

Varieties of Saving and Crises

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Abstract*

This paper shows, using probit analysis, that low national savings increase the risk of macroeconomic crisis. Foreign savings are a poor substitute of national savings not only for domestic investment (Feldstein-Horioka result), but also for stability. It is found that deeper financial integration does not cure low investment and can improve the situation only to the extent that the risks of the foreign saving portfolio can be kept under control. Overall, a fundamental conclusion is that strong national savings are key for robust growth. Extending the probit analysis, the paper shows that the composition of foreign assets and liabilities matters substantially for portfolio risk and derives an index to assess the associated country risk.

JEL classifications: E21, E22, E44, F32, F34, G01, G15, H63

Keywords: National saving, Foreign saving, Self-Financed capital stock, Net foreign liabilities, Gross external assets and liabilities, Crises, Stability, Investment and growth

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1. Introduction

It is well known that Latin America and the Caribbean saves little in comparison to other developing and emerging regions. In this paper we explore to which extent financial integration can compensate this saving shortfall and whether that path may present a macroeconomic stability risk.

Countries invest in physical capital in order to grow. Domestic investment can in principle be financed either from national or foreign sources (i.e., via capital inflows). Foreign financiers would be willing to supplement national financing if the latter is in short supply and leaves profits on the table. If national and foreign financing were equivalent, the source of financing would be irrelevant and only the aggregate financing supply would matter. If foreign financing is a good substitute, then low national saving rates would be of little consequence. By contrast, if a shortfall in national financing is only imperfectly offset by foreign financing—leading to an inferior investment outcome—then the national-foreign distinction is important. To the extent that foreign financing is not offered or is less apt than national financing, either because it is more expensive and/or more uncertain, then the scarcity of national savings available to finance good investment opportunities would be a constraint.

This paper explores another dimension through which national and foreign savings are different: the absorption of capital inflows can bring about increased risks of instability in external accounts, which can result in costly macroeconomic crises.

Unfortunately, international financial integration does not seem to be an effective cure for low national saving. Deeper financial integration facilitates international portfolio diversification and lead to risk-reducing foreign assets because the accumulated foreign assets may be repatriated when foreign investors pull out. But at the same time, it may bring even larger amounts of risky foreign liabilities and magnify the effects of unsustainable macroeconomic policies through capital flight.

Crisis-related volatility—with which Latin American and the Caribbean unfortunately has extensive experience—in turn generates dis-incentives to save in domestic assets because the real value of savings usually falls in the aftermath of financial crises. It also discourages foreign investors from providing resources to the domestic economy, which raises the external capital cost premium. This sets in motion a vicious cycle of low national saving, higher demand for less forthcoming foreign saving, increased sovereign risk, macroeconomic crises and back to the

beginning. Mobilizing national saving would thus help to break the cycle and set in motion the opposite dynamics.

In a world in which financial integration is increasing, it is worth exploring how the composition of net external saving impacts risks. In this paper we argue not only that gross foreign assets and liabilities impact risk differentially but also that the types of assets and liabilities matter.

The following sections are organized as follows. Section 2 sets up definitions and describes the data. In Section 3 we argue that foreign saving is not a perfect substitute for national saving in terms of its associated macroeconomic risk by means of a statistical model in which risk is measured by the expected probability of external crisis. In Section 4 we expand this statistical model to show how the composition of foreign saving is also relevant in terms of risk and derive an index that measures the risk associated with the external portfolio of assets and liabilities. In Section 5 we argue that financial integration has limited effect on domestic investment and is worthwhile only if its attendant risks are tightly controlled. Finally, we conclude in Section 6.

2. Stylized Facts

2.1 External Crisis and Foreign Saving

Figure 1 shows the proportion of countries in Latin America and the Caribbean, and in the rest of the world, which enter into external crisis on a given year. The crisis definition and the sample we use as baseline are from Catão and Milesi-Ferretti (2014). The definition of external crisis includes defaults and rescheduling events as well as events of IMF support higher than twice the respective country's IMF quota.¹ As is common in the literature, we only include in the sample the initial year of each crisis to avoid second order effects affecting the results. The sample includes a maximum of 71 countries (of which 42 are emerging economies, 16 of them from Latin America and the Caribbean) for the period 1970-2011.²

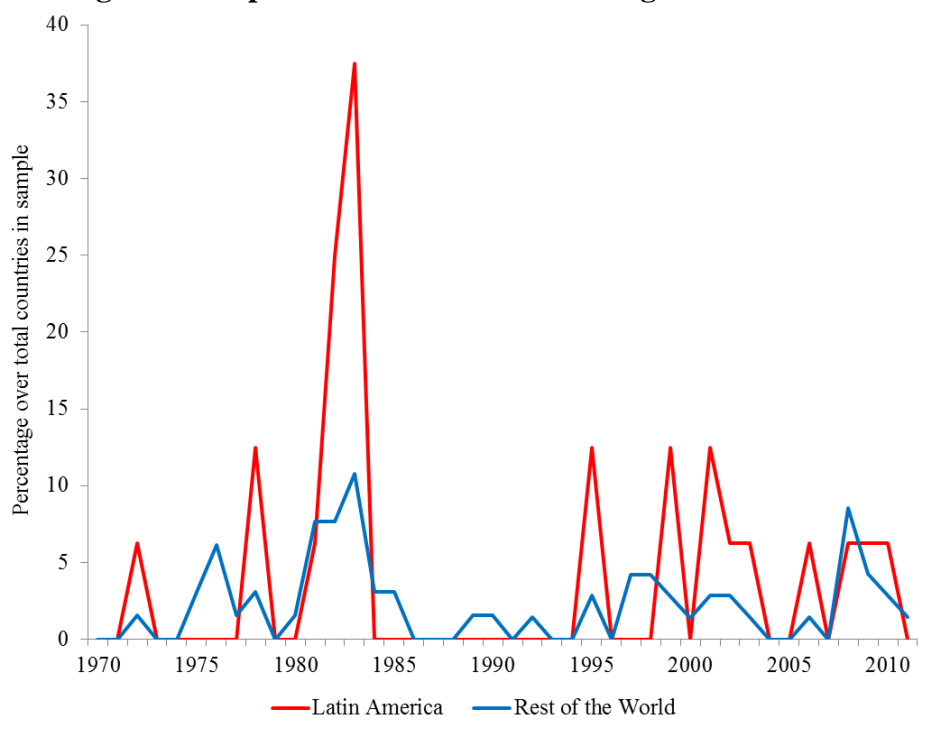
In the early 1980s, most countries in Latin America and the Caribbean suffered an external crisis. Other periods of relatively high volatility include the mid-1990s (i.e., the

¹ IMF support in turn is defined as IMF loans at least twice as large as the respective country's quota in the IMF, when all net disbursements are computed from a program's inception to its end.

² See Appendix 1 for the list of countries and Appendix 3 for alternative samples and crisis definitions used in robustness checks to our main findings.

“Tequila Crisis” which had its origin in Mexico and spread throughout the region); the late 1990s through the early 2000s (which is a period that encompasses the aftermath of the Asian and Russian financial crises of 1997 and 1998); and the post-global financial crisis period in 2008. The relatively high prevalence of crises in Latin America and the Caribbean shows that it is a high-risk region.³

Figure 1. Proportion of Countries Entering External Crisis



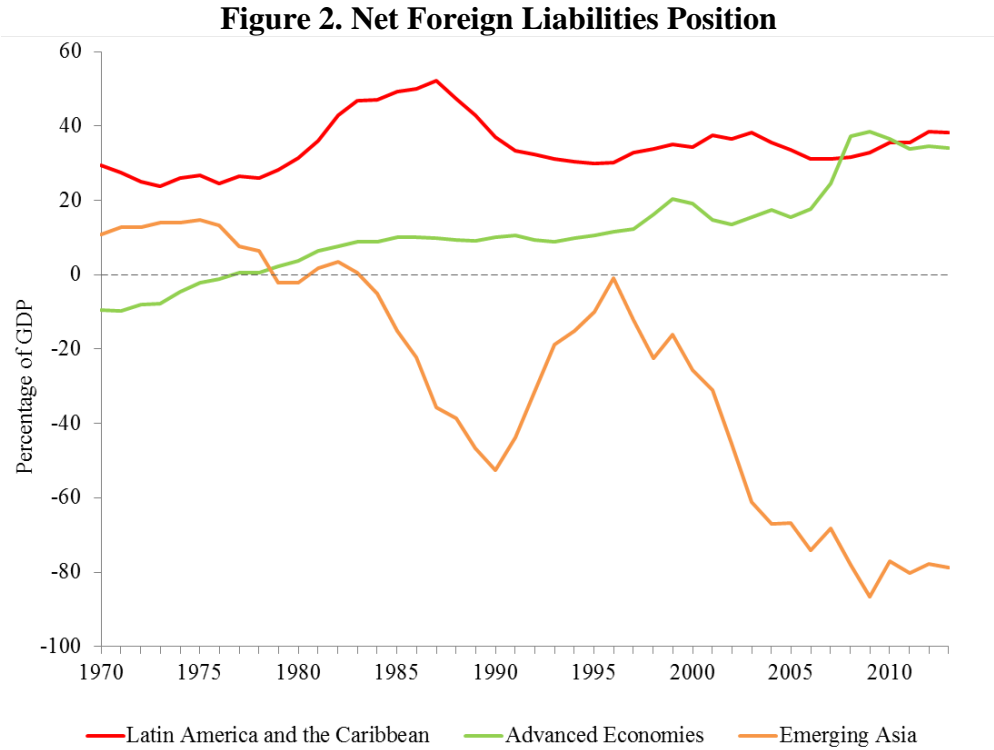
Note: The figure shows the proportion of countries in Latin America and the Caribbean, and in the rest of the world, entering an external crisis in a given year. The data show some bunching over time; that is, external crises affect multiple countries at the same time.
Source: Authors’ calculations based on the definition of external crisis in Catão and Milesi-Ferretti (2014).

According to Catão and Milesi-Ferretti (2014), the high risk in this region is in turn related to the large net foreign liabilities position (measured as share of GDP). Data on stocks of foreign saving come from The External Wealth of Nations Database Mark II (Lane and Milesi-Ferretti, 2007, updated in 2011). Throughout this paper, when we use ratios of stocks to GDP we

³ The fact that there is some bunching of crises across countries’ data around specific dates—a phenomenon that was previously documented by Calvo, Izquierdo and Mejía (2004) in their work on Sudden Stops—suggests that the prevalence of crises is, to some extent, due to factors that are external to the control of national authorities.

are actually using the Hodrick-Prescott trend in order to prevent GDP-related variability from affecting the precision of our estimations. The reason for doing so in this particular context is that we use stock variables as regressors, which are less volatile than flow variables like GDP. Then, by scaling by GDP trend, we not only gain in terms of comparability across countries, but we also avoid most of the cost of adding noise to the normalized series.⁴

Figure 2 shows that the typical LAC country has larger net foreign liabilities position (relative to GDP) than the typical country in other regions. The contrast is striking vis-à-vis Emerging Asia, where the typical country is a large net creditor.



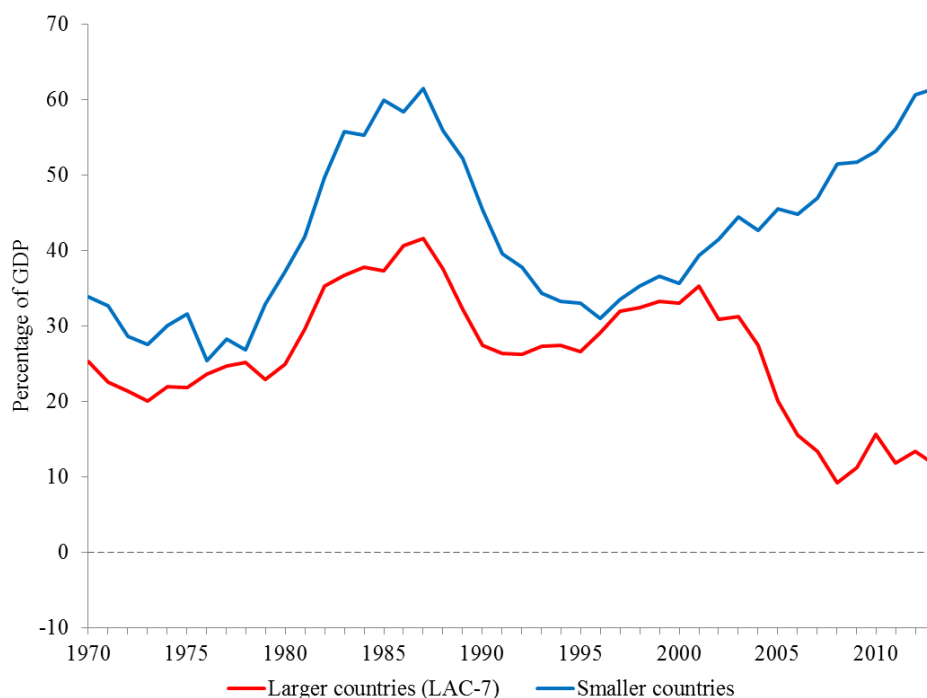
Note: Figure shows the simple average of Net Foreign Liabilities (as a percent of GDP) for select country groupings. See Appendix1 for the list of countries in each country group.
Source: Authors’ calculations based on External Wealth of Nations database.

Figure 3 shows that the pattern of high net foreign liabilities is especially relevant for the smaller countries in the region, many of which are located in Central America and the Caribbean. Net foreign liabilities (as a share of GDP) have been increasing over the last decade in the typical country of the group of smaller countries. In contrast, that ratio has been declining for the typical

⁴ We also used the GDP without detrending and find similar results, but with lower precision.

country in the group of largest economies in the region (the so-called “LAC-7” comprised of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela).

Figure 3. Net Foreign Liabilities Position in Latin America and the Caribbean



Note: The figure shows the simple average of Net Foreign Liabilities (as a percent of GDP) for select country groupings. LAC-7 includes Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela. Together, they account for more than 90 percent of the regional GDP. Smaller countries are the rest of the countries in the region not included in LAC-7, most of them in Central America and the Caribbean.
Source: Authors’ calculations based on External Wealth of Nations database.

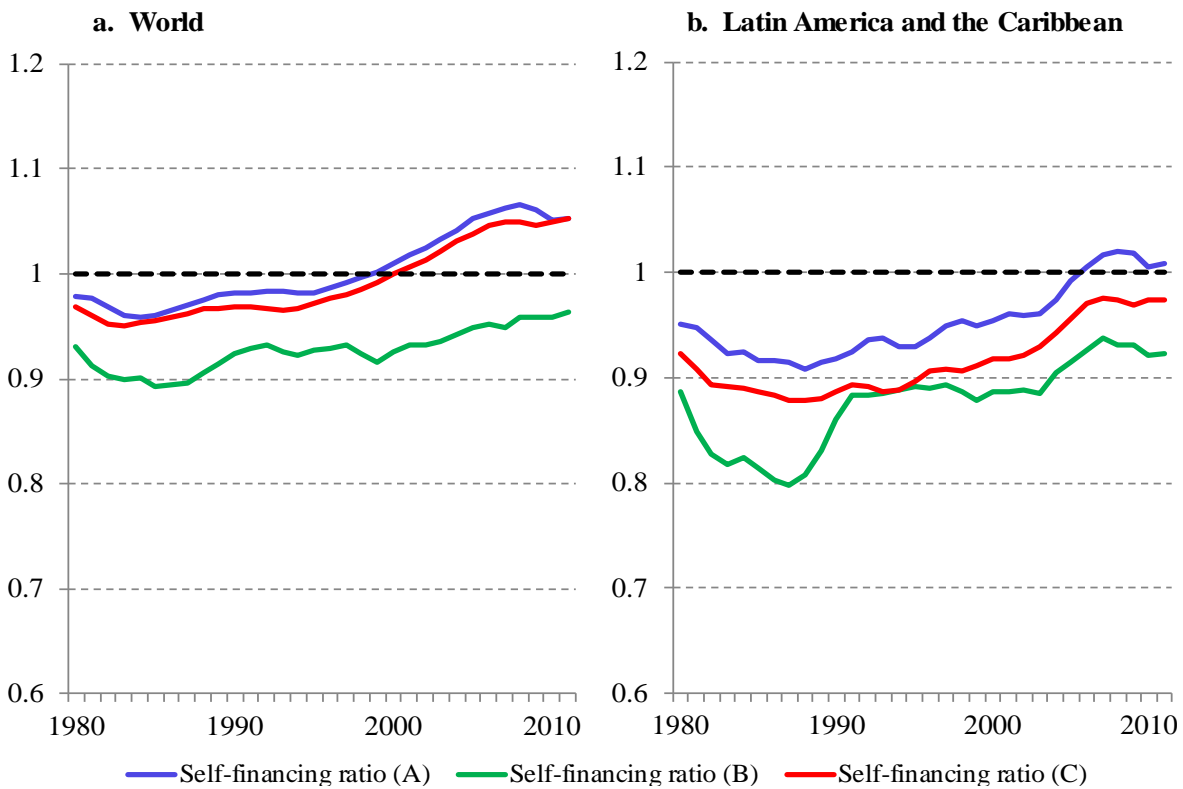
2.2 National Saving: The Self-Financed Capital Stock

The domestic equivalent to the net foreign liabilities position of a country is the self-financed capital stock (SFKS). We explore three ways of computing the SFKS (see Appendix 2). For each of the three measures, we compute their ratio to GDP for comparability across countries.⁵ This also solves the problem of having data on different monetary units, base years, etc., across different data sources. In Figure 4 we show, for each version of the SFKS, the corresponding

⁵ More specifically, we compute their ratio to GDP trend, obtained from HP filtering the corresponding GDP series, to avoid statistical noise from temporary fluctuations in GDP.

version of the so-called “Self-Financing Ratio” (SFR), which is the ratio of the SFKS to the corresponding estimation of capital stock. We observe that for all three measures, the average SFR is close to 1. These updated measures confirm the main result of Aizenman, Pinto and Radziwill (2007): on average, the capital stock can be well accounted for by national saving. In Latin America and the Caribbean: the portion of the capital stock that can be accounted for by national saving ranged on average from 90 to 100 percent during the last few decades.⁶

Figure 4. Self-Financing Ratios in the World



Note: Figure shows the simple average of the three versions of the Self-Financing Ratio for the entire sample, calculated as the ratio between each version of the SFKS and the corresponding capital stock computed with the same methodology (version A) or obtained from the same data source (versions B and C).

Source: Authors’ calculations based on data from the World Bank World Development Indicators database, Penn World Tables 8.0 and External Wealth of Nations database (Lane and Milesi Ferretti, 2007, updated in 2014).

⁶ True, these measures may overestimate its importance because not all national savings are applied to domestic financing. Nevertheless, if capital outflows are fully deducted from national savings to arrive at a lower bound for national financing, the self-financed portion of the capital stock is still predominant (averaging between 70 percent and 80 percent in the last few decades). See Figure 11 in Section 5.

3. Is National and Foreign Saving the Same in Terms of Risk?

3.1 Foreign Financing is a Poor Substitute of National Financing

Foreign and national financing are poor substitutes. In fact, a world in which there was perfect financial integration across countries would look totally different. If foreign and national financing were good substitutes, national savers would prefer to hold the bulk of their wealth in foreign assets in order to hedge the fluctuations of their domestic sources of income. This financial incentive for portfolio diversification would lead to domestic investment being mostly financed by foreign financing, especially in small countries. This imaginary world indeed runs counter to reality: capital flows are small relative to the volume of domestic investment, and the financing of the domestic capital stock in each country has been predominantly national.⁷

The underlying reason for this poor substitution is that foreign financing carries an additional risk premium, the so-called country risk spread, because each sovereign state retains jurisdiction to rule in favor of nationals. Even at the relatively low levels of foreign exposure that are observed, when country prospects deteriorate, the risk premium may increase sharply and eventually become prohibitive. This is hardly surprising: foreigners tend to have less information about local conditions and may be more vulnerable than domestic investors to, for example, the risk of expropriation. Why would foreigners wish to invest, unless there is a premium to entice them, in countries where locals are not eager to save?

In the absence of country risk spread, the supply of foreign financing would be totally elastic at the world interest rate and any shortfall of national financing could be seamlessly replaced by additional foreign financing, thus keeping investment unchanged (and yielding a marginal return equal to the world interest rate). However, due to this poor substitutability, national savings are more valuable as a source of financing because of their lower cost and they would therefore support more investment. Furthermore, national savings may also enable better absorption of foreign savings. Aghion, Comin and Howitt (2006) provide theoretical underpinnings to this connection between foreign and national financing. In their model, national

⁷ Capital flows are actually smaller than they seem once offsetting capital inflows and outflows resulting from double-entry accounting conventions for financial transactions are netted out; in particular, true capital outflows coming from national savings may be substantially lower than headline capital outflows (Borio and Disyatat, 2011). Aizenman, Pinto and Radziwill (2007) show that accumulated national saving represented some 90 percent of the total stock of domestic capital across emerging countries during the 1990s.

financing is a form of collateral that enables foreign savers' participation in domestic investment. Without that collateral, foreign financing of local projects would be reduced due to agency problems (i.e., local investors have more knowledge of local conditions) and, as a result, investment would remain more constrained.

As shown by Feldstein and Horioka (1980), there is a high correlation between domestic investment and national saving across countries.⁸ This “home bias” captured by Feldstein-Horioka type estimates is also verified in Latin America and the Caribbean (Cavallo and Pedemonte, 2016). A positive correlation between domestic investment and national savings is the natural consequence of imperfect financial integration across countries, where shocks to national saving would have a direct impact on investment because they would not be completely offset by foreign saving. Concerning investment, recourse to foreign savings is a helpful remedy but would not cure weak national savings.⁹

3.2 The Absorption of Foreign Savings Entails Macroeconomic Risks

Countries in Latin America and the Caribbean exhibit on average low national saving rates and absorb more foreign savings (as a share of their national product) than those in, for example, East Asia. There are reasons to suspect that the absorption of foreign savings may contribute to building up risks that may lead to crises and the ensuing volatility that is associated with them.

First, foreign savings may be unreliable because their availability and financial terms depend on changing international circumstances which are outside the control of national authorities. It is well known that capital flows to Latin America and the Caribbean are influenced by external factors (so-called “push factors”);¹⁰ for example, events such as a rate increase by the

⁸ For the purposes of this paper, it is important to distinguish “national saving” (i.e., the unconsumed part of national income) from “domestic saving” (i.e., the unconsumed part of gross domestic output). The difference between the two is international factor payments. In terms of national accounting, national saving is equal to Investment + current account deficit (i.e., foreign saving). Instead, domestic saving is equal to Investment + Trade Balance.

⁹ The observed correlation may also reflect other linkages between domestic investment and national savings, for example, that higher investment due to better business opportunities in the real economy may also provide better financial incentives for national savings (because of a higher country spread and domestic interest rate as demand for funds increases). Therefore, the Feldstein-Horioka estimation may overestimate the causal impact of national savings on investment. At the same time, Feldstein and Bacchetta (1991) rejected competing explanations, such as that the high estimated correlation between national saving and investment reflected a spurious impact of economic growth or other omitted variables. They also rejected the hypothesis that the high estimated saving retention coefficient reflected an endogenous response of fiscal policy to external account imbalances (Summers, 1988).

¹⁰ See Calvo, Leiderman and Reinhart (1996) for a summary of the discussion on the role of global factors versus domestic factors in driving capital flows to emerging markets.

Federal Reserve Board of the United States have a significant impact on capital inflows to the region.

Second, foreign financiers may be especially anxious because they rightly fear that under economic stress, national policies may discriminate against foreign liabilities or even expropriate them as a quick way to favor national welfare, especially if foreign liabilities become too large relative to the size of the domestic economy. In those contexts, it is understandable that foreign investors may want to watch their exposure to the recipient country and, if they decide to run the risk, favor certain types of capital flows that are short-term, liquid and easier to repatriate. In turn, this behavior would lead to pro-cyclical capital flows during crisis periods that undermine macroeconomic stability.

Third, attracting foreign financing calls for high returns in foreign currency, which requires the host country's ability to generate foreign exchange. This is another instance in which foreign and national savings are different. In most cases external debt contracts are stipulated in foreign currency and need to be serviced correspondingly. The inability to issue foreign debt in local currency at reasonable terms, the so-called "original sin" of emerging economies, is still a preponderant feature in the region and one that hampers financial integration (see Levy-Yeyati and Zúñiga, 2015). But more generally, irrespective of the specifics of the foreign liability contract, in the last analysis foreigners care about the real value of their holdings in terms of their purchasing power in their own countries. For example, American holders of domestic equity assets, either of national or foreign companies, care about the dollar value of their shares. This means that foreigners care about the potential conversion of domestic assets into foreign currency. In the absence of disposable foreign assets, the ability of a country to generate foreign exchange may be quite limited. In fact, transforming domestic resources into foreign exchange through increased net exports is a disruptive and costly process, especially if the adjustment needs to be effected quickly.

Unreliable foreign savings and difficult balance of payments adjustments make for an explosive mix, which is many times the cause of disequilibrium or a key transmission channel of macroeconomic crises. Therefore, while larger absorption of foreign savings helps to alleviate the constraint on domestic investment imposed by limited national saving (and in this way supports faster growth compared to a case of financial isolation), it is important to recognize the financial risks it carries that detract from its value. There is a potential tradeoff between crisis vs.

growth (Rancière, Tornell and Westerman 2006). In the extreme, macroeconomic risks brought on by the excessive accumulation of foreign liabilities over time may not only incur direct crisis costs but also ultimately raise the cost of capital and depress investment down the line.¹¹

By contrast, stronger national saving is positive on both counts: it would not only raise investment but also lower macroeconomic risks, each factor reinforcing the other, thus strongly contributing to faster and less volatile growth. Can the market be trusted to self-regulate the absorption of foreign savings concerning macroeconomic risk? Possibly not. Individual market participants utilizing foreign financing cannot internalize the collective harm done by contributing to mounting aggregate foreign financing that may upset macroeconomic equilibrium. By raising macroeconomic risk, each operation adding to foreign liabilities would compromise the net returns of all domestic investment without facing any disincentive to do so, which would lead to excessive macroeconomic risk.¹² In fact, the true measure of macroeconomic risk may actually exceed what is reflected in financial market pricing (i.e., sovereign spreads, yields on credit-default swaps, etc.) and go under the radar because much of the cost of crises is often ultimately borne by workers and other third parties not involved in the financial transactions. The bottom line is that the market may fail to find the right trade-off between economic risk and return of absorbing foreign saving. If so, this market failure provides a rationale for public policy promoting national saving.¹³

What is the evidence that foreign saving increase crisis risk in practice? As documented in the work of Lane and Milesi-Ferretti (2007), the different rates of absorption of foreign saving over time give rise to sizeable cross-country differences in net foreign liabilities (NFL) positions (i.e., the sum of foreign liabilities minus foreign assets). This is because the NFL position of a country is the sum of the accumulated absorption of foreign saving, appropriately priced and

¹¹ For example, in Latin America and the Caribbean in the 1980s, the unyielding external debt overhang acted as an implicit tax on investment (the fruits of growth would increase countries' capacity to pay and then be captured by external creditors) and, possibly more importantly, created deep uncertainty as to how the burden of the ultimate costs would be distributed across different economic agents. See Cavallo, Fernández-Arias and Powell (2014).

¹² For example, in Jeanne and Korinek (2010) individual agents do not fully internalize how their individual capital inflow decisions impact overall volatility in the economy, which leads to excessive leverage unless regulated. Along the same lines, Fernández-Arias and Lombardo (1998) show that an unregulated economy absorbs foreign savings too quickly because it cannot properly ration its space to borrow abroad before reaching the country's credit ceiling.

¹³ The study of macroeconomic risks emerging from the absorption of foreign savings opens a policy agenda on how to address market externalities in this regard, including the regulation of the rate of absorption and policies discriminating among types of capital inflows and outflows. The analysis of these financial policy implications is beyond the scope of this paper.

depreciated over time. Catão and Milesi-Ferretti (2014) show, using statistical analysis, that a country's ratio of net foreign liabilities to GDP is a significant predictor of external crises.¹⁴ These crises, which in turn encompass a variety of different types of events, usually entail output contraction and, more generally, are associated with large economic, social and political costs in the affected economies.^{15,16}

Can these risks be avoided by supporting domestic investment with national savings instead of foreign savings? In other words, is national saving different in terms of associated macroeconomic risks? We expanded Catão and Milesi-Ferretti's statistical analysis to include so-called *self-financed capital stock* (i.e., the sum of the accumulated national saving, appropriately depreciated over time). By construction, the self-financed capital stock is the "national" counterpart to the net foreign liability position.

Table 1 shows the results of the exercise.¹⁷ The dependent variable in the regressions is the external crisis indicator (i.e., dummy variable taking the value = 1 in a crisis year, and = 0 otherwise).^{18,19} Column (1) shows the Catão and Milesi-Ferretti basic analysis and confirms their result that higher net foreign liabilities (as a share of GDP) increase the risk of external crisis.²⁰ Columns 2a, 2b and 2c show that the self-financed capital stock does not. In contrast to the

¹⁴ The statistical analysis is conducted using a probit regression. The NFL ratio is statistically significant and substantial in economic terms. Crisis risk increases sharply as NFL exceeds 50 percent of GDP and whenever NFL/GDP ratio rises some 20 percentage points above the country-specific historical mean. The implication is that foreign liabilities are risky and should be kept under control.

¹⁵ In general, the economic studies that find a negative effect of a variety of macroeconomic crises on productivity and growth underscore their short-run destabilizing effects on macroeconomic variables and link them to the adverse effects of output volatility on long-term growth. Crises reduce productivity and output, increase uncertainty, drive away investments and produce social tensions that hurt growth. See, for example, Ramey and Ramey (1995); Cerra and Saxena (2008); and Blyde, Daude and Fernández-Arias (2010).

¹⁶ The sample includes 71 countries (of which 42 are emerging markets, 16 of them from Latin America and the Caribbean) for the period 1970-2011.

¹⁷ As in Catão and Milesi-Ferretti (2014), the sample consists of a maximum of 71 countries with annual data for the period 1970-2011. This exercise is based on a slightly smaller sample limited by the availability of information needed to conduct the more detailed statistical analysis used in this paper.

¹⁸ Following standard procedures in the literature, we exclude contiguous crisis years to avoid double-counting.

¹⁹ The results reported herein are based on the external crisis definition only but are validated using alternative crises indicators. See Appendix 3 for a battery of robustness checks using alternative crises indicators. These include the following: banking and currency crises (Laeven and Valencia, 2012); real currency crisis with and without recessions (based on definitions by Catão and Milesi Ferretti 2014); and an indicator of GDP collapse based on Barro and Ursúa (2008). By and large, the main qualitative results contrasting foreign and national saving hold.

²⁰ These regressions include a constant term (not reported) and a control for global conditions (i.e., the total number of crises in the rest of the world on each year). Catão and Milesi-Ferretti (2014) show that this result is robust even after controlling for a wide range of other factors. In Appendix 3, we perform a battery of checks that confirm that the result is robust.

foreign-financed capital stock expressed in net foreign liabilities, the self-financed capital stock appears to be largely neutral, not affecting the risk of crisis, no matter how it is measured (see Appendix 2). Finally, in columns 3a, 3b and 3c we introduce both variables jointly to compare their own risk contributions and confirm that net foreign liabilities remain a significant predictor of external crises, while the self-financed capital stock carries much less or no risk.²¹

National saving is thus a *safer* source of investment financing along this dimension. As such, a change in the composition of investment financing in favor of national saving would *reduce* the risk associated with external crises. In fact, given the large disparity in risk coefficients, an increase in national savings would lead to a net reduction in risk even if the foreign savings are reduced only marginally.²² Therefore, low national saving not only leads to lower real investment, but it may also create financial vulnerabilities that are associated with external crises.

Table 1. Probit Regressions of External Crisis Indicator

Variables	External Savings	National Savings			External and National Savings		
	(1)	(2A)	(2B)	(2C)	(3A)	(3B)	(3C)
Net Foreign Liabilities (NFL)	1.37*** (0.25)				1.31*** (0.29)	1.42*** (0.24)	1.55*** (0.21)
Self-Financed Capital Stock		-0.59*** (0.19)	0.03 (0.10)	0.02 (0.12)	-0.17 (0.22)	0.13 (0.09)	0.17** (0.08)
Observations	1,416	1,384	1,393	1,416	1,384	1,393	1,416
Version of SFKS	-	A	B	C	A	B	C

Notes: Probit estimates. Regressions include unreported constant term, and control for global cycle. All the regressors but the global control are lagged one period in order to avoid endogeneity. Estimation period: 1970-2011; robust country-clustered standard errors are in parenthesis.

*** p<0.01, ** p<0.05, * p<0.1

²¹ We verify that in all cases the coefficients are significantly different in a statistical sense. Net foreign liabilities as measured is the exact counterpart of self-financed capital stock in column 2c, adding up to capital stock. Alternative measures of net foreign liabilities conforming to the methods used in columns 2a and 2b yield very similar results (see Appendix 3).

²² The correlation between foreign and national savings across countries is consistently negative. The Feldstein-Horioka regressions imply that, despite imperfections in financial integration, increased national savings substantially crowd out foreign savings.

4. Not All Foreign Saving Is Created Equal

Economists refer to foreign saving as the *net* flow of capital into a country. Therefore, countries running current account deficits (i.e., where investment exceeds national saving) are net importers of saving, while countries running current account surpluses are net exporters of saving. Yet the *net* flow itself is a combination of two elements: the “gross capital inflows” to the reporting economy originating from foreign investors minus the “gross capital outflows” from the reporting economy originating from national investors.²³ The latter is national saving that is diverted towards the acquisition of foreign assets. Specifically, whenever a resident purchases a foreign asset, that transaction—all else equal—mechanically results in a reduction in foreign saving (i.e., a reduction in net capital inflows in accounting terms). To the extent that this is not made up of a gross capital inflow, it will result in less aggregate financing available for domestic investment. In this section we ask what, if any, are the implications of these financial transactions for external crisis risk? Is it *net* foreign liabilities (i.e., the absorption of capital inflows *net* of capital outflows) that really matters for macroeconomic risk? Or, instead, do gross inflows and outflows perform differently in terms of their contribution to risk?

The arguments concerning poor substitutability between financing sources focus on the weaker position of foreigners vis-à-vis nationals and potential difficulties in generating the foreign exchange foreigners care about. This points to looking at the space of gross—rather than net—positions, differentiating *gross liabilities* (which result from the accumulation of capital inflows from foreigners) and *gross assets* (which result from the accumulation of capital outflows from nationals).²⁴

Gross foreign liabilities can be expected to be risky because they require a premium to travel and may be unreliable (i.e., volatile as a source of financing). How about gross foreign assets? National saving applied to purchasing foreign assets (i.e., a concept that is sometimes referred to as “capital flight”) could be presumed to be neutral concerning risk because these assets are placed outside the domestic economy. However, they could also be a source of safety

²³ It is perhaps confusing, but the concept of Gross Inflows actually refers to the net changes in the financial position of non-residents that constitute liabilities of the reporting country, while Gross Outflows refer to the net changes in the financial position of residents that constitute liabilities of the rest of the world, or foreign assets of the reporting country.

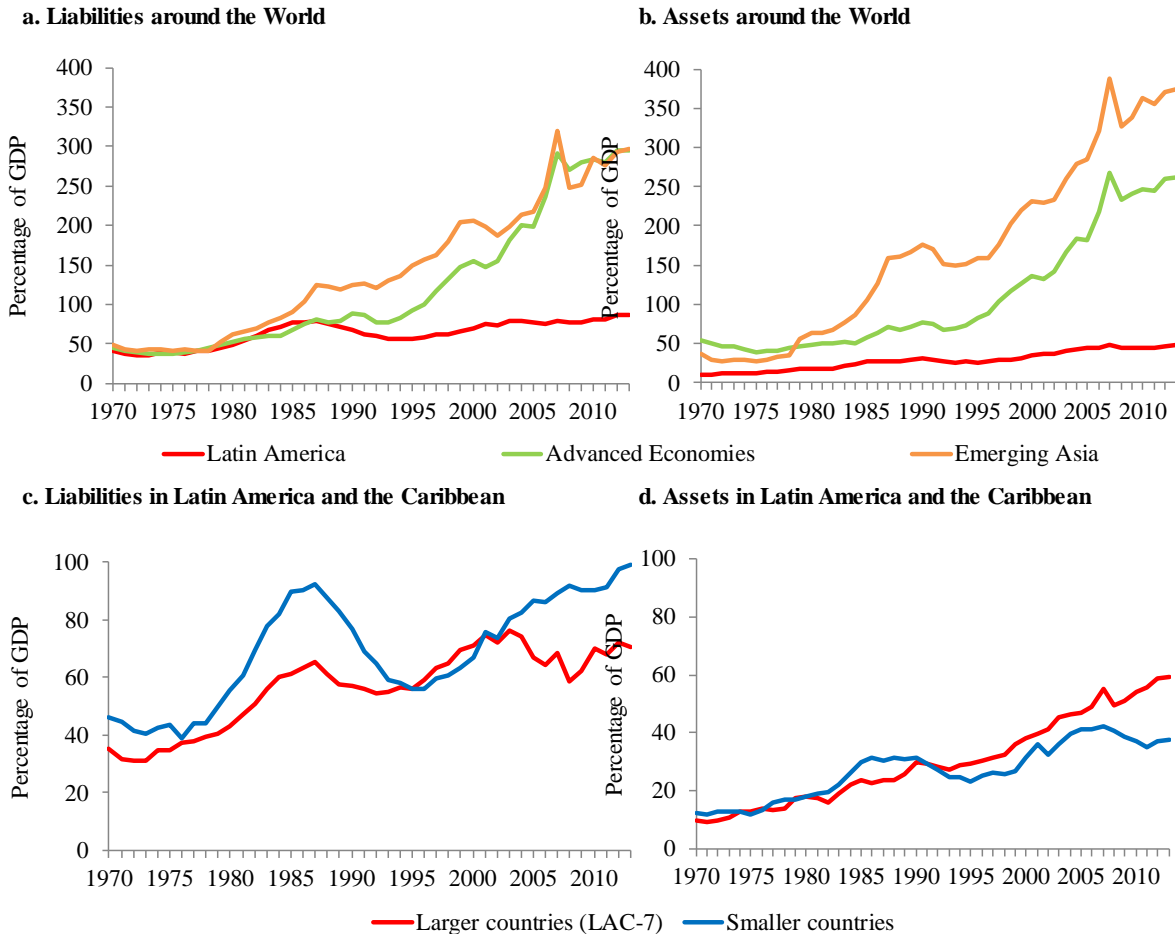
²⁴ See Borio and Disyatat (2011) for a discussion on the role of gross versus net capital flows and the links to external financing.

for nationals if foreign assets can be used to stabilize shocks associated with a dry-up of foreign financing. In particular, accumulated foreign assets by residents could be repatriated to offset a fall in gross capital inflows. At the same time, capital flight would contribute to risk indirectly to the extent that it creates the need for a larger absorption of foreign saving to match domestic investment demand. The net effect would depend on whether the protective effect of foreign assets more than offsets the risk effect of increased foreign liabilities, in which case gross outflows would result in more stable *net* capital flows.²⁵

Over the last decade or so, there has been a significant increase worldwide in both gross capital inflows and gross capital outflows. Figure 5 shows the corresponding gross positions of foreign liabilities and assets in the typical country in selected regions of the world. To a large extent gross positions may be misleading because they reflect offsetting entries in balance of payments accounting of financial transactions that have no net financial effect or diversification value (see Borio and Disyatat, 2011, for a discussion). While it is not clear how much of these gross flows reflect international portfolio diversification once round-tripping through double entries is netted out, it appears that financial integration is on the rise. The trend towards increased gross positions in the national balance sheet of countries is remarkable in advanced countries and in Emerging Asia—where gross foreign assets and liabilities stand at approximately 300 percent of GDP. The same trend is already observed in Latin America and the Caribbean, although gross foreign assets and liabilities as a share of GDP are still significantly less than in advanced countries.

²⁵ See Cavallo et al. (2015) for an analysis of the implications of two-way gross capital flows for the stability of net flows.

Figure 5. Gross Foreign Assets and Liabilities around the World

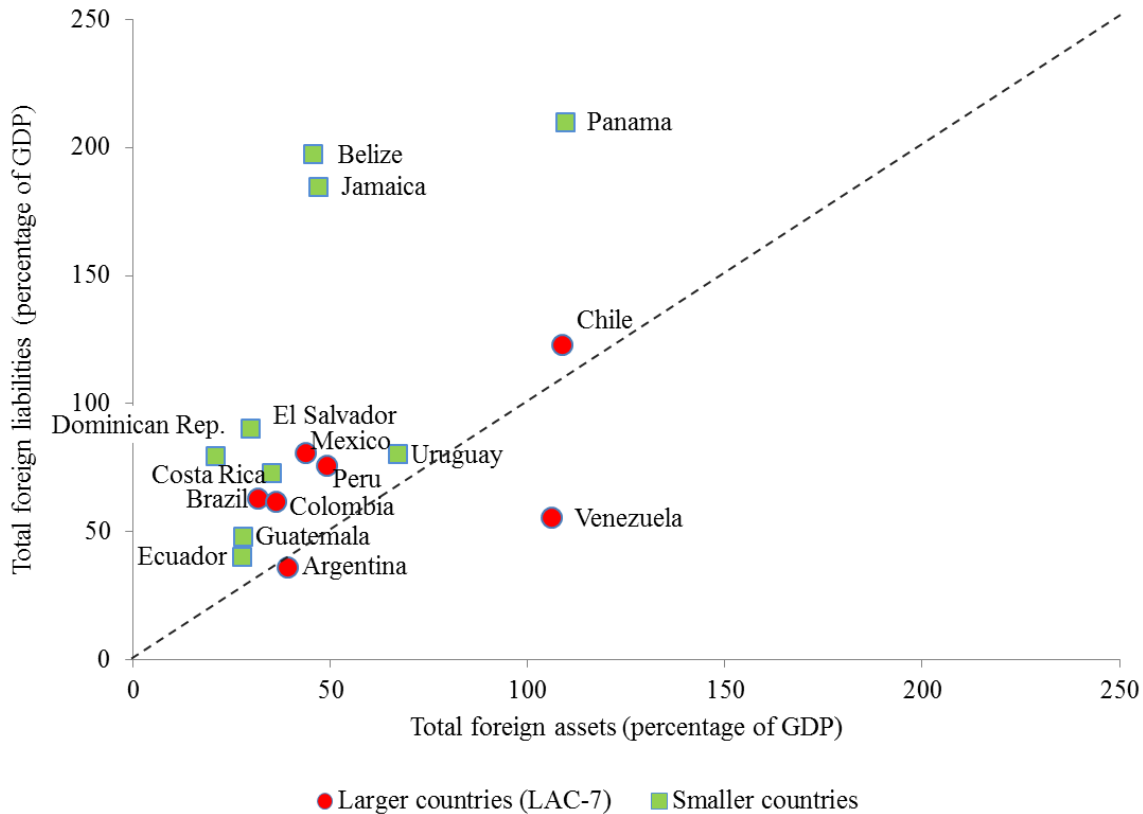


Note: The figure shows the simple average of net foreign liabilities (as a percent of GDP) for select country groupings. See Appendix 1 for the list of countries in each country group.
Source: Authors' calculations based on External Wealth of Nations database.

These trends of increasing gross assets and liabilities are likely the result of deeper financial integration, which has facilitated the cross-border financial transactions to achieve greater portfolio diversification and international risk-sharing.²⁶ The corollary of this process is that, in many countries, including in Latin American and the Caribbean, net foreign liabilities are now underpinned by more substantial gross external assets and liabilities (see Figure 6).

²⁶ See Committee on International Economic Policy and Reform. 2012. "Banks and Cross-Border Capital Flows: Policy Challenges and Regulatory Responses." Report. Brookings, Washington, DC.

Figure 6. Gross Foreign Assets and Liabilities in Latin America and the Caribbean, 2013



Note: The figure shows total foreign assets and liabilities (as a percent of GDP) for Latin American and Caribbean countries in 2013. At the 45° line, total foreign assets equal total foreign liabilities: that is, net financial liabilities (NFL) equal zero. Dots above the 45° line depict countries with NFL > 0. Dots below the 45° line depict countries with NFL < 0.

Source: Authors' calculations based on External Wealth of Nations database.

In order to analyze the implications of *gross* positions for the risk of external crises, we examined the effect of foreign liabilities and assets separately using the same empirical model as in the preceding section. Table 2 shows the results of the same regressions as in Table 1, but where NFL is replaced by its gross components (i.e., total foreign liabilities, TFL, and total foreign assets, TFA, respectively, both as ratios of GDP).²⁷

²⁷ The data on gross foreign assets and liabilities comes from the Lane and Milesi-Ferretti (2007) dataset (updated in 2014).

Table 2. Probit Regressions of External Crisis Indicator (Gross Total Positions)

Variables	External Savings	External and National Savings		
	(1)	(2A)	(2B)	(2C)
Total Foreign Liabilities (TFL)	1.52*** (0.35)	1.54*** (0.37)	1.61*** (0.32)	1.85*** (0.29)
Total Foreign Assets (TFA)	-2.16*** (0.49)	-2.12*** (0.54)	-2.27*** (0.46)	-2.66*** (0.50)
Self-Financed Capital Stock (SFKS)		0.07 (0.24)	0.18** (0.09)	0.24*** (0.09)
Observations	1,416	1,384	1,393	1,416
Version of SFKS	-	A	B	C

Notes: Probit estimates. Regressions include unreported constant term, and control for global cycle. All the regressors but the global control are lagged one period in order to avoid endogeneity. Estimation period: 1970-2011; robust country-clustered standard errors are in parenthesis.

*** p<0.01, ** p<0.05, * p<0.1

As expected, gross foreign liabilities increase the probability of crisis. Concerning foreign assets, they appear to *reduce* the risk of crisis, suggesting that foreign assets possess insurance value due to potential capital repatriation. This finding goes against the view that capital outflows weaken economies and that what really matters for risk are gross foreign liabilities. Of course, higher capital outflows can be expected to be associated with financial conditions for additional capital inflows in order to satisfy domestic investment demand, a natural consequence of better international financial integration leading to inflows and outflows growing in tandem. So it is important to gauge the *extent* to which the protection afforded by foreign assets mitigates the risk of foreign liabilities. Based on the results for the coefficient estimates on foreign assets and liabilities respectively, a dollar of foreign assets appears to *more than offset* the risk generated by a dollar of foreign liabilities: the financial integration effect of higher gross flows underlying a given net flow reduces overall crisis risk (with high statistical certainty).²⁸ According to this evidence, the net position of foreign liabilities is not sufficient to

²⁸ We run statistical tests to gauge the extent of risk offsetting. In all the specifications of Table 2 we reject the hypothesis of full offset (i.e., TFA = -TFL) to favor more than full offset at the 5 percent confidence level. See Appendix 3 for details.

predict the risk of external crises. The underlying gross positions are also important: a given net position is less risky if it is supported by deeper financial integration.

Finally, it remains true in this exercise that self-financing carries little or no risk. As such, this reinforces the conclusion that encouraging national savings in order to lower the dependence on foreign savings for investment would *reduce* the macroeconomic risk associated with external crises. If the absorption of less foreign savings takes the form of less foreign liabilities, some of the risks would be removed. If it takes the form of more foreign assets, some of the risks would be mitigated. It follows that stronger national savings is the key to increasing investment at minimum risk.

4.1 The Risk Profile of Foreign Assets and Liabilities

However, before concluding that risk is reasonably well tracked by looking at gross foreign assets and liabilities, it is important to look deeper into the risk profile of the actual assets and liabilities involved. The conclusions obtained so far may be too broad because different types of financial flows may entail different risks to the domestic economy. If so, assessing macroeconomic risk by looking at aggregates, even if discriminating between gross external assets and liabilities, would paint a misleading picture. In particular, countries in which riskier types of external liabilities are more prevalent would underestimate the macroeconomic risk brought about by the absorption of foreign saving.

Concerning liabilities, many studies distinguish types of financing in relation to characteristics such as the international risk sharing they provide and how footloose they are. Some of them discuss the validity of a pecking order of foreign liabilities, where short-term debt in foreign currency would be the riskiest and FDI the safest.²⁹ The key point is that different types of capital inflows may have different impacts on country solvency (both the ability and the willingness to honor foreign claims) and the liquidity the country needs for macroeconomic stability. There is much less research on how different types of foreign assets may help prevent macroeconomic crises or cure their effects. It stands to reason that how easy it is to repatriate assets and how safely they can be channeled by the financial system to address the sources of financial stress are key for their insurance value.

²⁹ Fernández-Arias and Hausmann (2001). For a recent survey, see Levy Yeyati and Zúñiga (2015).

Distinguishing foreign assets and liabilities by type may be relevant for both the risk potential of foreign liabilities and the safety value of foreign assets because portfolio composition varies across countries. In order to study countries' risk profile in a more granular fashion, in the empirical work we decompose gross foreign liabilities and assets into their main components. For this purpose, total foreign liabilities are decomposed into three types: debt, portfolio equity investment (stocks), and direct equity investment. In the case of total foreign assets, the decomposition also includes foreign exchange reserves held by the public sector as a separate category.

The results are reported in Table 3, which revisits the regression in Table 2 by disaggregating Total Foreign Liabilities and Total Foreign Assets into their components. Column 1 estimates the risk profile of the gross foreign positions, and Column (2) shows the risk-friendly nature of national savings by including the three measures of self-financed capital stock as additional explanatory variables.

Table 3. Probit Regressions of External Crisis Indicator, Gross Positions by type of Instrument

Variables	External Savings	External and National Savings		
	(1)	(2A)	(2B)	(2C)
Debt Liabilities	2.09*** (0.41)	2.19*** (0.41)	2.14*** (0.40)	2.13*** (0.36)
Portfolio Equity Liabilities	1.12 (1.45)	1.23 (1.46)	1.43 (1.44)	1.60 (1.46)
FDI Liabilities	0.64 (0.61)	0.23 (0.56)	0.77 (0.56)	1.73** (0.68)
Debt Assets	-2.15*** (0.49)	-2.18*** (0.51)	-2.24*** (0.48)	-2.34*** (0.48)
Portfolio Equity Assets	-13.91** (5.46)	-13.59** (5.29)	-13.72*** (5.28)	-14.90*** (5.21)
FDI Assets	0.00 (0.97)	0.44 (0.96)	-0.17 (0.97)	-1.00 (1.01)
Reserve Assets	-2.81** (1.16)	-2.15** (1.09)	-3.16*** (1.08)	-4.84*** (1.42)
Self-Financed Capital Stock		-0.18 (0.22)	0.16 (0.10)	0.27** (0.12)
Observations	1,416	1,384	1,393	1,416
Version of SFKS	-	A	B	C

On the liabilities side, we find that external crisis risk rises as the composition of gross external liabilities is tilted towards debt liabilities. The evidence is broadly consistent with the idea that equity liabilities (both portfolio and direct investment) are low-risk. In particular, there is strong statistical evidence that foreign direct investment is less risky than debt.^{30,31} At the same time, the risk associated with the self-financed capital stock remains negligible compared to the risk associated with external debt liabilities.

Concerning external assets, we find that those that are more easily sold: i.e., portfolio equity assets, reserve assets, and debt assets, are the ones that reduce the risk of external crises. By contrast, FDI, the least liquid of the four, has no such insurance value. This is consistent with the hypothesis that there is an insurance value to the type of assets that are more easily repatriated. In particular, we note that reserve assets, which are designed to protect external equilibrium, appear to be in fact useful to prevent crises.

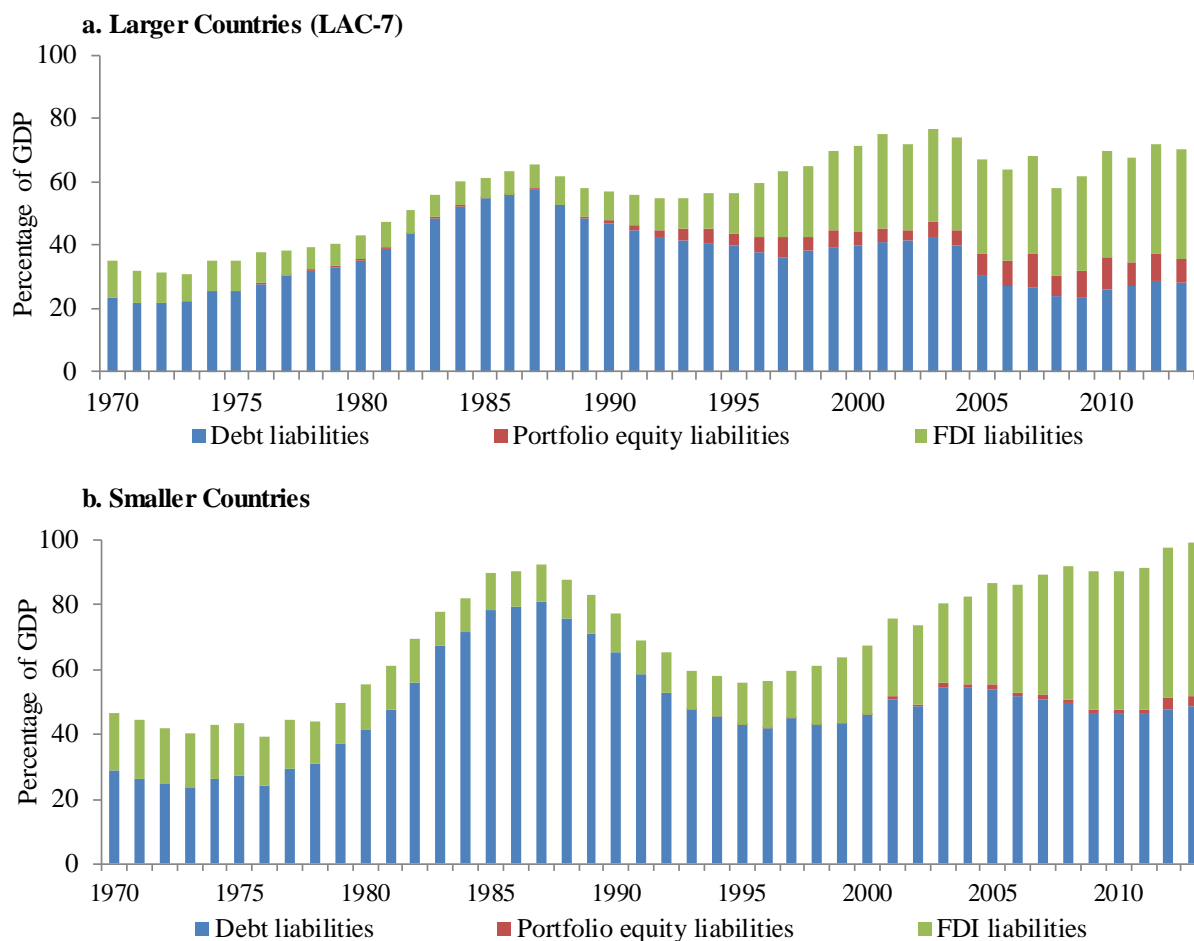
A key implication of this analysis is that the risks associated with net foreign liabilities vary with the financial characteristics of international financing, mainly the debt/equity divide of foreign liabilities and the degree of liquidity of foreign assets. Therefore, a full assessment of the risks entailed by the absorption of foreign saving to supplement national saving requires taking into account the composition of the resulting portfolio of foreign assets and liabilities. Put differently, the stability gain associated with strengthening national savings depends on how the portfolio of net foreign savings would shrink.

Based on these differential risk features, it is reassuring that the composition of assets and liabilities in Latin America and the Caribbean has been changing for the better since the 1990s (Figures 7 and 8). The most remarkable trend in our region is the increase of the share of equity amongst foreign liabilities, especially FDI, and the corresponding reduction in the share of debt.

³⁰ We reject at the 1 percent confidence level the null hypothesis that the estimated coefficients for “debt liabilities” and “FDI Liabilities” are equal to each other.

³¹ This result is confirmed by Hansen and Wagner (2015). They show that FDI liabilities are a particularly safer form of capital inflows when they are substantially based on the retained-earnings of multinational corporations. It turns out that retained earnings used to finance domestic investment behave as national saving, both components of what the authors call “local savings.” From the point of view of macroeconomic financial risks, it is as if these companies were in part owned by nationals.

Figure 7. Composition of Gross Foreign Liabilities in Latin America and the Caribbean

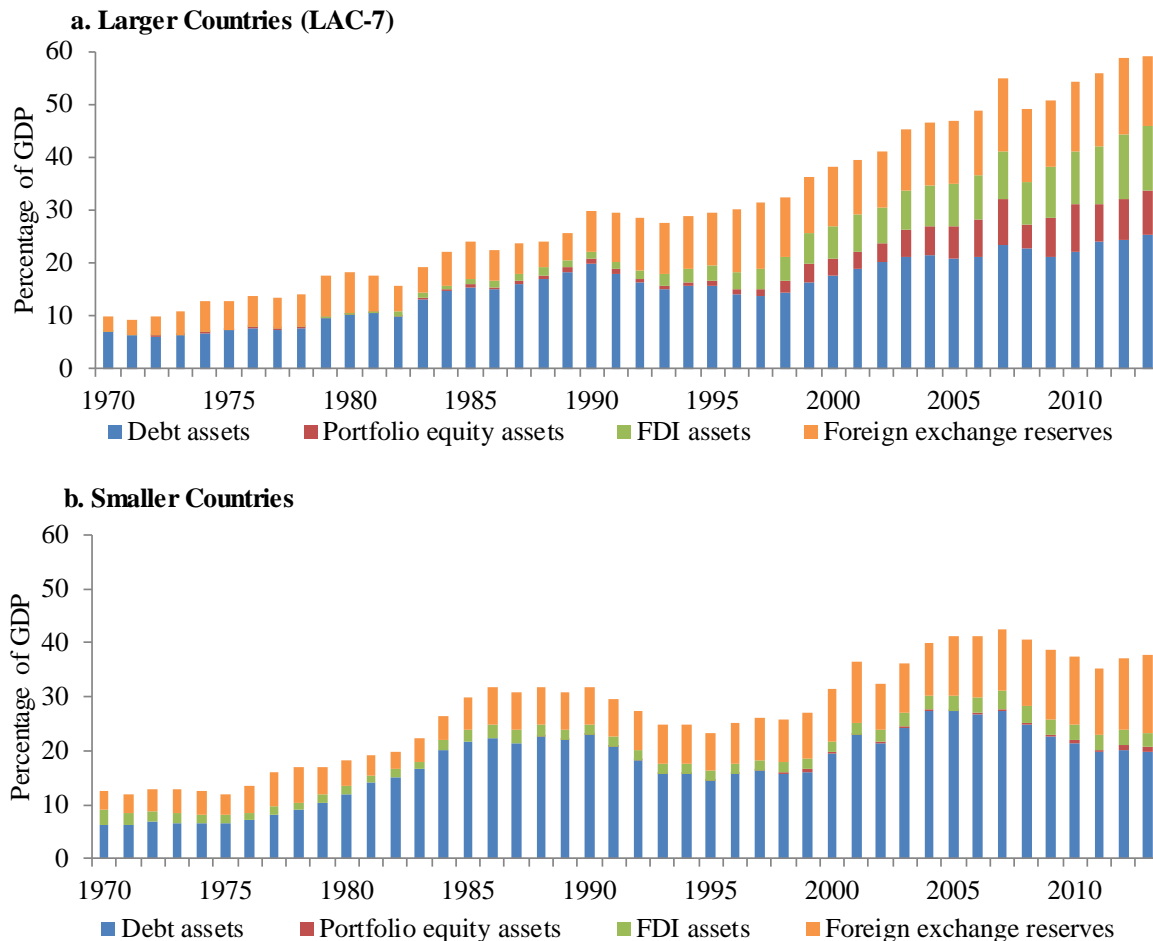


Note: The figure shows the composition of foreign liabilities by instrument. Simple averages by country group are presented. Financial derivatives, which are small in Latin America and the Caribbean, are not shown in this decomposition. FDI = foreign direct investment. For country groupings see Appendix 1.

Source: Authors' calculations based on External Wealth of Nations database.

On the foreign assets side, there is a significant increase in reserve assets amongst both the larger and the smaller countries in the region and also a remarkable increase in portfolio and direct investment assets in the group of larger countries.

Figure 8. Composition of Gross Foreign Assets in Latin America and the Caribbean



Note: The figure shows the composition of foreign liabilities by instrument. Simple averages by country group are presented. Financial derivatives, which are small in Latin America and the Caribbean, are not shown in this decomposition. FDI = foreign direct investment. For country groupings see Appendix 1.

Source: Authors' calculations based on External Wealth of Nations database.

4.2 Application: The External Portfolio Vulnerability Index (EPVI)

The statistical model above yields a risk profile of foreign savings that depends on the portfolio composition of foreign assets and liabilities in a country's balance sheet. The contribution to the risk of external crisis of each country's portfolio can be summarized in the "External Portfolio Vulnerability Index" (EPVI). This index is based on: i) the estimated coefficients in the regressions (column 2c of Table 3) for each of the explanatory variables related to gross external assets (i.e., debt assets, portfolio equity assets, FDI assets and Reserve assets) and liabilities (debt liabilities, portfolio equality liabilities and FDI liabilities) respectively; and ii) the observed levels of each of those variables for countries in the sample. We can calculate the contribution to

the risk of external crisis of each country's portfolio. The EPVI leaves out other factors relevant for risk, such as global factors, which may compound external portfolio risks.

Note as a reference that, by construction, an EVPI value of 1 equals a neutral contribution to risk (i.e., the portfolio is such that the positive and negative risks associated with it balance out). Instead, values of the EPVI higher than 1 indicate that the balance of risks is such that the portfolio by itself *increases* the probability of an external crisis. Finally, values of EPVI lower than 1 mean that the balance of risks is such that the portfolio reduces the probability of an external crisis.³² Figure 9 shows how the EPVI has been evolving in LAC and selected comparators over time.

In Latin America and the Caribbean, the external portfolio in the 1980s contributed to very substantial risk. From the final years of that decade to the middle 1990s, the index declined rapidly. However, since then, it has been increasing and the EPVI for the typical country in the region is still above the neutral level, meaning that on average the external portfolio in Latin American and the Caribbean is still a risk factor for external crisis. In sharp contrast, in Emerging Asia the balance is such that countries' external portfolios contribute to *reducing* the risks of external crisis.

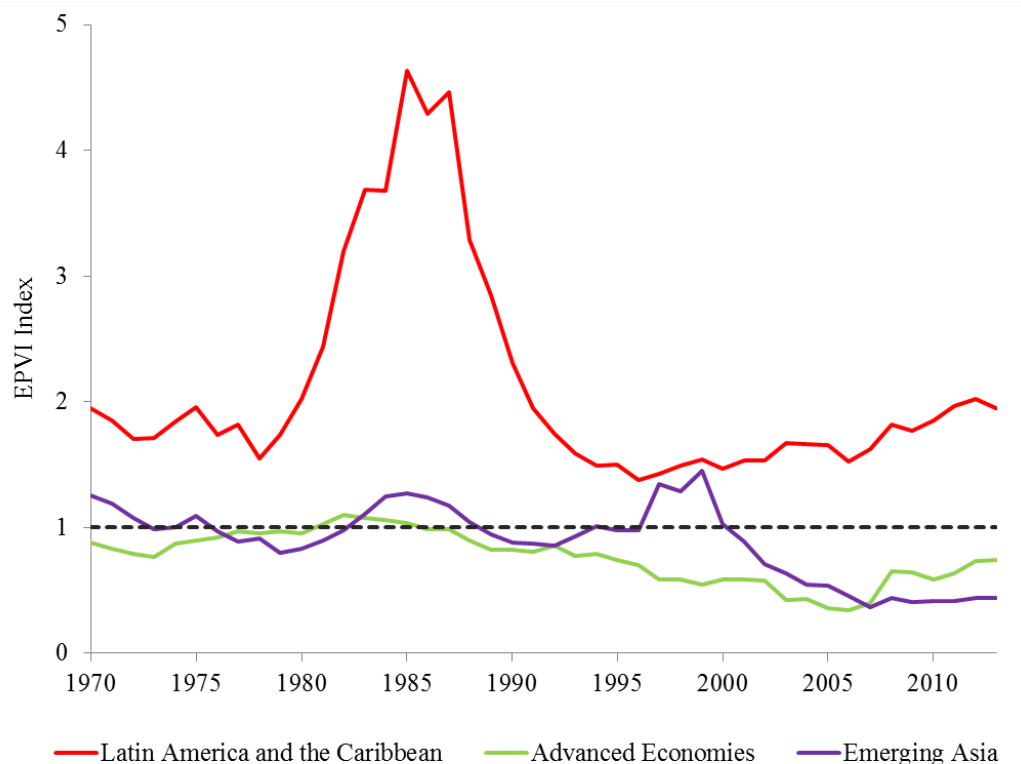
The evolution of risk in Latin America owes much to the changes in the composition of the external portfolio mentioned above. The EPVI in Latin America and the Caribbean can be decomposed to show the contribution that better portfolio composition has made by considering the EPVI that would have prevailed had the composition of both liabilities and assets remained the same as at the beginning of the period in 1970. Figure 10 shows how this counterfactual EPVI would have evolved driven only by the changes in the aggregate volume of assets and liabilities. The difference between actual and counterfactual EPVI, shown in the same figure, can be attributed to the change in portfolio composition over time. In particular, the lower panel shows the separate effect of portfolio composition of assets and liabilities.

The region appears to follow an intuitive pattern: in the 1980s, countries had substantially more external liabilities than assets (as a share of GDP) and the composition of external liabilities tilted towards the riskiest instruments: i.e., external debt. Both factors contributed to higher risk and, perhaps not surprisingly, during that period, the region underwent a severe debt

³² Note that the EPVI only refers to the contribution of a country's external portfolio to overall risk. Overall risk also depends on the other factors included in the statistical exercise.

crisis. Coming out of the crisis, liabilities declined and assets continued to increase, and, importantly, the deterioration of portfolio composition turned around, all of this leading to a return to normal risk levels.

**Figure 9. External Portfolio Vulnerability Index (EPVI),
Simple Average by Country Group**



Note: The External Portfolio Vulnerability Index (EPVI) is the exponential of the linear combination of the observed values of the variables related to the external portfolio (gross foreign assets and liabilities) with the estimated coefficients in the probit regression acting as scalars. Values of the EPVI higher than 1 indicate the portfolio by itself increases the probability of an external crisis. The figure presents the simple average by country group. See Appendix 1 for the list of countries in each country group.

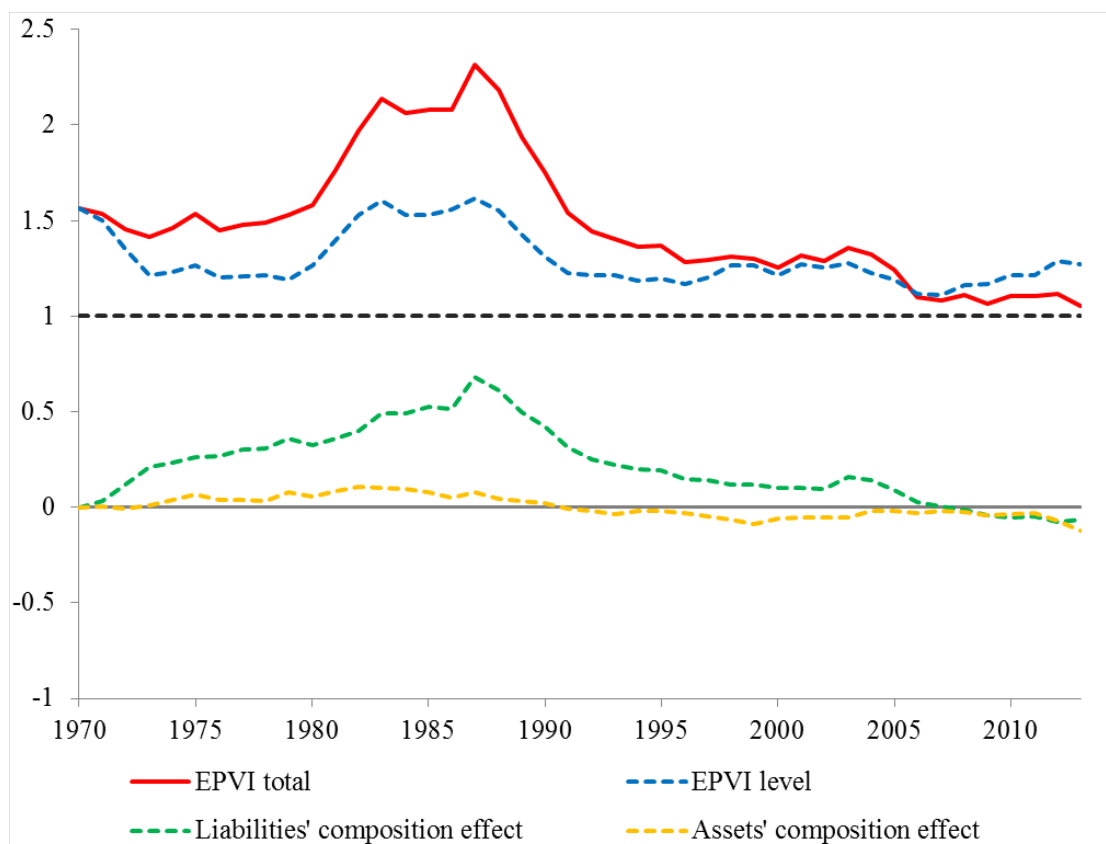
Source: Authors' formulation based on authors' calculations.

Over the past decade portfolio composition has markedly improved, partly masking the increase in risk driven by the trend in aggregate assets and liabilities. This is mainly due to the external asset side: many countries in the region have accumulated significant stocks of liquid foreign assets. The composition of external liabilities has also shifted towards less risky instruments, particularly FDI.

The bottom line is that while risk in the Latin American and the Caribbean region remains high by international standards (in part because net foreign liabilities remain high), the

gradual change to safer types in the composition of external assets and liabilities has helped to make the contribution to risk of the external portfolio lower than what it would be otherwise.

Figure 10. EPVI Total, EPVI Level and Composition Effects of the Assets and Liabilities Portfolio in Latin America and the Caribbean



Note: The EPVI total is the exponentiated linear combination of the observed values of the variables related to the external portfolio (i.e., gross external assets and liabilities) with the estimated coefficients in the probit regression (column 2c of Table 3) acting as coefficients. The EPVI level is such that it reflects the observed changes in the levels of total foreign assets and liabilities, but conserving the initial shares of their gross components, showing the EPVI that would have prevailed if only the levels (and not their composition) of total assets and liabilities had changed. The difference between EPVI total and EPVI level is attributable to changes in composition of assets and liabilities. Liabilities' (assets') composition effect is calculated as the difference between the EPVI total and another counterfactual in which only the shares of gross liabilities (assets) are held constant. The figure presents the simple average for Latin America and the Caribbean.

Source: Authors' formulation based on authors' calculations.

Does this render less important the risk reduction that would be obtained by stronger national savings? No. Stronger national saving would help to *reduce* the risk of external crises, either because it reduces the demand for foreign liabilities or because it facilitates the

accumulation of foreign assets (assuming that investment increases by less than national savings, as the evidence indicates). For any given effect on liabilities and assets, countries in which liabilities are *riskier* and assets are *safer* would benefit the most from stronger national savings. A safer external portfolio composition does not imply that the risk reduction afforded by stronger national saving is any weaker.

5. Financial Integration Is No Cure

Better financial integration can facilitate the flow of capital across countries. As a result, financial integration can help to alleviate the negative impact of a national saving shortfall and sustain higher domestic investment through lower cost of capital.³³ However, if financial integration results in excessive absorption of (particularly risky forms) of foreign financing, it can also increase the risk of external crises. In turn, financial integration could result in more frequent costly crises and, consequently, even deter investment down the road.³⁴

In order to assess this trade-off in greater detail, we revisit the evidence regarding the extent to which financial integration effectively helps to reduce the constraint imposed by low national saving.³⁵

First, it should be noted that policies aimed at improving financial integration in emerging markets are up against the strong reasons behind cross-country risks, most notably risks of expropriation, that impede the absorption of foreign financing. It is not surprising that foreign saving is small relative to investment even in countries with *de jure* open capital accounts. The strong “home bias” observed even in advanced countries—as reflected in

³³ The level of investment is not all that counts. National savings may constrain not only the level of domestic investment but also its quality. Savings that are not efficiently allocated lead to the financing of low return investments and the failure to realize high return investments, which would be reflected in lower aggregate total factor productivity. Low national savings also calls for high absorption of net foreign savings and, consequently, lower net exports. To the extent that production of exports is an ingredient of high productivity and growth, national savings may also constrain growth through this macroeconomic channel (De la Torre and Ize, 2015). Presumably, better financial integration would also result in increased net foreign savings and produce the same effect.

³⁴ In addition, financial integration may increase the ability of national saving to easily flee the country, which would deepen macroeconomic instability in certain circumstances.

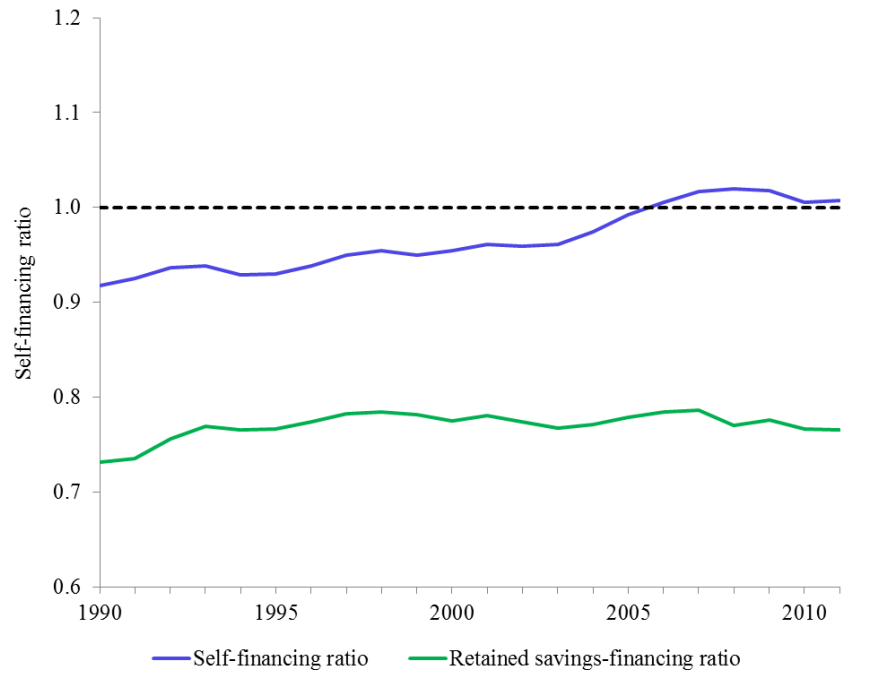
³⁵ Of course, financial integration can have other benefits; for example, lower impediments to cross-border financing can widen the scope for risk diversification. Yet we abstract from a full assessment of all the possible benefits of financial integration to focus on just one that is particularly relevant for the theme of this report: the investment response.

Feldstein and Horioka (1980) and the subsequent literature—suggests that national saving continues to be important for domestic investment.

Furthermore, as noted, larger absorption of foreign savings following deeper financial integration may depress investment down the road if it results in higher crisis risk. More worrisome, open capital accounts may conceivably reduce, rather than expand, the pool of national saving available for domestic investment. In countries where domestic conditions do not nurture national saving, such as inflationary environments, or institutional environments that deliver poor protection of property rights, savers may be more inclined to place their saving abroad, thereby reducing the pool of national saving that is retained domestically to finance domestic investment. In such contexts, opening capital accounts without providing the correct incentives for local savers can facilitate capital flight, further constraining domestic investment in countries with impaired access to foreign financing.

A first sign that Latin America and the Caribbean should not expect advances in international financial integration to offer a cure for low investment constrained by national savings is the evolution of the so-called self-financing ratio shown in Figure 4, which does not appear to be declining over time. The flipside of the high importance of national saving is the low importance of foreign savings in accounting for the capital stock. True, some national savings do not finance domestic investment but “leak” abroad in the form of capital outflows, so that the externally-financed investment is larger than what (net) foreign savings suggest. Nevertheless, even if all external assets are subtracted to obtain a lower bound to retained national saving, their high importance does not appear to be declining over time (Figure 11).

Figure 11. The Self-Financing Ratio vs. the Retained Savings-Financing Ratio in Latin America and the Caribbean



Note: The figure shows the regional simple average for the self-financing ratio (SFR) using the methodology associated to version B of the self-financed capital stock described in Appendix 2 (blue line) and the retained savings version of it, in which gross outflows are deducted from gross national saving in the numerator of the formula. This is the so-called retained savings-financing ratio (green line).

Source: Authors' calculations based on data from World Bank World Development Indicators database.

To analyze in more detail the overall effects of increased financial integration on domestic investment, consider a simple exercise extending the basic Feldstein-Horioka (1980) framework relating domestic investment to national savings to include how that relationship is affected by financial integration as measured by the index FI . We estimate the following equation relating investment I and national savings S (as a proportion of output Y) in Latin America and the Caribbean, where i denotes a country and t the year to which the observed variable is referred and $\varepsilon_{i,t}$ is the stochastic error term.³⁶

$$\frac{I_{i,t}}{Y_{i,t}} = \alpha_i + \tau_t + \beta \left(\frac{S_{i,t}}{Y_{i,t}} \right) + \gamma (FI_{i,t}) + \delta \left(\frac{S_{i,t}}{Y_{i,t}} \right) (FI_{i,t}) + \varepsilon_{i,t}$$

³⁶ This specification allows for time- and individual-fixed effects (α_i and τ_t).

The question is how financial integration affects investment, either directly as a separate factor (γ) or through the saving retention rate (β).³⁷

Financial integration ($FI_{i,t}$) is captured through two standard measures used in the literature: i) the Chinn-Ito index measuring *de jure* financial openness (i.e., lack of formal restrictions to the movement of capital flows across countries); and ii) the Lane and Milesi-Ferretti (2007) index of *de facto* financial openness (i.e., the sum of foreign assets and liabilities as a share of GDP), which encompasses *de jure* considerations concerning financial openness as well as easier financial conditions in the supply of foreign savings. In both cases, larger numbers indicate more openness.

Table 4. Impact of Financial Integration and National Saving on Domestic Investment in Latin America and the Caribbean

Regressors	De Jure	De Facto
Gross National Saving (GNS)	0.73 *** (0.10)	0.40 *** (0.04)
Financial Openness (FO)	3.39 ** (1.61)	0.84 * (0.47)
GNS * FO	-0.27 *** (0.08)	-0.04 (0.02)
Adjusted R-squared	0.63	0.60
Observations	527	527

Notes: Estimated using annual data (1981-2012) for a sample of 17 countries in the Latin America and the Caribbean region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Paraguay, Peru, Uruguay and Venezuela. Vertical bar shows the average gross national saving (as a percentage of GDP) for the countries in the sample. Estimation method: FMOLS.

Source: Authors' calculations based on methodology of Cavallo and Pedemonte (2016).

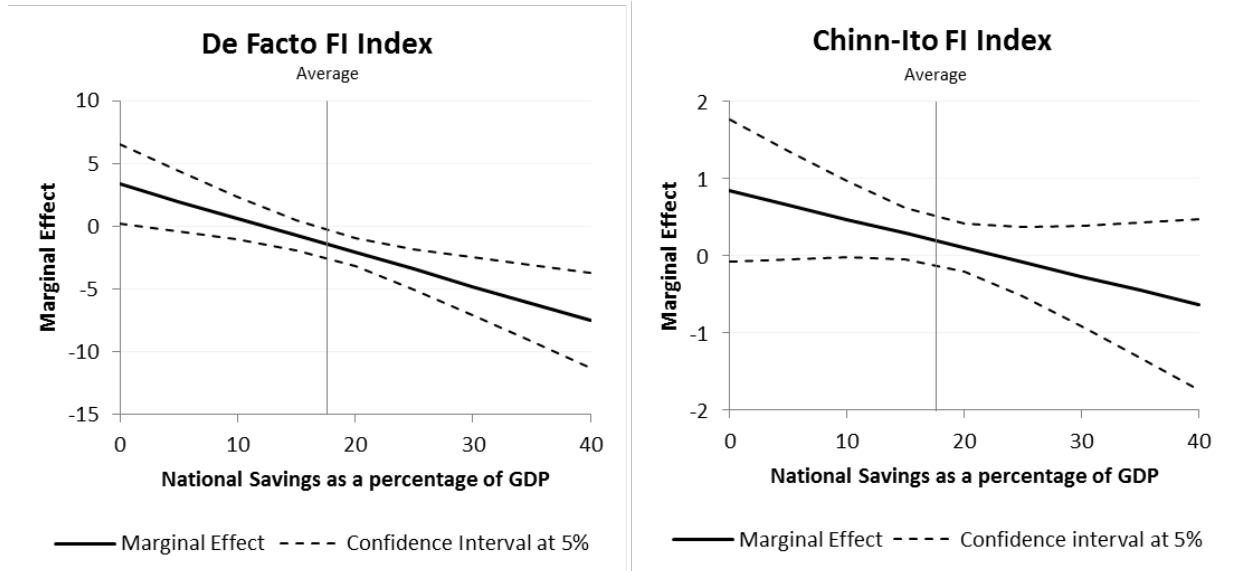
³⁷ Some authors argue that this kind of estimation method would yield a bias so that the savings retention rate is overestimated. To the extent that financial integration does not affect that bias, the analysis would remain valid.

The statistical exercise can be used to estimate the effect of financial integration on domestic investment, $\gamma + \delta \left(\frac{S_{i,t}}{Y_{i,t}} \right)$, which may depend on national savings. In Table 4 we present the results of this exercise for both measures of financial openness. In the same line as the literature, national saving appears to be positively correlated to investment, although not with a one-to-one relationship. Regarding financial openness, the results suggest it has on average a positive direct effect on investment and a negative indirect effect on it through the interaction with national savings. This is consistent with the idea of more financial integration crowding out national saving through increasing flows of foreign saving. The net effect of financial integration on investment would then depend on the level of the national saving rate.

Figure 12 plots the estimated marginal response of investment to financial integration as a decreasing function of national saving.³⁸ This implies that financial integration has a relatively higher impact on investment in countries when national saving rates are lower. In other words, financial integration appears to be more helpful when national savings are weak. However, at the average levels of national saving observed in LAC countries (i.e., less than 20 percent of GDP) the investment impact of financial integration is not statistically different from zero. Based on this evidence, its investment effect is negligible.

³⁸ This assumes that national savings remain constant as financial integration deepens. This no-crowding-out assumption may be optimistic to the extent that financial integration brings lower domestic interest rates.

Figure 12. Impact of Financial Integration on Investment in Latin America and the Caribbean



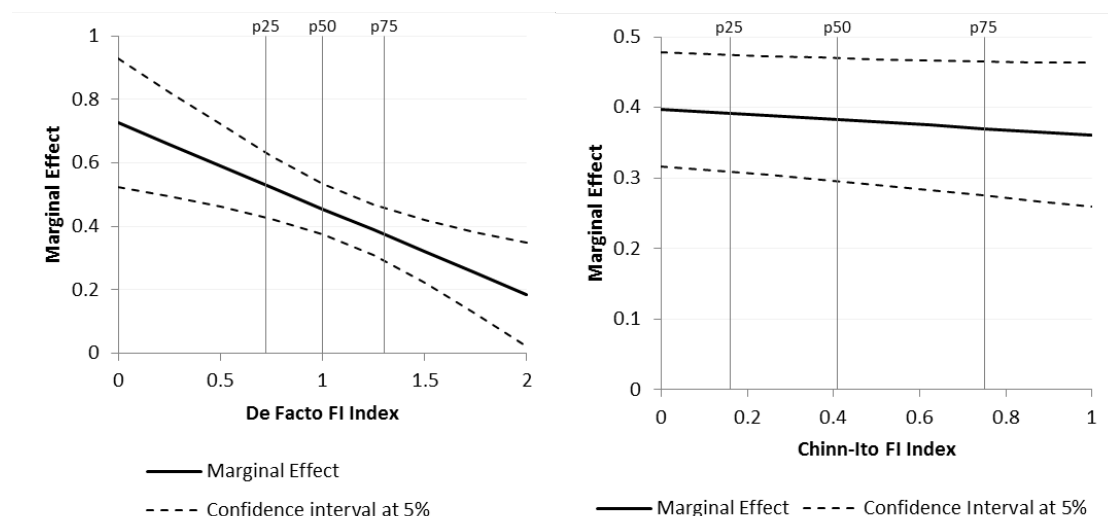
Note: Figure shows the estimated impact (marginal effect) of financial integration on investment with corresponding confidence intervals. Estimated using annual data (1981-2012) for a sample of 17 countries in the Latin America and the Caribbean region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Paraguay, Peru, Uruguay and Venezuela. Vertical bar shows the average gross national saving (as a percentage of GDP) for the countries in the sample. Estimation method: FMOLS. *Source:* Authors' calculations based on methodology of Cavallo and Pedemonte (2016).

The estimation above does not provide evidence of a strong *investment* response of financial integration in Latin America and the Caribbean. In addition, if greater financial integration is not matched with appropriate policies and regulations to keep exposure to macroeconomic risk under control and increases macroeconomic risks as highlighted in this paper, then the net result of the trade-off between more investments vs. higher risk could even be negative. The steady advance of financial integration over the past 20 years in the region, coupled with the equally steady increase in the index of macroeconomic risk shown in Figure 10—especially when changes in composition are left aside—is a warning sign.

It is clear that more financial integration is beneficial when soundly managed. Even then, it is important to recognize that financial integration is far from a cure and stronger national saving remains the key to faster and sustainable growth. The statistical analysis above can also be used to demonstrate this conclusion.

Figure 13 plots the estimated impact of national saving on domestic investment, $\beta + \delta(FI_{i,t})$, which varies with the level of countries' financial integration (along with statistical confidence bands).

Figure 13. Impact of National Saving on Investment in Latin America and the Caribbean



Note: Figure shows the estimated impact (marginal effect) of national saving on investment with corresponding confidence intervals. Estimated using annual data (1981-2012) for a sample of 17 countries in the Latin American and the Caribbean region: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Paraguay, Peru, Uruguay and Venezuela. Vertical bar shows the average gross national saving (as a percentage of GDP) for the countries in the sample. Estimation method: FMOLS.

Source: Authors' calculations based on methodology of Cavallo and Pedemonte (2016).

National saving is a statistically significant factor: the higher the level of financial integration, the lower the estimated impact of an increase in the national saving rate on investment. Its quantitative effect, however, is limited. Within the range of the distribution of financial integration for countries in the LAC region (i.e., the relevant interval in the x-axis for each indicator indicated with vertical lines), the estimated saving retention coefficient remains positive with high statistical certainty. Therefore, national saving continues to constrain domestic investment even at high levels of financial integration. Put differently, financial integration helps to relax the national savings constraint, but it remains true that stronger national saving would yield higher investment. Better financial integration does not appear to be a game changer.

6. Conclusions

National and foreign savings are not good substitutes. Foreign savings only partially redress the investment shortfall due to restricted national savings. Furthermore, the absorption of foreign saving can increase macroeconomic risks because foreign liabilities increase the probability of external crises, while national saving does not. These crises in turn can end up deterring investment and growth. Foreign savings are therefore a limited and risky remedy for sustaining investment, and financial markets may fail to dose correctly. Sound policies supporting national saving would support faster and more sustainable growth.

For a given level of domestic investment, higher national saving reduces the demand for absorbing net foreign saving, which for most countries in Latin America and the Caribbean represents a crisis risk factor that is again on the rise. A slower accumulation of foreign liabilities would reduce risks. Even if national saving is partly diverted abroad through capital outflows, external assets accumulated in the process would provide better protection against external crises.

It is important to note, however, that different types of foreign assets and liabilities have different impacts in terms of risk. In particular, debt-creating foreign liabilities generate more risk than equity, particularly long-term equity (FDI). It stands to reason that foreign financiers will prefer to invest long term and “sink in” equity in countries where locals are also willing to save. This implies higher national saving can work as an effective signaling device to support the absorption of “safer” forms of foreign saving. At the same time, liquid foreign assets that can be easily repatriated, including international reserves, are effective protection against risk. The risk improvement brought about by higher national saving would crucially depend on the composition of the external portfolio adjustment: countries with the riskiest liabilities and safest assets would stand to gain the most.

Unfortunately, international financial integration is not proving to be an effective cure for low national saving. Deeper financial integration facilitates international portfolio diversification and can help to reduce crisis risk because the accumulated foreign assets may be repatriated when foreign investors pull out. At the same time, however, such integration may bring even larger amounts of risky foreign liabilities and magnify the effects of unsustainable macroeconomic policies through capital flight. Importantly, the evidence suggests that the investment impact of financial integration is small and that national savings continues to be a

strong constraining factor for investment, so it would be unwise to pin too much hope on rising financial integration. While deeper international financial integration is clearly a welcome development within a sound macroeconomic policy framework, even in the best of circumstances it does not appear to be a game changer. Policies supporting strong national savings remain key for robust growth.

Appendix 1. Country List and Groupings

The following is the list of countries and country groupings used in figures and tables in sections 1 to 3. The list of countries is the same as that of Catão and Milesi-Ferretti (2014), but the groupings are different in order to compare Latin America and the Caribbean with other country groups.

Advanced Economies	Emerging Asia	Other Emerging
Australia	China	Bulgaria
Austria	Hong Kong	Croatia
Belgium	Korea	Czech Republic
Canada	Taiwan	Egypt
Cyprus	Indonesia	Estonia
Denmark	Malaysia	Hungary
Finland	Thailand	India
France		Jordan
Germany	Latin America and the Caribbean	Latvia
Greece	Argentina	Lithuania
Iceland	Belize	Morocco
Israel	Brazil	Oman
Italy	Chile	Pakistan
Japan	Colombia	Philippines
Malta	Costa Rica	Poland
Netherlands	Dominican Republic	Romania
New Zealand	Ecuador	Russia
Norway	El Salvador	Serbia
Portugal	Guatemala	Slovak Republic
Singapore	Jamaica	South Africa
Slovenia	Mexico	Turkey
Spain	Panama	Ukraine
Sweden	Peru	
Switzerland	Uruguay	
United Kingdom	Venezuela	
United States		

Appendix 2. The Self-Financed Capital Stock (SFKS)

The self-financed capital stock at time t is the portion of a country's capital stock (KS) that can be accounted by national savings, accumulated and appropriately depreciated over time. We can denote an 'ideal' formula for SFKS at the end of period t as

$$\widehat{SFKS}_t = \sum_{i=1}^{\infty} GNS_{t-i} \prod_{s=t-i+1}^t (1 - \delta_s) + GNS_t,$$

where GNS is gross national saving in constant local currency unit (LCU) and we are allowing the depreciation rate δ_t to change over time. As it is impossible to have in practice a series of infinite annual observations for GNS and depreciation rates, we have to rely on approximated measures of SFKS. Next, we define three different computable measures with different methodologies and data sources, but theoretically equivalent. All of them are proxies for the stock generated by flows of gross national saving.

Aizenman, Pinto and Radziwill (2007) define a related concept: the Self-Financing Ratio (SFR). The SFR is the self-financed capital stock (SFKS) at time t over total capital stock (KS), or:

$$SFKS_t = SFR_t \cdot KS_t$$

Using the methodology of Aizenman, Pinto and Radziwill (2007),³⁹ the first measure of the SFKS (SFKS (A)) is defined as follows:

$$SFKS(A)_t = \sum_{i=1}^n GNS_{t-i} (1 - \delta)^{i-1} + kY_{t-n}(1 - \delta)^n,$$

where the SFKS at all times t is calculated using a back-casting horizon of n periods,⁴⁰ and assuming a constant depreciation rate δ and a fixed KS/GDP ratio k .⁴¹ In this approach, national

³⁹ Actually, it equals the numerator of their formula for computing the self-financing ratio, computed and plotted in Figure 4.

⁴⁰ It means that we cannot compute it for the first 10 years of data. The benefit of doing so is that each observation of $SFKS(A)$ is calculated with the same amount of cumulated observations of GNS. So, if there is a bias related with using a constant depreciation rate, at least each observation is equally biased and then the series' trends should not be affected.

⁴¹ It can be easily shown that the assumption of the initial SFKS in $t-10$ does not have a significant impact on that of t . Using a constant depreciation rate of 10 percent, only 38.7 percent of the initial capital stock is still available at time t .

savings are accumulated over periods of 10 years with a constant depreciation rate $\delta = 0.10$ starting from assumed initial capital stocks (posited to be equal to 3 times annual output). This is a traditional permanent inventory method with a constant accumulation horizon to ensure uniformity across time.

The second approach to produce SFKS (B) is more data-demanding but requires less stringent assumptions. SFKS (B) is defined as:

$$SFKS(B)_t = SFKS(B)_0 \prod_{s=1}^t (1 - \delta_s) + \sum_{i=1}^{t-1} GNS_i \prod_{s=i+1}^t (1 - \delta_s) + GNS_t,$$

where an assumption⁴² is made for $SFKS(B)_0$. This alternative proxy takes advantage of the greater availability of data on capital stocks since the release of the Penn World Tables 8.0 database to relax the assumptions on depreciation rates and initial capital stocks. In particular, depreciation rates over time are derived from the series on investment and capital stock from the PWT database. This method yields greater variation in the SFKS across countries and time.

Finally, a third measure, SFKS (C), is obtained as the difference between the capital stock estimated by PWT and net foreign liabilities as estimated by Lane and Milesi-Ferretti (2007, updated 2014). This measure of net foreign liabilities results from the accumulation of foreign savings appropriately depreciated and valued. This measure of self-financed capital stock ensures that when added to this measure of foreign-financed capital stock they add up to total capital stock.

$$SFKS(C)_t = KS_t - NFL_t$$

⁴² As in $SFKS(A)$, we do not want our measure to be significantly “more biased” at the beginning of the sample than at the end of it. Then, we also sacrifice the first 10 years of data on GNS in order to get a good enough initial observation of $SFKS(B)$, as follows: $SFKS(B)_0 = SFKS(B)_{-10} \prod_{s=-10}^0 (1 - \delta_s) + \sum_{i=-9}^{-1} GNS_i \prod_{s=i}^0 (1 - \delta_s) + GNS_0$, where non-positive subscripts denote years previous to the official beginning of our sample, which are used to get our first observation of SFKS. For $SFKS(B)_{-10}$, we assumed it to be a fraction of the capital stock at that year, being that fraction a proxy of the corresponding $SFR(B)_{-10}$. As we do not have previous data on GNS to compute it, we computed for each country a previous iteration of the series of SFR from time -10 to 0, where $SFR(B)_0^{-1} = SFKS(B)_0^{-1} / KS_0$ (the superscript meaning it corresponds to the previous iteration), and where $SFKS(B)_0^{-1}$ is computed as $SFKS(B)_0$, but using $SFKS(B)_{-10}^{-1} = 0.9 KS_{-10}$, 0.9 being the average SFR in the Aizenman, Pinto and Radziwill (2007) sample. Then, we used $SFR(B)_{-10} = SFR(B)_0^{-1}$ as an estimation, which is not too bad as the SFR changes very slowly.

We perform the first iteration of the SFR in order to get for each country a more precise estimation than directly using 0.9. Although it might still be far from precise, it is just an estimation for year -10, which implies that our methodology still allows the $SFKS(B)$ 10 years to get rid of any initial bias before entering the sample.

The three measures of SFKS are conceptually equivalent. If no assumptions were made regarding $SFKS_0$, k and δ , the three proxies would be exactly the same. However, assumptions have to be made because of data restrictions. We explored as many alternatives as possible in order to minimize the chance of obtaining results driven by the construction of the SFKS. Measure A uses only data on GNS,⁴³ which are broadly available; to compute k we follow Aizenman, Pinto and Radziwill (2007). They assume k is constant and equal to 3. This is so because, when the study was done, data on capital stock were not as broadly available. Also, they assume a constant depreciation rate $\delta = 0.10$ across both time and countries. This is a very good use of the available data, but it implies some obvious shortcomings, especially if we aim to focus on the SFKS instead of the SFR. For measure B, we take advantage of the availability of data on KS⁴⁴ not only for the assumption on the initial level of SFKS but also for deriving the depreciation rates implicit in the series on investment and KS. This allows us to have variation across countries and time, which is a consequence of the respective different distributions of KS among asset types. Finally, with respect to measure C, its computation is pretty straightforward, using data on foreign savings⁴⁵ to arrive at a simple approximation to the actual SFKS. However, we are aware of the inconvenience of mixing data with different methodologies, and that is why we do not rely on only one way of measuring the national counterpart of external savings.

⁴³ In our calculations, as in Aizenman, Pinto and Radziwill (2007), data on GNS come from the World Bank World Development Indicators database. However, as our focus is the SFKS, we compute constant GNS using the investment deflator and current GNS in order to get a series of constant GNS that reflects the goods-producing value of the SFKS. On the other hand, Aizenman, Pinto and Radziwill (2007) use the constant GNS provided in the WDI database, which is based on the consumption deflator. This is not a problem for them as long as they are focusing on the SFR and the deflator used in both the numerator, and the denominator is not as relevant as in our case.

⁴⁴ Data on capital stock in constant local currency unit are obtained from Penn World Tables 8.0 database.

⁴⁵ Data in current U.S. dollars from Lane and Milesi-Ferretti's External Wealth of Nations database.

Appendix 3. Robustness Exercises

The main findings of the probit regressions in Sections 3 and 4 are the following:

Findings from Table 1

1. Higher net foreign liabilities (as a share of GDP) increase the risk of external crisis.
2. In contrast to net foreign liabilities, the self-financed capital stock appears to be largely neutral.
3. The self-financed capital stock carries much less or no risk. National saving is thus a safer source of investment financing along this dimension.

Findings from Table 2

4. Gross foreign liabilities increase the probability of crisis, while foreign assets appear to reduce the risk of crisis.
5. A dollar of foreign assets appears to more than offset the risk generated by a dollar of foreign liabilities.
6. Self-financing carries little or no risk.

Findings from Table 3

7. On the liabilities side, external crisis risk rises as the composition of gross external liabilities is tilted towards debt liabilities.
8. The risk associated with the self-financed capital stock remains negligible compared to the risk associated to external debt⁴⁶ liabilities.
9. Concerning external assets, those that are more easily sold (i.e. portfolio equity assets, reserve assets, and debt assets) are the ones that reduce the risk of external crises. By contrast, FDI, the least liquid of the four, has no such insurance value.

These findings have been validated through diverse robustness exercises, which are described in the following sections.

Robustness to Crisis Definition

Table A1 shows a list of the definitions of crisis used in our exercises. Row A contains the external crisis definition used in our baseline exercises in Section 3, while the following rows show the crisis variables used in the robustness exercises. Table A2 synthesizes the results of the robustness exercises in which the previous crisis definitions are used. Each numbered column

⁴⁶ This paper refers to external liabilities in general, while the result might be more accurately described stressing the relative negligibility versus debt liabilities.

represents one of the findings stated in the previous section, and it is marked with an X⁴⁷ if found to be robust within each definition of crisis.

Table A1. Crisis Variables and Sources

Reference	Crisis Definition	Authors/Source	
		Authors	Source
A	External Crisis	Catao & Milesi Ferretti	Sent by the authors
B	Systemic Banking Crisis	Laeven & Valencia	Downloaded from web
C	Currency (nominal) Crisis	Laeven & Valencia	Downloaded from web
D	Sovereign Debt Crisis	Laeven & Valencia	Downloaded from web
E	Currency (real) Crisis	Catao & Milesi Ferretti	Constructed by us based on their definition
F	Currency (real) Crisis & Recession	Catao & Milesi Ferretti	Constructed by us based on their definition
G	External Crisis & Recession	Catao & Milesi Ferretti	Constructed by us based on their data
H	GDP (per capita) Collapse	Barro	Constructed by us based on their definition

Table A2. Results of Robustness Exercises to Crisis Definition⁴⁸

Reference	Crisis Definition	Robustness of findings								
		1	2	3	4	5	6	7	8	9
A	External Crisis	X	X	X	X	X	X	X	X	X
B	Systemic Banking Crisis	X	X	X	X		X	X	X	
C	Currency (nominal) Crisis	X	X	X	X	X	X	X	X	X
D	Sovereign Debt Crisis	X	X	X	X	X	X	X	X	
E	Currency (real) Crisis	X	X	X	X	X	X			
F	Currency (real) Crisis & Recession	X	X	X	X	X	X	X	X	X
G	External Crisis & Recession	X	X	X	X	X	X	X	X	X
H	GDP (per capita) Collapse	X	X	X	X		X	X	X	

Several observations can be made regarding these results:

- B5: Coefficient on assets is smaller than that on liabilities.
- B9: Among assets, only debt assets have a significant coefficient.
- D7: Portfolio Equity Liabilities have a negative and significant coefficient, which rather than interpreted as being protective should be understood as a predictor of currency stability, as foreign investors would be willing to invest

⁴⁷ Results are found to be robust when the correspondent coefficients are significant at 10 percent in at least one of the three versions of SFKS and the finding is not contradicted by opposite and significant coefficients in any of the three versions of SFKS.

⁴⁸ Outputs of regressions are available from the authors upon request.

more in local currency-denominated stocks the less likely is this currency to suddenly depreciate.

- D9: Only debt assets have a significant coefficient (among asset types).
- E7-9: Only reserve assets have significant coefficients and then are found to be protective.
- H5: Although they are almost equal, the coefficient on assets is smaller than that of liabilities.
- H9: Only Portfolio Equity Assets are found to be protective.

Robustness to Variable Omission, Sample and More

The outcomes of some extra robustness exercises are presented in Table A3, where it can be seen how the main results are robust in general.

Table A3. Results of Various Robustness Exercises⁴⁹

Reference	Changes versus Baseline Model	Robustness of findings								
		1	2	3	4	5	6	7	8	9
A	Baseline	X	X	X	X	X	X	X	X	X
B	Sample B: 71 CMF + 7 countries	X	X	X	X	X	X	X	X	X
C	Sample C: 71 CMF + T&T, HK, Paraguay - Panama	X	X	X	X	X	X	X	X	X
D	Non-smoothed GDP	X	X	X	X	X	X	X	X	X
E	Without advanced economies	X	X	X	X	X	X	X	X	
F	Control: De facto financial integration (Lane & MF)*	X	X	X	X	X	X	X	X	X
G	Control: CAB (2-year MA)	X	X	X	X	X	X		X	X
H	Control: Fiscal gap (Catao & MF definition)	X	X	X	X	X	X		X	X
I	Control: Composition of Savings (Market Cap, Credit)	X	X	X	X	X	X		X	X
J	Not controlling for Total World Crisis	X	X	X	X	X	X	X	X	X
K	With time fixed effects	X	X	X	X	X	X	X	X	X

Notes: CMF = Catão and Milesi-Ferretti (2014); Lane & MF = Lane and Milesi-Ferretti (2007).

* It is a global control, in the sense that it is computed for each year as the sample average of Total Assets plus Total Liabilities, over GDP trend.

⁴⁹ Outputs of regressions are available from the authors upon request.

Several observations can be made regarding these results:

- E9: Portfolio Equity Assets are no longer found to be protective—probably due to a sample reduced by more than a half—and FDI Assets are found to be risky (or at least a predictor of crisis).⁵⁰
- G7 & H7: When using version 3 of SFKS, FDI Liabilities appear to be riskier than Debt Liabilities.
- I7: Coefficient on Portfolio Equity Liabilities, even though less significant, is greater than that of Debt Liabilities.

Another exercise involved computing alternative measures of net foreign liabilities conforming to the methodologies A and B used for the self-financed capital stock (using foreign saving as argument –instead of national saving– obtained as the difference between domestic investment and national saving), yielding very similar results to those in Table 1.

Robustness to Model Specification

While Catão and Milesi-Ferretti include in their regressions the net components of Net Foreign Liabilities, we use the gross components for the reasons discussed in Section 4.2. Here we present some statistical evidence supporting the relevance of this differentiation between the asset and the liability side of each component.

In order to check the hypothesis of equality of coefficients of each component of NFL, we run for completeness both Wald tests and Likelihood Ratio (LR)⁵¹ tests for each version of SFKS, with the following restrictions:

- Debt Liabilities = - Debt Assets
- FDI Liabilities = - FDI Assets
- Portfolio Equity Liabilities = - Portfolio Equity Assets

⁵⁰ From this result and some results obtained in regressions with interaction terms for Advanced Economies (not reported here), it seems to be that FDI Assets are risky for Emerging Economies while being protective for Advanced Economies, or at least correlated with crisis in opposite directions depending on the country group, which explains FDI Assets' statistical insignificance in the full sample.

⁵¹ As we compute in our baseline regressions robust standard errors clustered at country level, it is not possible to run the LR test for this specification. So, we compute all regressions without robust standard errors to be able to run the LR test, results that turn out to be very similar to the former ones, driving to the same findings stated at the beginning of this appendix.

This comparison of restricted and unrestricted models is equivalent to comparing a model with gross components as regressors versus a model using the net components, as in Catão and Milesi-Ferretti (2014). The results are presented in Table A4, showing the level at which the null hypothesis of simultaneously equality of coefficients has been rejected, if so.

Table A4. Wald and Likelihood Ratio Tests of Simultaneous Equality of Coefficients

Test	Version of SFKS		
	(1)	(2)	(3)
Wald	Not Rejected	10%	5%
LR	1%	1%	1%

As shown, in the vast majority of the exercises we found statistical evidence supporting the hypothesis that gross decomposition adds relevant information versus the net decomposition. In the only case in which the null hypothesis could not be rejected, the p-value of the associated Chi statistic was 0.12, pretty close to rejection.

We also run individual tests on coefficients, testing a variety of hypothesis. Their outcome is summarized in Table A5, showing for each model and hypothesis the significance level at which the null hypothesis of equality of coefficients was rejected.

Table A5. Wald Tests of Individual Equality of Coefficients

#	Model Hypothesis	Without SFKS	SFKS A	SFKS B	SFKS C
1	NFL = SFKS	-	1%	1%	1%
2	TFA = - TFL	5%	5%	5%	5%
3	SFKS = TFL	-	1%	1%	1%
4	SFKS = TFA	-	1%	1%	1%
5	PEA = - PEL	5%	5%	5%	1%
6	FDIA = - FDIL	Not rejected	Not rejected	Not rejected	Not rejected
7	DA = -DL	Not rejected	Not rejected	Not rejected	Not rejected
8	DL = PEL	Not rejected	Not rejected	Not rejected	Not rejected
9	DL = FDIL	10%	5%	Not rejected	Not rejected
10	PEL = FDIL	Not rejected	Not rejected	Not rejected	Not rejected
11	DA = PEA	5%	5%	5%	5%
12	DA = FDIA	10%	5%	Not rejected	Not rejected
13	DA = FXR	Not rejected	Not rejected	Not rejected	10%
14	PEA = FDIA	5%	5%	5%	5%
15	FXR = PEA	5%	5%	10%	10%
16	FXR = FDIA	5%	5%	1%	1%

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