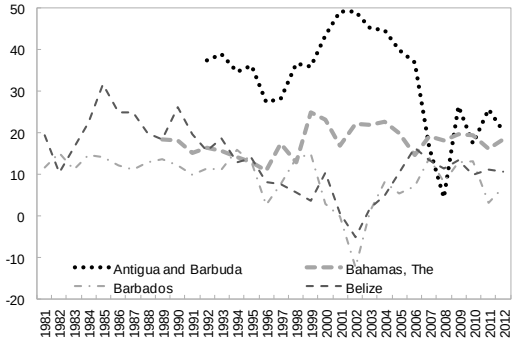


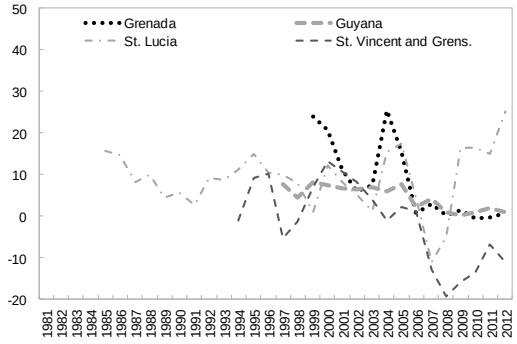






(c) Small LAC



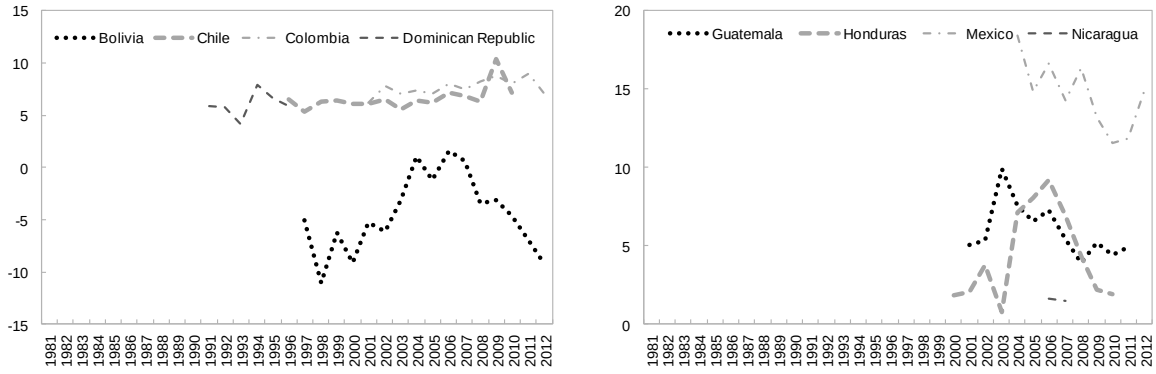


Source: Authors' calculations.

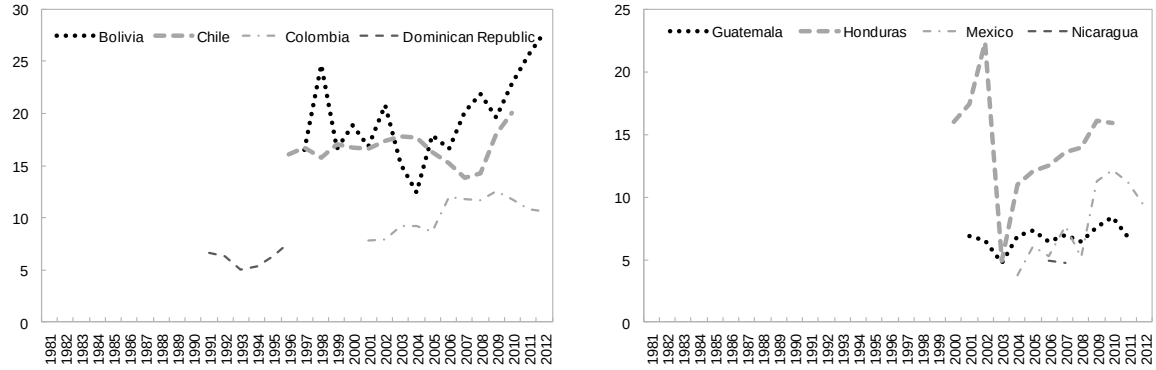
Figure 3. Household and Corporate Saving Rates in LAC

(Percent of GPDI)

(a) Household saving rates



(b) Corporate saving rates

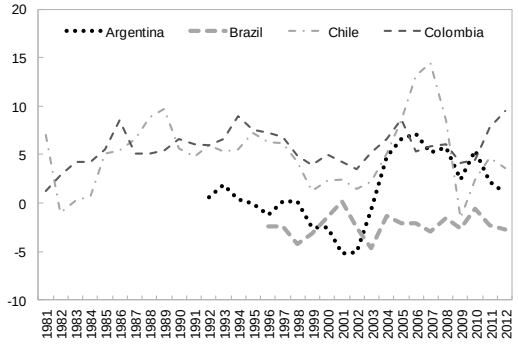


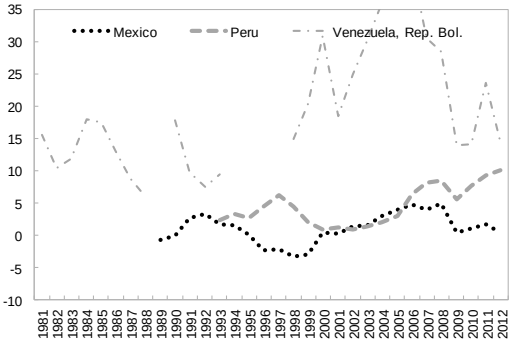
Source: Authors' calculations.

Figure 4. Public Saving Rates in LAC Subgroups

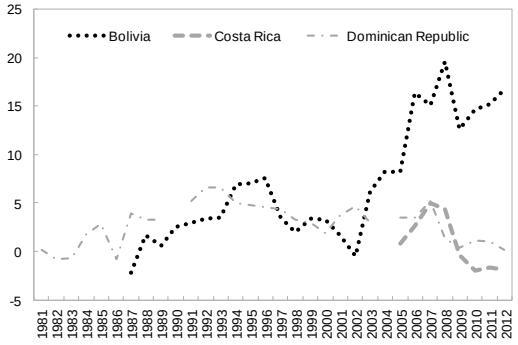
(Percent of GPDI)

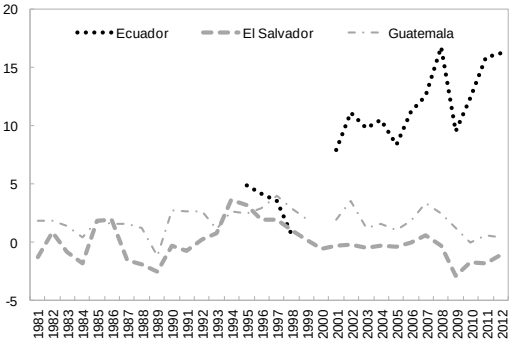
(a) LAC7

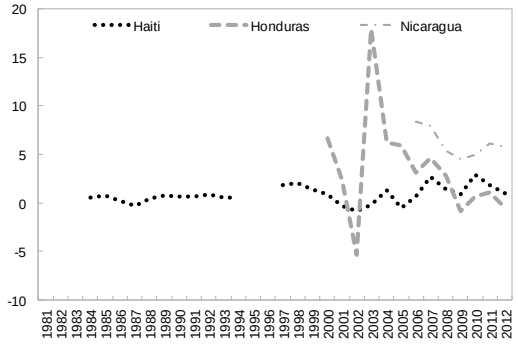


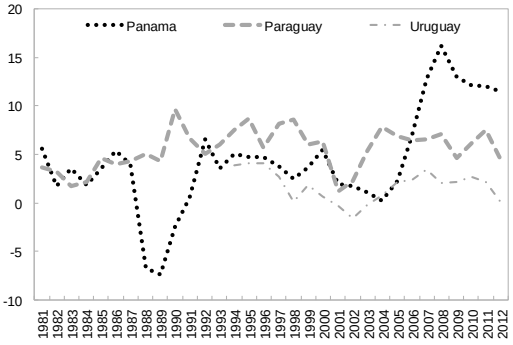


(b) Middle LAC

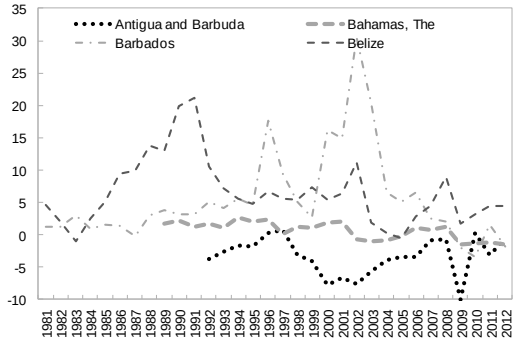


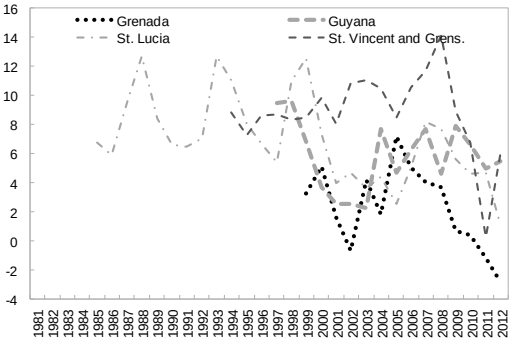






(c) Small LAC





Notes: Public saving rates for Venezuela for 2004-2006 are 36.0, 43.8, and 41.6 percent of GPDI, respectively.
Source: Authors' calculations.

IV. IS LAC DIFFERENT?

This section describes the empirical methodology and presents the econometric results in the following order. First we discuss the findings on the determinants of private saving across regions. Second, we explore any differential effect across LAC subgroups. Third, we investigate the determinants of public saving in LAC and LAC subgroups. Fourth, we study the impact of TOT and commodity price shocks on private saving in LAC. And fifth, we analyze the effects on private saving of the adoption of some macroeconomic policy frameworks.

A. Empirical Methodology

We investigate the private saving determinants by relying on the empirical methodology used in Loayza et al. (2000) and Grigoli et al. (2014). In particular, we estimate the following dynamic model:

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \delta z_{i,t} + c_i + \tau_t + u_{it} \quad (2)$$

where $y_{i,t}$ denotes the private saving rate, γ is the coefficient on the lagged dependent variable, $x_{i,t}$ includes the endogenous (and predetermined) covariates for country i at time t, $z_{i,t}$ includes (strictly) exogenous variables and an intercept, β and δ are the relative coefficients, c_i and τ_t are the time-fixed and country-fixed effects, respectively, and ε_{it} is a mean zero error term that captures unobserved heterogeneity.

The baseline specification includes the explanatory variables used in Grigoli et al. (2014). More specifically, $x_{i,t}$ and $z_{i,t}$ include the log of real per capita GPDI in PPP terms, real growth rate of per capita GPDI in PPP terms, public saving in percent of GPDI, inflation, the real deposit rate, and the flow of private sector credit in percent of GPDI as endogenous variables, and the log of the TOT, the old-age dependency ratio, and the share of urban population as exogenous variables.[13]

To unveil any differential effects in LAC, we rely on nested specifications. Compared to running regressions on a LAC-specific dataset, this strategy employs interaction terms and takes advantage of the large number of observations, which in turn allows the inclusion of more control variables. Thus, we expand the baseline specification to include interaction terms between our $x_{i,t}$ and $z_{i,t}$ variables, and a dummy variable $D_{i,t}$, which takes value one if the country belongs to the LAC region or any other country group analyzed. More formally, we estimate the following nested model:

[13] Endogenous variables are assumed to be correlated with present, past or future error terms.

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \delta z_{i,t} + \xi D_{i,t} y_{i,t-1} + \varphi D_{i,t} x_{i,t} + \omega D_{i,t} z_{i,t} + c_i + \tau_t + u_{it} \quad (3)$$

where ξ, φ, and ω are the coefficients of the interaction terms. The dummy variable $D_{i,t}$ is not included as a separate regressor because it would be perfectly collinear with time-fixed effects τ_t (in the case of time periods) or the country-fixed effects c_i (in the case of country subgroups). The effect of the corresponding regressor $x_{i,t}$ belonging to a specific time period or country group $D_{i,t}$, on the dependent variable $y_{i,t}$, is given by $\beta + \varphi$. Analogously, the effect of $z_{i,t}$ ($y_{i,t-1}$) belonging to the same country group or time period on the dependent variable $y_{i,t}$ is given by $\delta + \omega$ ($\gamma + \xi$).

In some instances, we are interested in exploring the combined impact of two regressors, e.g. the adoption of inflation targeting and inflation, and its differential impact in LAC. In these cases, we employ multiple interaction terms as in the following specification:

$$y_{i,t} = \gamma y_{i,t-1} + \beta x_{i,t} + \delta z_{i,t} + \xi D_{i,t} y_{i,t-1} + \varphi D_{i,t} x_{i,t} + \omega D_{i,t} z_{i,t} + \eta x_{it}^n + \pi k_{i,t} + \psi x_{it}^n k_{i,t} + \\ + \sigma D_{i,t} x_{it}^n + \rho D_{i,t} k_{i,t} + \zeta D_{i,t} x_{it}^n k_{i,t} + c_i + \tau_t + u_{it} \quad (4)$$

where x_{it}^n is the n^{th} variable of the matrix $x_{i,t}$ (e.g., the adoption of inflation targeting), $k_{i,t}$ is the other component of the interaction term (e.g., inflation), $x_{it}^n k_{i,t}$ is the interaction term, $D_{i,t} k_{i,t} x_{it}^n$ is the multiple interaction term that describes the differential effects for LAC, and η, π, ψ, and ζ are the relative coefficients. Thus, the effect of the interaction term $x_{it}^n k_{i,t}$ on the dependent variable $y_{i,t}$ for LAC is equal to $\psi + \zeta$. The linear model in equation (3) is further modified to investigate non-linearities and asymmetric effects. This is done including squared terms of some explanatory variables as well as dummies interacted with the variables of interest.

As in Grigoli et al. (2014), we employ the two-step system GMM (S-GMM) estimator (Arellano and Bond, 1997, and Blundell and Bond, 1998). This allows to increase efficiency by estimating a system of two simultaneous equations, one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments). This estimator builds upon the difference GMM, which assumes that the idiosyncratic error u_{it} is a white noise process and that past values of the endogenous variables $y_{i,t-s}$ are not correlated with the current error u_{it}. However, it also requires that the instruments are exogenous to the fixed effects. We test these assumptions by applying a second-order serial correlation test for the residuals and the Hansen J-test for overidentifying restrictions. Given that standard errors tend to be severely downward biased in the two-step variant of the S-GMM (see Arellano and Bond, 1991, and Blundell and Bond, 1998), we implement the finite-sample correction of the two-step covariance matrix derived by Windmeijer (2005), which yields unbiased standard errors.

B. Private Saving

Table 3 reports the results for the baseline specification for private saving. In Column 1 we start with the baseline specification for the world sample estimated by Grigoli et al. (2014).[14] Then we test for differential regional effects for Africa, Asia and Pacific, Europe, Middle East and Central Asia, and LAC in Columns 2 to 6. In Column 7 we run the same specification for a comparator group of high-growth Asian countries, which includes China, Hong Kong, India, Indonesia, Republic of Korea, Malaysia, Singapore, Sri Lanka, Thailand, and Vietnam. Finally, in Column 8 we include LAC and high-growth Asian economies in the same specification to study the differential effects of the explanatory variables with respect to the rest of the world that excludes these two subgroups.

The results for the baseline regressors are generally robust across columns including regional differential effects. Most regressors are systematically significant, with the exception of TOT, which loses significance when the regressors are interacted with a dummy for African countries and Middle East and Central Asia (possibly because the effect is mostly driven by these countries), and the flow of credit to the private sector, which is significant only when regressors are interacted with a dummy for Africa and high-growth Asian economies. In terms of coefficients' magnitude, the only specification that shows some variation is the one including interaction terms for the African countries (possibly because of the large number of countries in the region and their peculiar features).

The analysis of the differential effects reveals some interesting features. First, private saving is less persistent in African countries, reflecting the higher volatility in these economies. Sensitivity to the income level is lower for Europe and the Middle East and Central Asia. In these subgroups a one pp increase in the income level raises the private saving rate by about 0.06 pp, which is about half of the effect in other economies. Consistently with the results in Grigoli et al. (2014), we find reduced sensitivity of private saving rates to income growth in poorer countries, i.e., Africa, while only in Asia and Pacific there is a larger sensitivity to income growth.

Among the other regressors, private saving is much more responsive to changes in inflation and real deposit rates in the subgroup of high-growth Asian economies. As expected, the proportion of elderly in the population is a drag on private saving particularly in Europe, where the share of old dependants is significantly higher than in other regions. Finally, the negative impact of the share of urban population on private saving is considerably reduced in Europe, Middle East and Central Asia, and LAC. In the latter group, an increase of one pp in the share of urban population is associated with a reduction in saving of only 0.01 pp.

[14] As noted above, data revisions produce slightly different results than in Grigoli et al. (2014).

Table 3. Regional Differences in Private Saving Determinants

(Dependent variable: private saving/GPDI)

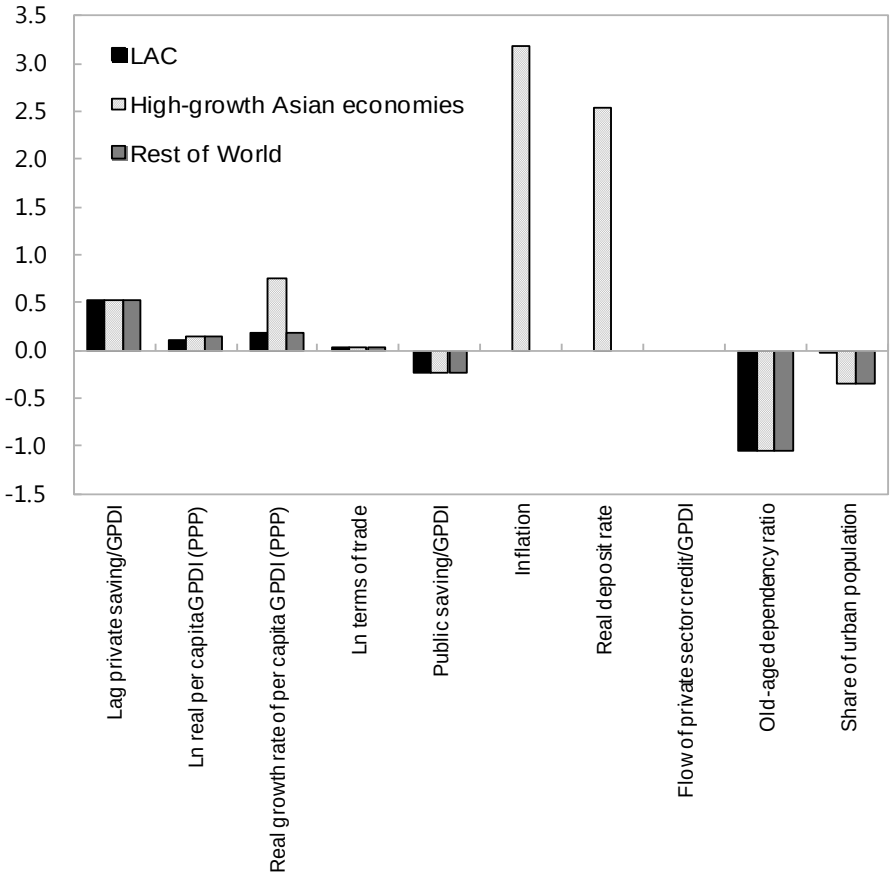
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	All economies	X= Africa	X= Asia and Pacific	X= Europe	X= Middle East and Central Asia	X= LAC	X= High-growth Asian economies	X= LAC	Z= High-growth Asian economies
Lag dependent variable	0.593***	0.829***	0.565***	0.614***	0.580***	0.550***	0.570***	0.520***	.
	(0.066)	(0.048)	(0.075)	(0.074)	(0.106)	(0.063)	(0.066)	(0.066)	.
Ln real per capita GPDI (PPP)	0.171***	0.080***	0.141***	0.142***	0.153***	0.165***	0.161***	0.154***	.
	(0.032)	(0.021)	(0.032)	(0.032)	(0.034)	(0.037)	(0.031)	(0.037)	.
Real growth rate of per capita GPDI (PPP)	0.255***	0.376***	0.212***	0.263***	0.237***	0.219***	0.228***	0.193***	.
	(0.040)	(0.044)	(0.041)	(0.048)	(0.058)	(0.039)	(0.042)	(0.039)	.
Ln TOT	0.052***	0.043	0.049***	0.050***	0.027	0.029*	0.053***	0.033*	.
	(0.015)	(0.034)	(0.015)	(0.015)	(0.022)	(0.016)	(0.015)	(0.017)	.
Public saving/GPDI	-0.253***	-0.107*	-0.253***	-0.255***	-0.308***	-0.236***	-0.246***	-0.236***	.
	(0.064)	(0.056)	(0.072)	(0.077)	(0.101)	(0.069)	(0.066)	(0.071)	.
Inflation	0.388***	0.396***	0.292**	0.341**	0.330***	0.397**	0.301**	0.264	.
	(0.124)	(0.123)	(0.127)	(0.145)	(0.117)	(0.184)	(0.143)	(0.207)	.
Real deposit rate	0.141	0.264**	0.071	0.109	0.116	0.144	0.086	0.044	.
	(0.098)	(0.103)	(0.092)	(0.109)	(0.085)	(0.159)	(0.096)	(0.157)	.
Flow of private sector credit/GPDI	-0.082**	-0.121***	-0.054	-0.119	-0.087*	-0.057	-0.084**	-0.056	.
	(0.039)	(0.034)	(0.044)	(0.088)	(0.052)	(0.048)	(0.038)	(0.046)	.
Old-age dependency ratio	-1.129***	-0.387***	-0.977***	-1.137***	-1.080***	-1.104***	-1.055***	-1.046***	.
	(0.242)	(0.122)	(0.245)	(0.373)	(0.303)	(0.236)	(0.233)	(0.233)	.
Share of urban population	-0.392***	-0.141**	-0.283***	-0.315***	-0.319***	-0.390***	-0.356***	-0.351**	.
	(0.099)	(0.061)	(0.104)	(0.106)	(0.099)	(0.136)	(0.099)	(0.141)	.
X (or Z) * Lag private saving/GPDI	.	-0.324**	0.221	0.011	0.086	0.163	0.101	0.181	0.162
	.	(0.141)	(0.174)	(0.124)	(0.143)	(0.135)	(0.164)	(0.134)	(0.164)
X (or Z) * Ln real per capita GPDI (PPP)	.	0.068	-0.058	-0.078**	-0.091***	-0.057*	0.343	-0.052*	0.267
	.	(0.059)	(0.078)	(0.037)	(0.032)	(0.031)	(0.476)	(0.030)	(0.344)
X (or Z) * Real growth rate of per capita GPDI (PPP)	.	-0.254***	0.374***	-0.010	0.064	0.045	0.589	0.065	0.554*
	.	(0.066)	(0.124)	(0.075)	(0.072)	(0.055)	(0.413)	(0.055)	(0.306)
X (or Z) * Ln TOT	.	-0.056	0.051	0.064	0.113*	0.032	-0.486	0.026	-0.392
	.	(0.071)	(0.105)	(0.056)	(0.061)	(0.049)	(0.611)	(0.048)	(0.445)
X (or Z) * Public saving/GPDI	.	-0.182	-0.207	-0.247*	0.204	-0.146	-2.364	-0.160	-1.979
	.	(0.161)	(0.293)	(0.131)	(0.129)	(0.224)	(2.284)	(0.211)	(1.568)
X (or Z) * Inflation	.	-0.141	0.951*	-0.040	-0.219	-0.061	3.555*	0.076	3.181**
	.	(0.273)	(0.494)	(0.183)	(1.009)	(0.201)	(1.961)	(0.214)	(1.557)
X (or Z) * Real deposit rate	.	-0.160	0.878**	-0.022	-0.042	0.101	2.776**	0.223	2.549**
	.	(0.244)	(0.431)	(0.166)	(0.788)	(0.165)	(1.244)	(0.164)	(1.046)
X (or Z) * Flow of private sector credit/GPDI	.	0.310	-0.082	0.080	0.169	-0.113	0.027	-0.115	-0.011
	.	(0.382)	(0.074)	(0.096)	(0.177)	(0.090)	(0.079)	(0.088)	(0.081)
X (or Z) * Old-age dependency ratio	.	-1.456	0.743	1.056**	0.830	0.257	-6.125	0.233	-4.903
	.	(1.172)	(0.610)	(0.414)	(0.544)	(0.309)	(7.767)	(0.286)	(5.496)
X (or Z) * Share of urban population	.	-0.104	0.159	0.349***	0.258**	0.375***	-0.316	0.338**	-0.186
	.	(0.236)	(0.315)	(0.116)	(0.118)	(0.135)	(0.858)	(0.135)	(0.667)
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Lags/Instruments	1/48	1/65	1/65	1/65	1/65	1/65	1/65	1/82	
AR(1) *p*-val.	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	
AR(2) *p*-val.	0.286	0.783	0.323	0.291	0.337	0.344	0.416	0.493	
Hansen *J*-test *p*-val.	0.751	0.310	0.425	0.338	0.383	0.918	0.995	0.997	
Observations	3,243	3,243	3,243	3,243	3,243	3,243	3,243	3,243	
Number of countries	153	153	153	153	153	153	153	153	

Notes: Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation. System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The null hypothesis for the Hansen *J*-test is that the full set of instruments is valid. All estimations include a constant term. ***, **, * next to a number indicate statistical significance at 1, 5 and 10 percent, respectively.

Source: Authors' calculations.

Figure 5 plots the size of the regression coefficients obtained in Column 8 of Table 3 for LAC, high-growth Asian economies, and the rest of the world. The chart permits to appreciate how private saving rates react more strongly to changes in some of the baseline determinants in high-growth Asian economies. More specifically, the impact of an increase of one pp in the growth rate of GPDI per capita (PPP) in these economies is almost four times larger than in LAC and the rest of the world (even though this is significant at 10 percent significance level). Similarly, a higher inflation rate and a higher real deposit rate have an impact only in high-growth Asian economies.

Figure 5. World and Regional Estimates



Notes: Coefficient size corresponds to the percentage increase in private saving/GPDI resulting from a one percentage point increase of the explanatory variable. Only statistically significant coefficients are reported. Point estimates are derived from nested regressions using statistically significant interaction terms between regional dummies and every variable of the baseline specification.
Source: Authors' calculations.

Table 4 zooms in on the LAC subgroups to identify any differential effect of the baseline private saving regressors, relative to the rest of the world. Column 1 explores differences for the LAC7 subgroup, Column 2 for Middle LAC, and Column 3 for Small LAC. The results for the rest of the world show significant robustness with those obtained in Column 6 of Table 3.

Differential effects in the determinants of private saving are absent when subgroups of LAC are compared to the rest of the world. In particular, none of the regressors interacted with any of the country group dummy is significant, with the exception of inflation in Middle LAC, which turns out to reduce private saving by 0.09 pp. These results suggest that while LAC as a group is somewhat different with respect to a few variables from the rest of the world, the subgroups are not. LAC subgroups share with the world their sensitivity of private saving rates to fundamental saving determinants.

Table 4. Differences Across LAC Subgroups

(Dependent variable: private saving/GPDI)

	(1)	(2)	(3)
	X= LAC7	X= Middle LAC	X= Small LAC
Lag dependent variable	0.574***	0.588***	0.548***
	(0.069)	(0.069)	(0.061)
Ln real per capita GPDI (PPP)	0.174***	0.166***	0.195***
	(0.045)	(0.035)	(0.049)
Real growth rate of per capita GPDI (PPP)	0.247***	0.245***	0.225***
	(0.046)	(0.041)	(0.043)
Ln TOT	0.078***	0.040***	0.050***
	(0.027)	(0.015)	(0.019)
Public saving/GPDI	-0.279***	-0.242***	-0.306***
	(0.080)	(0.064)	(0.116)
Inflation	0.387	0.461***	0.428***
	(0.268)	(0.150)	(0.133)
Real deposit rate	0.166	0.183	0.125
	(0.204)	(0.122)	(0.154)
Flow of private sector credit/GPDI	-0.075	-0.066	-0.075
	(0.050)	(0.044)	(0.045)
Old-age dependency ratio	-1.188***	-1.110***	-1.239***
	(0.254)	(0.249)	(0.304)
Share of urban population	-0.383**	-0.380***	-0.484***
	(0.158)	(0.111)	(0.162)
X * Lag private saving/GPDI	0.036	-0.250	0.788
	(0.951)	(0.247)	(1.667)
X * Ln real per capita GPDI (PPP)	0.456	-0.142	0.143
	(0.468)	(0.095)	(0.210)
X * Real growth rate of per capita GPDI (PPP)	0.795	-0.150	-0.138
	(0.563)	(0.175)	(0.841)
X * Ln TOT	-0.685	0.210	-0.193
	(0.678)	(0.151)	(0.251)
X * Public saving/GPDI	-0.170	-0.492	5.212
	(0.873)	(0.468)	(10.414)
X * Inflation	-0.291	-0.555**	-6.164
	(2.371)	(0.279)	(7.763)
X * Real deposit rate	-0.193	-0.252	0.342
	(1.109)	(0.243)	(12.521)
X * Flow of private sector credit/GPDI	0.195	0.146	-1.741
	(1.695)	(0.125)	(4.134)
X * Old-age dependency ratio	0.472	1.102	-4.939
	(11.413)	(0.734)	(9.266)
X * Share of urban population	-1.078	0.317	-0.401
	(2.620)	(0.335)	(0.635)
Time-fixed effects	Yes	Yes	Yes
Lags/Instruments	1/65	1/65	1/65
AR(1) *p*-val.	0.000	0.000	0.006
AR(2) *p*-val.	0.351	0.310	0.340
Hansen *J*-test *p*-val.	0.999	0.906	0.999
Observations	3,243	3,243	3,243
Number of countries	153	153	153

Notes: Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation. System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The null hypothesis for the Hansen *J*-test is that the full set of instruments is valid. All estimations include a constant term. ***, **, * next to a number indicate
Source: Authors' calculations.

Figure 6 shows the contributions to the fitted values for the significant variables across regions and LAC subgroups.[15] In general, the largest positive contributions come from the lagged private saving rate, the real GPDI per capita (PPP), and TOT, while the largest negative ones come from the demographic variables.

Panel (a) presents the contributions for the lagged saving rate. This is highest in Asia and Pacific and Europe given their relatively more persistent saving rates (about 15 percent of GPDI), while the LAC contribution (9.3 percent of GPDI) is just slightly higher than the African one. However, the LAC group is heterogeneous. The LAC7 countries show the highest contribution (11.8 percent of GPDI), followed by Middle LAC (9 percent of GPDI), and Small LAC (7.1 percent of GPDI).

Panel (b) shows the contributions for the log of real GPDI per capita (PPP). Unsurprisingly, Europe has the largest contribution (43.2 percent of GPDI) as a result of the higher income levels. LAC enjoys the second highest contribution (29.3 percent of GPDI). Among LAC, Small LAC is the subgroup with the largest contribution (35.8 percent of GPDI). This result, however, is driven by the income level of countries like the Bahamas and Barbados. Small LAC is followed by LAC7 (31.5 percent of GPDI) and Middle LAC (22.9 percent of GPDI).

Contributions of TOT are presented in panel (d). These are very similar across regions and LAC subgroups as they range between 23.8 percent of GPDI for Middle LAC and 24.4 percent of GPDI for LAC7.

Among the demographic variables, the share of urban population shows the largest contributions in panel (i). In Europe the contribution is the largest (-27.6 percent of GPDI), followed by Middle East and Central Asia (-24.7 percent of GPDI), and LAC (-23.6 percent of GPDI). Across LAC, however, there is wide variation. LAC7 countries present an even higher contribution than in Europe (-31.6 percent of GPDI), while Small LAC's contribution is comparable to the African one (-16.7 percent of GPDI).

Panel (h) shows the contribution for the old-age dependency ratio. The relatively older population of Europe boosts the negative contribution of the dependency ratio for the region (-24 percent of GPDI). This is followed by Asia and Pacific (-12.1 percent of GPDI) and LAC (-11.2 percent of GPDI). With respect to this variable, LAC subgroups' contributions are homogeneous, ranging from -10.5 percent of GPDI for Middle LAC to -12.5 percent of GPDI for Small LAC.

[15] Figure 5 is based on estimates in Table 3, Column 1.

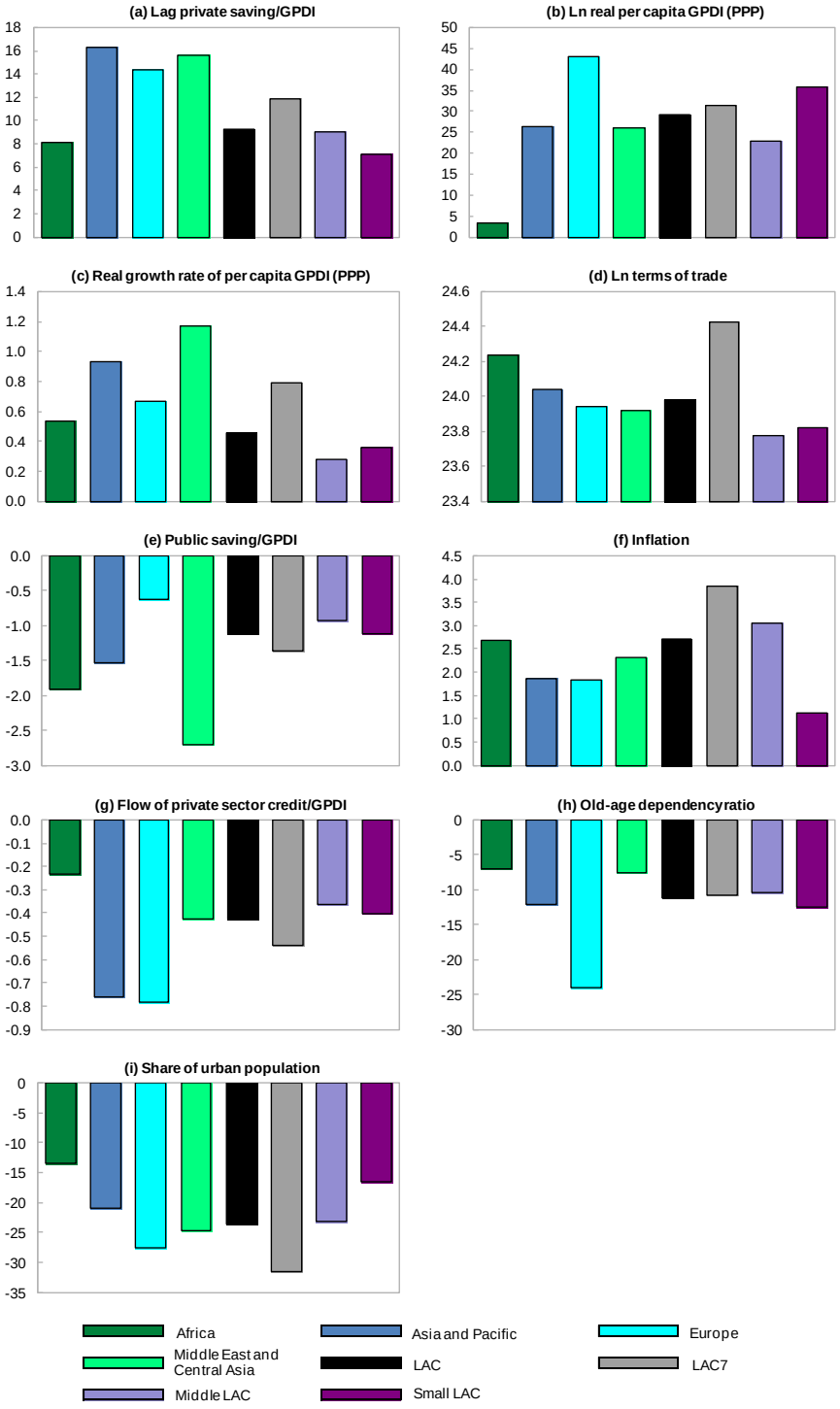
Four additional, statistically significant saving determinants – the growth rate of real GPDI (PPP), inflation, public saving, and the flow of credit to the private sector – present small contributions to private saving in all regions and LAC subregions.[16]

We conclude the following about the contributions of statistically significant determinants to private saving in LAC, noting that measured contributions combine the estimated coefficient and the sample average of the corresponding variable. First, LAC saving is fundamentally explained by its own lag, real GPDI per capita, the TOT, the share of urban population, and the old-age dependency ratio. Other statistically significant variables do not contribute much to explain saving. The same is largely true for other world regions and for the three LAC subgroups separately. Second, there are differences in the size of contributions of some determinants across LAC subgroups (and also across world regions). Saving persistence contributes more to saving in LAC7 than in Small LAC, possibly because larger economies are less subject to idiosyncratic shocks than smaller economies. Urbanization contributes (negatively) twice as much to saving in LAC7 than in Small LAC.

[16] This is also due to the exclusion of observations for which observed annual inflation or real interest rate fall outside the ± 50 percent range.[16] However, one should note that these variables generally present a much higher standard deviation and as a result contributions may still be large in presence of spikes. For more details, see the data cleaning described in Grigoli et al. (2014).

Figure 6. Contributions

(Percent of GPDI)



Notes: Panels show the variable contributions calculated with the coefficients of Table 3, Column 1. Only statistically significant contributions are reported. The use of the average PPP exchange rate to convert the real GPDI per capita in national currency into PPP yields an inflated contribution from GPDI per capita and a large and negative constant. Given that contributions from GPDI per capita and the constant term have a considerably smaller size in regressions where the real GPDI per capita is converted in PPP terms by using the PPP exchange rate of every year (instead of the average PPP exchange rate), we calculate the contribution of log of real GPDI per capita (PPP) net of the difference between the constants in these two regressions.
Source: Authors' calculations.

C. Public Saving

Table 5 presents the results for public saving rates. In Column 1, we start with the same specification as for private saving with the exception of the public saving rate, which is substituted with the private saving rate. We then exclude from the specification the variables that are not significant and report the results in Column 2. Starting in Column 3, we analyze the differential effects for LAC using the more restricted specification estimated in Column 2. Columns 4 to 6 report the differential effects for the LAC subgroups: LAC7 (Column 4), Middle LAC (Column 5), and Small LAC (Column 6).

The results in Column 1 suggest that many of the private saving determinants also affect public saving. For example, the sign and the magnitude of the coefficients for the lagged dependent variable, real GPDI per capita (PPP), TOT, and the old-age dependency ratio are similar to the results for the private saving rate. However, the coefficients for the other explanatory variables present interesting differences. An increase in the growth rate of the real GPDI per capita (PPP) of one pp reduces the public saving rate by 0.14 pp, possibly reflecting the procyclical behavior of fiscal policy. An increase by one pp in the credit to the private sector in percent of GPDI raises the public saving rate by 0.06 pp, suggesting some crowding-out. Finally, when private saving increases by one pp, public saving falls by 0.24 pp.

When we exclude the non-significant variables in Column 2, the remaining variables conserve their signs and significance levels and, with the exception of the lagged dependent variable, the magnitudes become larger. When we add the interaction terms between the explanatory variables and the country group dummies in the subsequent columns, the results for the rest of the world appear comparable with the world coefficients of Column 2.

We identify differential effects for some country subgroups. LAC7 present a persistence of public saving rate above one. In addition, in LAC7 income growth has a positive impact on public saving, as a one pp increase in the growth of real GPDI per capita (PPP) raises public saving by 0.41 pp, suggesting a countercyclical fiscal policy. Among the other subgroups, only Middle LAC shows some differences. In particular, an increase of one pp in the real GPDI per capita (PPP) has irtually no effect on public saving suggesting acyclicality of fiscal policy.

Table 5. Public Saving Determinants in LAC Subgroups

(Dependent variable: public saving/GPDI)

	(1)	(2)	(3)	(4)	(5)	(6)
			X= LAC	X= LAC7	X= Middle LAC	X= Small LAC
Lag dependent variable	0.504***	0.295***	0.414***	0.283**	0.358***	0.304***
	(0.119)	(0.110)	(0.104)	(0.111)	(0.102)	(0.113)
Ln real per capita GPDI (PPP)	0.103**	0.222**	0.100**	0.223**	0.125*	0.143**
	(0.042)	(0.089)	(0.044)	(0.087)	(0.069)	(0.072)
Real growth rate of per capita GPDI (PPP)	-0.145***	-0.201***	-0.240***	-0.199***	-0.221***	-0.208***
	(0.041)	(0.053)	(0.052)	(0.053)	(0.051)	(0.053)
Ln TOT	0.051**	0.077***	0.048*	0.091***	0.062**	0.062**
	(0.023)	(0.030)	(0.026)	(0.034)	(0.028)	(0.027)
Private saving/GPDI	-0.237***	-0.477***	-0.309**	-0.472***	-0.366**	-0.389**
	(0.076)	(0.147)	(0.121)	(0.146)	(0.143)	(0.153)
Inflation	-0.030	.	.	.	.	.
	(0.099)	.	.	.	.	.
Real deposit rate	-0.007	.	.	.	.	.
	(0.089)	.	.	.	.	.
Flow of private sector credit/GPDI	0.064**	0.150***	0.132**	0.151***	0.140**	0.150***
	(0.030)	(0.057)	(0.057)	(0.058)	(0.057)	(0.054)
Old-age dependency ratio	-0.956***	-2.699***	-1.447***	-2.757***	-1.685**	-1.870**
	(0.305)	(0.988)	(0.505)	(0.985)	(0.759)	(0.793)
Share of urban population	-0.181	.	.	.	.	.
	(0.131)	.	.	.	.	.
X * Lag private saving/GPDI	.	.	0.289	1.449**	0.029	1.421
	.	.	(0.200)	(0.602)	(0.430)	(0.980)
X * Ln real per capita GPDI (PPP)	.	.	-0.038	0.179	-0.092	-0.104
	.	.	(0.036)	(0.158)	(0.065)	(0.087)
X * Real growth rate of per capita GPDI (PPP)	.	.	0.160*	0.605***	0.214**	-0.153
	.	.	(0.091)	(0.213)	(0.083)	(0.211)
X * Ln TOT	.	.	0.032	-0.385	0.121	0.115
	.	.	(0.061)	(0.318)	(0.105)	(0.141)
X * Private saving/GPDI	.	.	0.004	-1.155	0.058	0.024
	.	.	(0.170)	(1.181)	(0.344)	(0.221)
X * Flow of private sector credit/GPDI	.	.	-0.072	-0.320	-0.013	0.244
	.	.	(0.103)	(0.440)	(0.151)	(0.208)
X * Old-age dependency ratio	.	.	0.843	2.302*	1.406*	1.576
	.	.	(0.579)	(1.385)	(0.729)	(1.382)
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Lags/Instruments	1/55	1/43	1/55	1/55	1/55	1/55
AR(1) *p*-val.	0.006	0.004	0.001	0.003	0.002	0.003
AR(2) *p*-val.	0.326	0.460	0.407	0.519	0.452	0.506
Hansen *J*-test *p*-val.	0.135	0.807	0.429	0.992	0.632	0.846
Observations	3,243	3,413	3,413	3,413	3,413	3,413
Number of countries	153	154	154	154	154	154

Notes: Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation. System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The null hypothesis for the Hansen *J*-test is that the full set of instruments is valid. All estimations include a constant term. ***, **, * next to a number indicate statistical significance at 1, 5 and 10 percent, respectively.

Source: Authors' calculations.

D. Terms-of-Trade and Commodity Price Shocks

In order to probe more deeply into the role of TOT in determining private saving in LAC, we perform an extensive series of tests and report the results in Table 6. As an alternative measure to the TOT, we also use here the NCPI introduced above.

First, we test for the role of the level, growth rate, volatility, and temporary/permanent component of TOT and NCPI in determining saving. A higher level of external relative prices induces a positive income effect on saving. A higher growth rate of external prices may induce a larger saving and investment effort (Izquierdo et al., 2008). Larger volatility in external prices raises precautionary saving. Temporary components of relative prices are expected to be largely saved while permanent components are expected to be spent. Second, we assess empirically if there are differential effects in LAC compared to the rest of the world. Finally, we do all the above by maintaining as controls all variables included in the baseline specification.

We start by testing if accelerations in the TOT or commodity prices determine higher private saving (Columns 1 and 2). Second, we look at whether income uncertainty (measured by larger standard deviations of external prices) is reflected in higher precautionary saving (Columns 3 and 4). Third, we disaggregate the indexes in their permanent and temporary components and study their effects on private saving (Columns 5 and 6).[17]

The results in Columns 1 and 2 suggest increases in the growth rate of the TOT index and NCPI boost private saving. While the impact of TOT (NCPI) is not different from zero, a one pp increase in the growth rate of the TOT index (NCPI) rises private saving by 0.06 (0.03) pp. We do not find any differential effect for LAC.

Income uncertainty associated with TOT shocks has a positive effect on private saving. As a proxy of income uncertainty, we include the three-year rolling standard deviation of the TOT (Column 3) and NCPI (Column 4). While the coefficients for TOT and NCPI are not significant, the ones on their standard deviation turn out positive and significant, suggesting that a one pp increase in the standard deviation of TOT index (NCPI) is associated with higher private saving rates by 0.1 (0.14) pp. The coefficients on the interaction terms with the LAC dummy suggest that there are no differential effects for the region.

[17] We also investigate possible interactions between external prices, on one hand, and trade openness, and a lessening of borrowing constraints (reflected by higher private credit flows), on the other hand (as suggested by Agénor and Aizenman, 2002). We find that trade openness does not play any role (alone or interacted with external prices) in determining private saving. The hypothesis that borrowing-constrained private agents may not be able to smooth consumption (hence reducing saving) when hit with adverse TOT shocks is rejected, but this is not robust to the use of the NCPI. Finally, we test for non-linear and asymmetric effects of TOT and commodity price shocks on private saving by including the quadratic term of TOT and the interaction terms with dummies taking value one when the indexes are higher than their medians, or, alternatively, when the indexes are increasing rapidly. The results, however, are not significant.

Table 6. Terms of Trade and Commodity Price Shocks

(Dependent variable: private saving/GPDI)

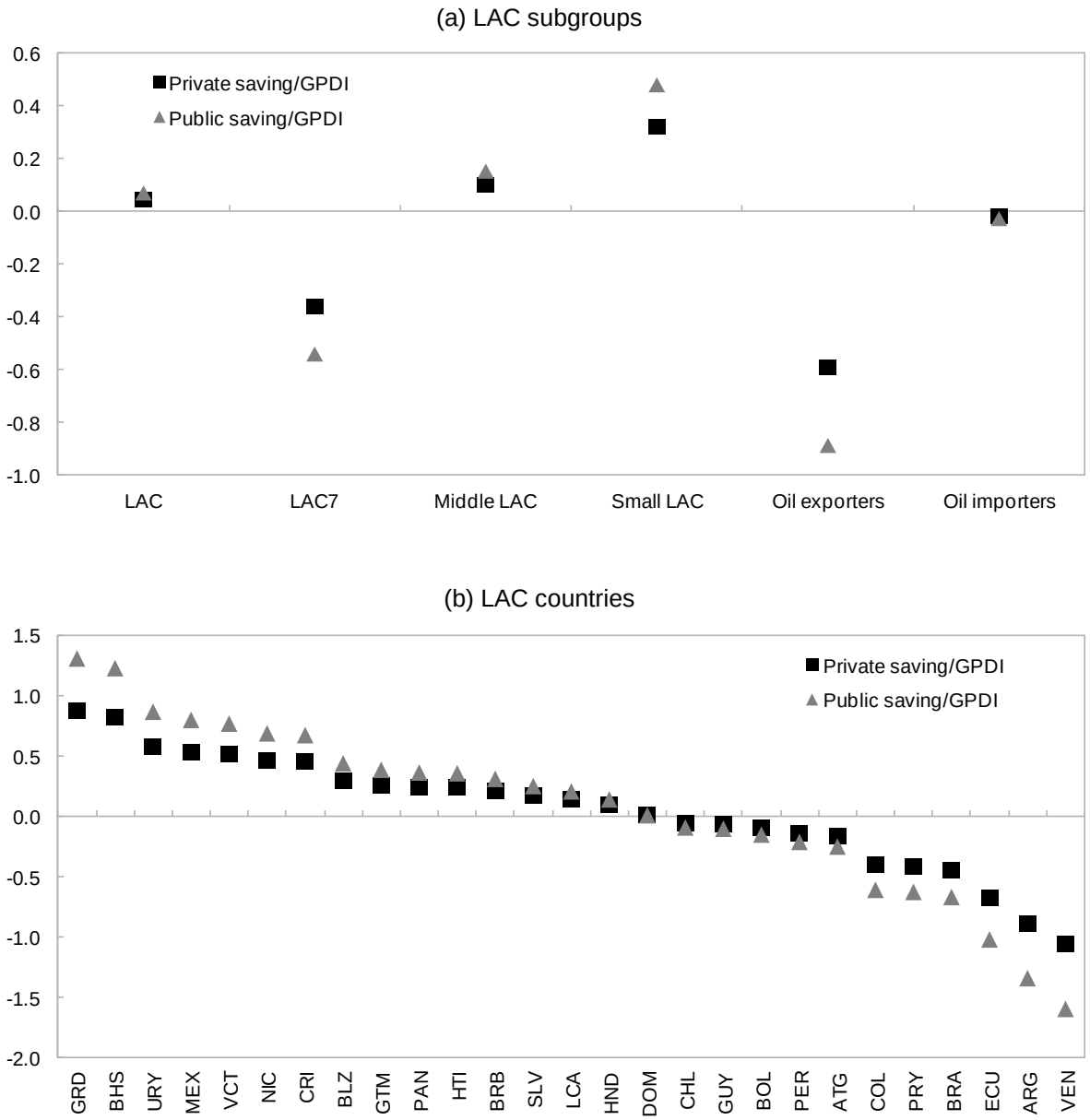
	(1)	(2)	(3)	(4)	(5)	(6)
Ln TOT	0.018	.	0.026	.	.	.
	(0.018)	.	(0.017)	.	.	.
LAC * Ln TOT	0.039	.	0.037	.	.	.
	(0.053)	.	(0.049)	.	.	.
Ln NCPI	.	-0.002	.	0.005	.	.
	.	(0.008)	.	(0.009)	.	.
LAC * Ln NCPI	.	-0.001	.	-0.014	.	.
	.	(0.046)	.	(0.049)	.	.
Growth rate of TOT	0.058***	.	.	.	.	.
	(0.018)	.	.	.	.	.
LAC * growth rate of TOT	-0.015	.	.	.	.	.
	(0.054)	.	.	.	.	.
Growth rate of NCPI	.	0.029**	.	.	.	.
	.	(0.013)	.	.	.	.
LAC * growth rate of NCPI	.	-0.003	.	.	.	.
	.	(0.027)	.	.	.	.
SD of ln TOT	.	.	0.113**	.	.	.
	.	.	(0.053)	.	.	.
LAC * SD of ln TOT	.	.	-0.074	.	.	.
	.	.	(0.105)	.	.	.
SD of ln NCPI	.	.	.	0.143**	.	.
	.	.	.	(0.061)	.	.
LAC * SD of ln NCPI	.	.	.	-0.088	.	.
	.	.	.	(0.122)	.	.
Permanent component of TOT	.	.	.	.	0.017	.
	.	.	.	.	(0.019)	.
Temporary component of TOT	.	.	.	.	0.098***	.
	.	.	.	.	(0.024)	.
LAC * Permanent component of TOT	.	.	.	.	0.039	.
	.	.	.	.	(0.058)	.
LAC * Temporary component of TOT	.	.	.	.	0.000	.
	.	.	.	.	(0.056)	.
Permanent component of NCPI	.	.	.	.	.	-0.008
	.	.	.	.	.	(0.018)
Temporary component of NCPI	.	.	.	.	.	0.056***
	.	.	.	.	.	(0.020)
LAC * Permanent component of NCPI	.	.	.	.	.	0.044
	.	.	.	.	.	(0.054)
LAC * Temporary component of NCPI	.	.	.	.	.	-0.003
						(0.043)
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Lags/Instruments	1/67	1-4/109	1/67	1-4/109	1/67	1/67
AR(1) *p*-val.	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) *p*-val.	0.340	0.716	0.37	0.699	0.313	0.704
Hansen *J*-test *p*-val.	0.871	0.907	0.932	0.945	0.864	0.594
Observations	3,242	3,268	3,242	3,268	3,234	3,268
Number of ifscode	153	154	153	154	152	154

Notes: Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation. System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The null hypothesis for the Hansen *J*-test is that the full set of instruments is valid. All estimations include a constant term, the regressors of the baseline specification, and their interaction terms with the LAC dummy. ***, **, * next to a number indicate statistical significance at 1, 5 and 10 percent, respectively.

Source: Authors' calculations.

Finally, consistent with the permanent-income hypothesis and the life-cycle hypothesis and in line with Grigoli et al. (2014), we find that increases in the temporary component of the TOT index and NCPI rise private saving. As shown in Columns 5 and 6, a one pp increase in the temporary component of TOT (NCPI) raises the private saving rate by 0.10 (0.06) pp. However, no significant effects come from the permanent components and no differential effects are present for LAC.

Figure 7. Change in Saving Rates Based on TOT Projections for 2019
(Percent of GPDI)



Notes: The changes in private (public) saving are calculated as the product between the first difference of ln TOT between 2012 and 2019 and the coefficient estimated in Column 1 of Table 3 (Column 2 of Table 5).
Source: Authors' calculations.

A recurrent and pressing policy question is how saving will behave given the projected fall in many international commodity prices. On average, TOT are projected to improve by 0.9 percent by 2019 in LAC, with the largest increase in Grenada (16.8 percent) and the largest fall in Venezuela (-20.8 percent). Thus, we estimate the change in private and public saving rates by relying on the estimated coefficients of TOT in Column 1 of Table 3 and Column 2 of Table 5, respectively, and the 2019 TOT projections of the World Economic Outlook (WEO) as of January 19, 2015. Figure 7 presents the estimated change in private and public saving rates for subgroups of economies in panel (a) and for every LAC country in panel (b).

LAC as a region is expected to observe a mild increase in both private and public saving (roughly 0.1 percent of GPDI). However, this average hides some heterogeneity. Private (public) saving in LAC7 is projected to fall by 0.4 (0.5) percent of GPDI, and to increase by 0.1 (0.2) percent of GPDI in Middle LAC and 0.3 (0.5) percent of GPDI in Small LAC, with Grenada observing the largest increase (0.9 percent of GPDI in private saving and 1.3 percent of GPDI in public saving). Since oil prices are the dominant component of the terms of trade changes, LAC oil exporters are expected to observe the largest fall—0.6 percent of GDPI in private saving and 0.9 percent of GPDI in public saving—with Venezuela observing the largest fall (1.1 percent of GPDI in private saving and 1.6 percent of GPDI in public saving). The WEO subgroup of oil importers includes some relatively minor oil exporters and, as a result, the final effect on saving is close to zero.[18] Finally, if projected changes in TOT were temporary, the final effect on private saving would be larger, ranging from -2.04 percent for Venezuela and 1.65 percent for Grenada, as the magnitude of the coefficient is almost twice as large as the one for actual TOT.

E. Fiscal Rules, Inflation Targeting, and Exchange Rate Flexibility

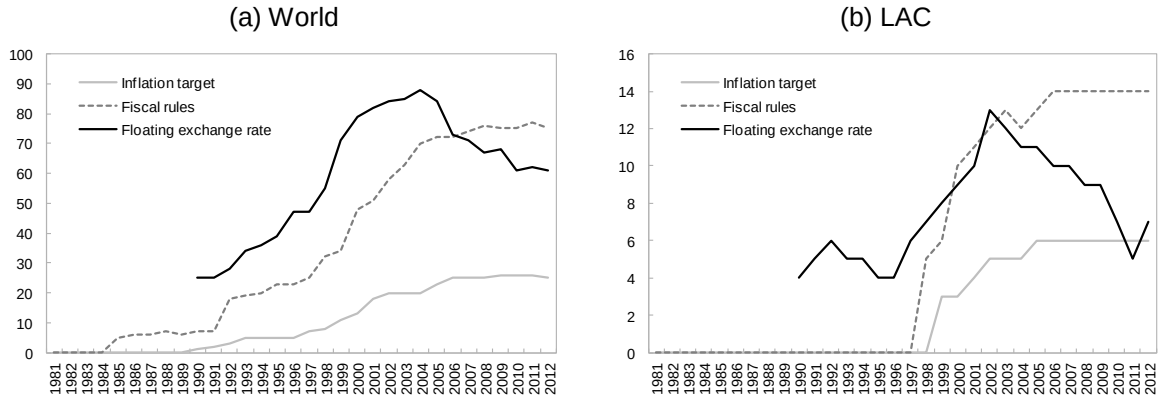
Beyond exogenous shocks, discretionary changes in policy regimes could affect private saving. As shown in Figure 8, the adoption of fiscal rules, inflation targeting, and floating exchange rate regimes has become more common since the 1990s, even though some countries reverted to managed exchange rate regimes during the last decade. The experience in LAC has been similar, with a steady increase in the number of countries with these macroeconomic regimes since the 1990s. As of the end of 2012, 75 countries have some category of fiscal rule in place (14 in LAC), 25 have adopted an inflation targeting regime (6 in LAC), and 61 run flexible exchange rate regimes (7 in LAC).

While the objective of these policy regimes is generally different from increasing private saving, we explore if saving rates are affected by the adoption of these frameworks. We test both for linear effects of policy regimes and the effects of interactions between policy regimes and selected relevant variables. We perform this for the world at large and testing for differential

[18] See Appendix I for a list of oil exporters and oil importers.

effects in LAC. Finally, we do all the above by maintaining as controls all variables included in the baseline specification.

Figure 8. Policy Frameworks
(Number of countries)



Source: Authors' calculations.

Table 7 presents the results of the effect on private saving rate stemming from the adoption of fiscal rules (Columns 1 to 8), the implementation of inflation targeting regimes (Columns 9 and 10), and the flexibilization of the exchange rate (Columns 11 and 12).

For any given level of capital expenditure, fiscal adjustment is reflected in higher government saving. The regression coefficient of private saving on government saving indicates offsetting private agents' behavior and hence the net effect on national saving. Additional effects could come from adoption of fiscal rules and its interaction with public saving. In Columns 1 to 8, we look at the impact of the adoption of expenditure rules, budget rule, debt rules, and more generally defined fiscal rules, on private saving, the differential effects for LAC, and the combined effect of fiscal rules with higher public saving.[19] None of the results are significant at five percent, suggesting that the adoption of fiscal rules is not reflected in changes of private saving.[20]

Successful monetary stabilization is generally reflected in low inflation. This, in turn, reduces precautionary saving as shown by the coefficient of inflation in the private saving regressions. Additional effects could come from adoption of inflation targeting and its interaction with inflation. Thus, we test these hypothesis and any differential effects for LAC in Columns 9 and

[19] The fiscal rule dummy takes the value one if any type of fiscal rule is adopted, and zero otherwise.

[20] We also study the impact of the fiscal rules on public saving but the results are not significant.

10. The results suggest that the inflation targeters have lower private saving by 2.66 pp—a worldwide result shared by LAC.

Finally, a more flexible exchange rate reduces the probability of exchange rate crises and persistent overvaluations, allows exchange-rate adjustment as a buffer against shocks, and enhances monetary policy independence. Thus, precautionary saving could decline as a result of floating. However, higher nominal and real exchange rate volatility, as well as the higher interest rate volatility associated with a floating exchange rate may rise precautionary saving. Hence, the aggregate effect on saving is ambiguous. The results in Columns 11 and 12 confirm this ambiguity as the coefficients are not significant.

Table 7. Policy Frameworks' Impact on Private Saving

(Dependent variable: private saving/GPDI)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Expenditure rule	1.465	1.290	.	.	.	.	.	.	.	.	.	.
	(1.226)	(1.510)	.	.	.	.	.	.	.	.	.	.
LAC * Expenditure rule	-2.436	-2.926	.	.	.	.	.	.	.	.	.	.
	(1.722)	(2.085)	.	.	.	.	.	.	.	.	.	.
Expenditure rule * Public saving/GPDI	.	0.010	.	.	.	.	.	.	.	.	.	.
	.	(0.094)	.	.	.	.	.	.	.	.	.	.
LAC * Expenditure rule * Public saving/GPDI	.	0.271	.	.	.	.	.	.	.	.	.	.
	.	(0.234)	.	.	.	.	.	.	.	.	.	.
Budget rule	.	.	2.358*	0.958	.	.	.	.	.	.	.	.
	.	.	(1.218)	(1.205)	.	.	.	.	.	.	.	.
LAC * Budget rule	.	.	-2.588	-2.382	.	.	.	.	.	.	.	.
	.	.	(1.799)	(2.526)	.	.	.	.	.	.	.	.
Budget rule * Public saving/GPDI	.	.	.	0.114	.	.	.	.	.	.	.	.
	.	.	.	(0.159)	.	.	.	.	.	.	.	.
LAC * Budget rule * Public saving/GPDI	.	.	.	0.188	.	.	.	.	.	.	.	.
	.	.	.	(0.400)	.	.	.	.	.	.	.	.
Debt rule	.	.	.	.	1.439	-0.188	.	.	.	.	.	.
	.	.	.	.	(1.290)	(1.282)	.	.	.	.	.	.
LAC * Debt rule	.	.	.	.	-3.777*	-1.920	.	.	.	.	.	.
	.	.	.	.	(2.188)	(5.017)	.	.	.	.	.	.
Debt rule * Public saving/GPDI	.	.	.	.	.	0.124	.	.	.	.	.	.
	.	.	.	.	.	(0.165)	.	.	.	.	.	.
LAC * Debt rule * Public saving/GPDI	.	.	.	.	.	-0.144	.	.	.	.	.	.
	.	.	.	.	.	(1.229)	.	.	.	.	.	.
Fiscal rule	.	.	.	.	.	.	1.230	-0.099	.	.	.	.
	.	.	.	.	.	.	(1.096)	(1.139)	.	.	.	.
LAC * Fiscal rule	.	.	.	.	.	.	-2.932	-2.608	.	.	.	.
	.	.	.	.	.	.	(1.816)	(2.444)	.	.	.	.
Fiscal rule * Public saving/GPDI	.	.	.	.	.	.	.	0.111	.	.	.	.
	.	.	.	.	.	.	.	(0.152)	.	.	.	.
LAC * Fiscal rule * Public saving/GPDI	.	.	.	.	.	.	.	0.176	.	.	.	.
	.	.	.	.	.	.	.	(0.373)	.	.	.	.
Inflation targeting	.	.	.	.	.	.	.	.	-2.662**	-1.834	.	.
	.	.	.	.	.	.	.	.	(1.267)	(1.315)	.	.
LAC * Inflation targeting	.	.	.	.	.	.	.	.	0.531	2.034	.	.
	.	.	.	.	.	.	.	.	(1.954)	(2.038)	.	.
Inflation targeting * Inflation	.	.	.	.	.	.	.	.	.	-0.231*	.	.
	.	.	.	.	.	.	.	.	.	(0.134)	.	.
LAC * Inflation targeting * Inflation	.	.	.	.	.	.	.	.	.	-0.193	.	.
	.	.	.	.	.	.	.	.	.	(0.235)	.	.
Floating ER regime	.	.	.	.	.	.	.	.	.	.	-1.303	-1.118
	.	.	.	.	.	.	.	.	.	.	(1.009)	(1.051)
LAC * Floating ER regime	.	.	.	.	.	.	.	.	.	.	1.988	2.381
	.	.	.	.	.	.	.	.	.	.	(1.480)	(1.599)
Floating ER regime * Real deposit rate	.	.	.	.	.	.	.	.	.	.	.	-0.046
	.	.	.	.	.	.	.	.	.	.	.	(0.092)
LAC * Floating ER regime * Real deposit rate	.	.	.	.	.	.	.	.	.	.	.	-0.072
	.	.	.	.	.	.	.	.	.	.	.	(0.148)
Time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lags/Instruments	1/67	1/71	1/67	1/71	1/67	1/71	1/67	1/71	1/67	1/71	1/59	1/63
AR(1) *p*-val.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) *p*-val.	0.343	0.338	0.347	0.294	0.336	0.306	0.339	0.289	0.344	0.342	0.391	0.385
Hansen *J*-test *p*-val.	0.918	0.945	0.886	0.476	0.916	0.263	0.908	0.418	0.943	0.963	0.516	0.359
Observations	3,243	3,243	3,243	3,243	3,243	3,243	3,243	3,243	3,243	3,243	2,791	2,791
Number of countries	153	153	153	153	153	153	153	153	153	153	153	153

Notes: Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation. System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The null hypothesis for the Hansen *J*-test is that the full set of instruments is valid. All estimations include a constant term, the regressors of the baseline specification, and their interaction terms with the LAC dummy. ***, **, * next to a number indicate statistical significance at 1, 5 and 10 percent, respectively.

Source: Authors' calculations.

V. Conclusions and Policy Implications

The empirical literature on determinants of saving in LAC reports a wide array of results, including contradictions and omissions. In particular, studies differ with respect to measures of saving, data coverage and construction, and model specifications. However, some common and unambiguous results are that income level, income growth, and TOT raise private saving; the age dependency ratios tend to reduce private saving rates; household structure variables such as formal head and the number of income-earning members increase private saving, while number of under-age members decrease it; and risk aversion and the discount factor raise saving.

Among the policy variables, the literature argues that fiscal consolidation reduces private saving, and that government pension payments reduce private saving and government transfers reduce household saving. Most of the evidence about taxes on firms suggests that they reduce corporate saving and the personal income tax rate lowers private saving. With respect to monetary policy, the interest rate has an ambiguous impact on private saving while the level of inflation positively affects it. Moreover, the microeconomic evidence on the effect of financial access measures is consistent with the expected negative sign, foreign saving inflows tend to partially offset aggregate private saving, and restrictions on capital flows raise aggregate private saving.

While the effect of labor and education policies on saving are ambiguous, the evidence on pension reforms is more conclusive. In particular, the fiscal deficit brought about by a transition toward a fully-funded pension regime raises household (and private) saving. Also, pension reforms that force active workers to do mandatory pension saving, which are partly (at most totally) offset by lower voluntary household saving.

In this paper, we expand upon the dataset used in Grigoli et al. (2014) to examine both private (and public) saving behavior in LAC, exploring some non-linearities. By relying on a nested econometric framework, we analyze differences and commonalities of saving behavior in LAC vis-à-vis other regions and the rest of the world, as well as within LAC. We find that our nested baseline private saving estimation is generally robust across regional groups, and that LAC private saving behaves in line with the rest of the world. However, LAC is much less responsive to urbanization. From a contribution analysis, we conclude that LAC saving is fundamentally explained by its own lag, real GPDI per capita, the TOT, the share of urban population, and the old-age dependency ratio, while other statistically significant variables do not contribute much to explain saving. However, saving persistence contributes more to saving in LAC7 than in Small LAC, possibly because larger economies are less subject to idiosyncratic shocks than smaller economies and urbanization contributes negatively twice as much to saving in LAC7 than in Small LAC.

From an extensive investigation of the effects of TOT on saving, we find that TOT and NCPI volatility and accelerations as well as the temporary components of TOT and NPCI raise private saving in both LAC and the rest of the world. Finally, we explore if private saving is affected by

the adoption of fiscal rules, inflation targeting, and floating exchange rate regimes. We conclude that fiscal rules do not affect private saving behavior, and implementing a floating exchange rate yields no effect on private saving either. In the case of monetary policy frameworks, inflation targeting further reduces private saving irrespective of the negative effects of inflation on saving.

We also examine public saving behavior across the world. While many private saving determinants affect public saving in a similar manner, increased income growth reduces public saving, possibly reflecting the procyclical behavior of fiscal policy, and increased private sector credit raises public saving, suggesting some crowding out. For LAC and Small LAC, the results suggest public saving behaves no differently than the rest of the world. In the case of LAC7, public saving shows more persistence, is positively affected by income growth (implying the presence of countercyclical fiscal policy), and is less sensitive to old-age dependency. In Middle LAC countries, income level reduces public saving (suggesting higher procyclical fiscal policy) and is less responsive to old-age dependency.

Appendix I. Country Groups

Table A1. List of Countries

Africa					
Angola	Central African Rep.	Eritrea	Kenya	Namibia	South Africa
Benin	Chad	Ethiopia	Lesotho	Niger	Swaziland
Botswana	Comoros	Gabon	Madagascar	Nigeria	São Tomé & Príncipe
Burkina Faso	Congo, Dem. Rep. of	Gambia, The	Malawi	Rwanda	Tanzania
Burundi	Congo, Republic of	Ghana	Mali	Senegal	Togo
Cameroon	Côte d'Ivoire	Guinea	Mauritius	Seychelles	Uganda
Cape Verde	Equatorial Guinea	Guinea-Bissau	Mozambique	Sierra Leone	
Asia and Pacific					
Australia	China,P.R.:Hong Kong ʘ	Korea, Republic of ʘ	New Zealand	Sri Lanka ʘ	
Bangladesh	India ʘ	Malaysia ʘ	Papua New Guinea	Thailand ʘ	
Cambodia	Indonesia ʘ	Maldives	Philippines	Vietnam ʘ	
China,P.R.: Mainland ʘ	Japan	Myanmar	Singapore ʘ		
Europe					
Albania	Czech Republic	Hungary	Luxembourg	Poland	Spain
Austria	Denmark	Iceland	Macedonia, FYR	Portugal	Sweden
Belgium	Estonia	Ireland	Malta	Romania	Switzerland
Bosnia & Herzegovina	Finland	Israel	Moldova	Russian Federation	Turkey
Bulgaria	France	Italy	Montenegro	Serbia, Republic of	Ukraine
Croatia	Germany	Latvia	Netherlands	Slovak Republic	United Kingdom
Cyprus	Greece	Lithuania	Norway	Slovenia	
Middle East and Central Asia					
Algeria	Djibouti	Kuwait	Morocco	Saudi Arabia	Tunisia
Armenia	Egypt	Kyrgyz Republic	Oman	Sudan	United Arab Emirates
Azerbaijan, Rep. of	Iran, I.R. of	Lebanon	Pakistan	Syrian Arab Republic	Yemen, Republic of
Bahrain, Kingdom of	Jordan	Mauritania	Qatar	Tajikistan	
LAC					
Antigua and Barbuda # ^	Bolivia + <>	Dominican Republic + ^	Guyana # ^	Panama + ^	Uruguay + ^
Argentina * ^	Brazil * ^	Ecuador + <>	Haiti + ^	Paraguay + ^	Venezuela, Rep. Bol. * <>
Bahamas, The # ^	Chile * ^	El Salvador + ^	Honduras + ^	Peru * ^	
Barbados # ^	Colombia * ^	Grenada # ^	Mexico * ^	St. Lucia # ^	
Belize # ^	Costa Rica + ^	Guatemala + ^	Nicaragua + ^	St. Vincent & Grens. # ^	
Other					
Canada					
United States					

Notes: ʘ, *, +, #, <>, and ^ denote high-growth Asian economies, LAC7, middle LAC, small LAC, LAC oil exporters, and LAC oil importers, respectively. Regions classified according to IMF regional departments. Oil exporters and oil importers classified according to the IMF World Economic Outlook.

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