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VULNERABILITY TO CHANGES IN EXTERNAL FINANCING DUE TO GLOBAL FACTORS*

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Abstract

Stops or reversals of foreign capital inflows can result in costly current account adjustments unless they are offset by other forms of external financing, such as capital inflows driven by a retrenchment of domestic investors. In this paper we propose a measure of vulnerability that differentiates between countries that have experienced this compensatory effect, and thus are more resilient to changes in external financing, and those that are more vulnerable, where declines in foreign capital inflows lead to current account adjustments. Then, we compare the impact on GDP growth and real exchange rates during episodes of strong capital flow fluctuations in both resilient and vulnerable economies. In the case of surges of capital inflows, we find that vulnerable economies experience higher increases in economic growth and real exchange rate appreciations compared to more resilient ones, while during sudden stops, they suffer higher exchange rate depreciations. In addition, we explore policy and structural determinants of our metric of vulnerability to external financing. We find that economies that are less financially open and have lower credit rating and net foreign assets tend to be more vulnerable to reversions of foreign investment.

Resumen

Las reversiones en las entradas de capital extranjero pueden tener como consecuencia un ajuste costoso en el déficit de cuenta corriente a menos que éstas sean compensadas por otras formas de financiamiento, tales como la repatriación de capitales por parte de residentes. Este trabajo propone una medida de vulnerabilidad que distingue entre países que han exhibido este mecanismo compensador, por lo que se consideran resilientes a cambios en el financiamiento externo, y aquellos vulnerables donde caídas en la inversión extranjera están acompañadas de un ajuste en la cuenta corriente. A continuación, se compara el impacto de eventos de volatilidad extrema de capitales sobre economías resilientes y vulnerables en términos de los efectos sobre el crecimiento del PIB y el ajuste del tipo de cambio real. Se encuentra que ante entradas masivas de capital externo las economías más vulnerables crecen más y se aprecian más que las economías resilientes, mientras que durante caídas extremas en las entradas brutas (sudden stops) estas economías se deprecian más. Adicionalmente, se exploran características de política y estructurales que diferencien a países resilientes de economías clasificadas como vulnerables, encontrando evidencia que economías con menor apertura financiera, peor rating crediticio y menor stock activos externos netos tienden a ser más vulnerables a cambios en el financiamiento externo.

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I. Introduction

Dealing with the volatility of foreign capital flows has been challenge for emerging economies. While free flow of capital can have widespread benefits, such as gains in productivity and growth derived from efficient resource allocation, it can also put at risk the financial stability of the recipient countries. Empirical evidence shows that massive surges in capital inflows, as in the pre-Asian crisis period, are associated with excessive credit growth, enlarged current account deficits, exchange rate appreciations and competitivity losses. The correction of this disequilibrium forces a painful adjustment once foreign capital flows reverse.

Recent developments have intensified these concerns. More restrictive liquidity conditions on international financial markets and the U.S. Federal Reserve's decision to taper its large-scale asset purchases was followed by capital outflows from emerging markets, particularly portfolio investment. This reversion might cause a painful adjustment unless it is compensated by other sources of funding such as repatriation of investment. Countries that experience this compensatory effect require smaller current account adjustments, and therefore are better prepared to face capital flow reversals due to global factors.

The purpose of this paper is to present evidence regarding this buffer mechanism against foreign capital inflow fluctuations. First, we identify countries where capital repatriation makes them resilient to foreign investment reductions due to a global shock. Then we analyze if this group of economies faces events of extreme capital fluctuations in a better way than countries that are more vulnerable to changes in external financing. In particular, we focus on the effect on economic growth and exchange rate. Finally, we look for factors that differentiate resilient and vulnerable economies, according to our measure.

The main contribution of this paper is to study how important is the compensating role of domestic investment repatriation while facing changes in external financing. The empirical literature on international capital flows started characterizing the trend and volatility of flows during normal and crisis periods.[1] Later studies have measured the economic consequences of episodes of extreme capital flow volatility[2], while others have explored the main determinants of those episodes.[3] With the exception of Cifuentes and Jara (2014) and IMF (2013), few papers have studied whether reversals in foreign capital inflows are offset by domestic investment repatriation. Cifuentes and Jara (2014) study events of capital repatriation during sudden stops in foreign investment. They find that more exchange rate flexibility and larger stock of assets abroad are associated with a higher degree of compensation of flows between residents and non-residents. Unlike that study, the work presented here does not differentiate between tranquil and crises times. Instead we analyze

[1] See Levchenko and Mauro (2007) and Sula and Willet (2009).
[2] Cowan and Raddatz (2013), Furceri et al (2011a), Furceri et al (2012), Gronn and Wallin Fredholm (2013).
[3] Broto et al (2011), Calderón and Kubota (2013), Edwards (2007), Forbes and Warnock (2012a and 2012b).

the compensatory effect of domestic capital flows during the whole period. Additionally, IMF (2013) proposes a metric that captures the compensatory role of resident capital flows which is similar to the measure presented here. Unlike IMF (2013), this paper considers changes in foreign capital inflows net of international reserves accumulation. Besides, we implement a statistical criterion for categorizing economies into vulnerable and resilient countries instead of splitting the sample in half. Furthermore, the estimation is performed on a quarterly frequency rather than annually. This represents a gain of information, because changes in quarterly data might not be reflected in the annual figures. Another difference is that this paper removes the effect of fluctuations in terms of trade that might cause changes in the current account balance that are not related to changes in foreign capital inflows. Additionally, this study focuses only on changes in foreign capital inflows in response to global shocks, excluding those cases where changes in investment flows are caused by domestic factors. Finally, in order to capture the effect of more volatile capital flows, we replicate the analysis excluding foreign direct investment.

We find that in the case of foreign capital surges, vulnerable economies experience higher increases in economic growth and real exchange rate appreciations compared to more resilient countries, while during sudden stops, they suffer higher exchange rate depreciations. In addition, we find that economies that are less financially open and have lower credit rating and net foreign assets tend to experience more painful adjustments in the current account when foreign investment reverses due to global shocks.

The structure of the paper is as follows. In the second section we propose a measure of vulnerability to changes in external financing which we estimate for 70 developed and emerging economies in a quarterly sample from 2000 to 2013. In the third section, we compare vulnerable and resilient economies according to their response to events of extreme capital flow volatility. The fourth section analyzes the determinants of that vulnerability. Finally, the fifth section concludes.

II. Vulnerability Measure of Changes in External Financing

In this section we propose a measure that identifies countries where capital repatriation serves as a buffer against foreign investment reversions due to a global shock. These countries are considered resilient to fluctuations in external financing: a reversal of foreign capital flows is accompanied by a small adjustment in the current account balance (CAD). This metric is derived from the balance of payment identity: foreign investment that enters the domestic market (gross foreign capital inflows net of the effect of international reserve accumulation) can be reflected in a larger current account deficit or in an increase in resident capital outflows:

$$(Capital\ inflows - Intl\ Reserves\ accum.) = CAD + Capital\ outflows \qquad (1)$$

Accordingly, a country is classified as vulnerable when capital inflows reductions are associated with current account deteriorations, since it might suffer a painful adjustment if these inflows are reversed. On the contrary, in a resilient economy a reversal in foreign investment is compensated with a change in the investment portfolio of domestic agents, who repatriate investment flows.

Additionally, our estimation controls for term of trade fluctuations (ToT), because they might cause movements in the current account that are not associated with changes in external financing.[4] We estimate the following regression for each country:

$$\left(\frac{CAD}{GDP}\right)_{it} = \alpha_i + \beta_i \left(\frac{Capital\ inflows - Intl\ reserves\ accum.}{GDP}\right)_{it} + \delta_i ToT_{it} + \varepsilon_{it} \qquad (2)$$

where β coefficient measures the sensibility of the current account deficit to changes in the external financing controlling for changes in term of trade. This estimation allows us to get one vulnerability parameter per country using a sample of 97 developed and emerging economies. Even though vulnerability can vary over time, we estimate an average vulnerability coefficient for the period 2000 to 2013. We use total gross inflows and, alternatively, foreign inflows excluding foreign direct investment (FDI).[5] We found 32 economies with non-significant coefficients (positive or negative) that are labeled as resilient to changes in external financing. The remaining 65 countries, with positive and statistically significant coefficients, are classified as vulnerable.

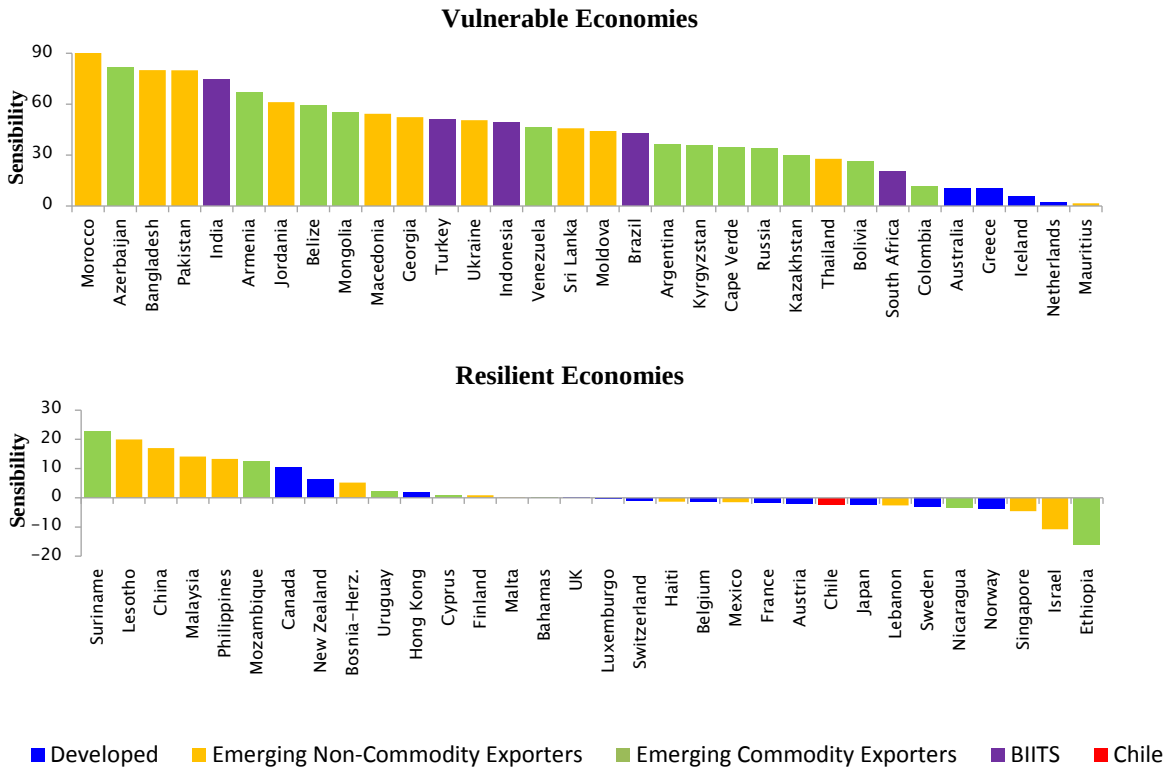
Moreover, the vulnerability to changes in external financing can be caused by pull or push factors. While the first factors are related to common global shocks, such as changes in risk appetite and in global liquidity, the second are country specific characteristics, such as risk rating and macroeconomic fundamentals. As the current shock of the Federal Reserve tapering policy is a global factor, this paper focuses only on economies whose vulnerability to changes in the external funding comes from such factors. In order to do that, we re-estimate **equation 2** instrumenting foreign capital inflows with variables that capture global shocks.[6] This procedure is applied for the 65 countries initially classified as vulnerable according to the first estimation. As result, we find 38 economies with positive and statistically significant re-estimated coefficients that are classified as vulnerable to changes in external financing due to global factors. The remaining 27 economies, with non-significant coefficients, are excluded from the analysis.

[4] We use a quarterly interpolation of annual terms of trade from UNCTAD as quarterly data is unavailable for most countries in the sample.

[5] Empirical literature finds that FDI flows (from residents and non-resident) are more stable (Forbes and Warnock (2012b), Levchenko and Mauro (2007), Sula and Willet (2009)) and that these flows are associated with higher economic growth (Aizenman et al, 2011).

[6] We choose VIX and Asian and European global EMBI as instrument variables. This estimation does not include terms of trade, as its effect is removed in the first stage.

Figure 1: Current Account Sensibility to Changes in Gross Capital Inflows due to Global Factors
(percentage, quarterly estimation by country, 2000-13)



Note: Kolmogorov-Smirnov between resilient and vulnerable economies p-value = 0.000
Sources: Authors' calculations based on IMF (IFS, WEO) and WDI

Figure 1 shows the two groups of economies: vulnerable and resilient economies to changes in capital inflows due to global factors. Chile belongs to the group of resilient economies, whereas other countries, such as Brazil, India, Indonesia, Turkey and South Africa belong to the group of vulnerable economies. However, it should be noted that we use this classification only to identify broad differences between the two groups of economies rather than precisely characterize any given country as more or less resilient.

III. Vulnerability Effects of Changes in External Financing

This section tries to characterize the consequences for an economy of being vulnerable to changes in external financing due to global factors. First, we compare vulnerable and resilient economies according to their sensitivity to financial shocks and their current account deficit. Then we compare the impact on GDP growth and real exchange rate during

episodes of massive fluctuations in capital flows in both resilient and vulnerable economies.

Table 1 compares the two groups of economies according to their sensibility to financial shocks, and the balance and standard deviation of their current account.[7] The first two columns present the median of each variable for the two sets of economies, while the third shows the p-value of the Kolmogorov-Smirnov test for comparing the differences between these two groups.[8] These results show that economies that are more vulnerable to changes in external financing are also more sensitive to global financial shocks, such as VIX and EMBIG. Additionally, this group of economies runs higher current account deficits and more volatile current account balances than resilient ones. These findings are consistent with IMF (2013).

Table 1: Effects of vulnerability to changes in the external financing

	Resilient	Vulnerable	Kolmogorov-Smirnov p-value
CDS Sensibility to VIX	2.5	15.7	0.000
CDS Sensibility to EMBIG	0.2	1.0	0.000
Current Account Balance (% GDP)	0.3	-2.5	0.066
Current Account standard deviation	2.7	3.7	0.027

Note: The third column tests the null hypothesis that both samples of countries come from the same distribution.
Source: Authors' calculations based on IMF (IFS and WEO), WDI.

Next we compare vulnerable and resilient economies according to their response to events of extreme capital flow volatility: bonanzas (when capital inflows increase rapidly) and sudden stops (when capital inflows suddenly slow). In particular, we focus on the effect on economic growth and exchange rate, estimating the following regressions:

$$Y_{it} = \alpha + \delta_i + \beta_V Vul_i + \beta_B Bon_{it} + \theta_B Bon_{it} \cdot Vul_i + \beta_S SS_{it} + \theta_S SS_{it} \cdot Vul_i + \beta_X{}' X_{it} + \varepsilon_{it} \quad (3)$$

where *Y* corresponds to the respective dependent variable (economic growth or exchange rate appreciation), *Vul* is the dummy variable for vulnerability, *Bon* is the dummy variable

[7] We use two alternatives proxies for sensibility to financial shocks: the sensibility of CDS to VIX and to EMBI global. To obtain these sensibility coefficients we run the following regressions over a quarterly sample from 2000 to 2013: $CDS = \mu_1 + \rho_1 VIX + v_1$ $CDS = \mu_2 + \rho_2 EMBIG + v_2$

[8] The null hypothesis of this test is that the two samples come from the same distribution. If null hypothesis is rejected, as in the case of the four variables analyzed, there is statistical evidence to support the idea that the two groups of economies are different.

for bonanzas, *SS* is the dummy variable for sudden stops, *X* is a matrix of variables commonly used in the literature, δ is the individual country effect that reflects the unobservable country heterogeneity, and ε is the error term. As control variables we include per capita GDP, financial and trade openness, exchange rate flexibility, interest rate spreads, economic growth of trading partners, fiscal balance and monetary aggregates. **Table 2** shows the results omitting the ones of the control variables, which are presented in the appendix. Each panel regression is estimated assuming a random effects model and the robust standard errors are adjusted by country level clusters. We do not consider time-specific effects since they are correlated with common foreign shocks such as the growth of the trading partners.

In the case of capital flow surges, we find that resilient economies do not experience significant changes in economic growth, whereas vulnerable countries grow more (1.0 pp). Results also show that during these episodes real exchange rate appreciates in both groups of countries, however, the effect is stronger in vulnerable economies (2.0 pp more).

Table 2: Effects of vulnerability to changes in the external financing during events of capital flow volatility

(extract of panel regressions, 1970 – 2010, %)

	Economic Growth	Exchange Rate Appreciation[+]
Vulnerability	0.001	0.006
	[0.006]	[0.013]
Bonanza	-0.012	1.195*
	[0.261]	[0.656]
Bonanza×Vulnerability	1.044**	1.956*
	[0.437]	[1.157]
Sudden Stop	-1.328**	0.446
	[0.583]	[1.824]
Sudden Stop×Vulnerability	0.242	-5.242*
	[1.413]	[3.125]
R^2	0.202	0.075
N° of Countries	70	70
N° of Observations	1324	1319

Note: [+] Increases indicate an appreciation of the real exchange rate. Extract of panel regressions with random effects and robust standard errors adjusted by country level clusters. Other explicative variables are omitted (see **appendix 1**). The dummy variable for vulnerability takes the value one if there is a positive and significant correlation between gross capital inflows instrumented with global variables and the current account deficit. The dummy variable for bonanza (sudden stop) takes the value of one if the annual increase (decrease) in net capital inflows is greater than its average plus (less) one standard deviation. Averages and standard deviations are calculated in 5 years rolling windows. Standard deviations in brackets. (*) p<0.1, (**) p<0.05, (***) p<0.01.

Source: Authors' calculations based on Chinn and Ito, IMF (AREAER, DOT, IFS, WEO) and WDI.

In the case of sudden stops, we find that both sets of economies exhibit similar decreases in economic growth (1.3 pp). In contrast, we do not find evidence that real exchange rate depreciates in resilient economies, while vulnerable countries suffer a significant real exchange rate depreciation (5.2 pp).

Related literature finds similar results, although they do not take into account the buffer mechanism of domestic capital repatriation. Empirical studies show that increases in the foreign capital inflows are related to overheating risks and excessive exchange rate appreciation (Gronn and Wallin Fredholm (2013), Furceri et al (2011a), Furceri et al (2012)).[9] On the other side, decreases in capital inflows are associated with declines in growth and exchange rate depreciation, especially in economies that are less financially developed (Calvo et al (2004), Cowan et al (2008), Cowan and Raddatz (2013)).

IV. Determinants of Vulnerability to Changes in the External Financing

In this section we look for factors of differentiation between resilient and vulnerable economies. In order to do that, we start by comparing both samples according to different factors. Then, we estimate a probit regression to find factors that jointly determine the probability of being vulnerable to changes external financing due to global factors.

The choice of determinants was based on two previous papers that study the compensatory mechanism between foreign and domestic investment inflows. In the first, IMF (2013) evaluates the differentiating characteristics of vulnerability to capital inflows using a graphical comparison for each variable. However, they do not include a joint statistical analysis of determinant factors. In the second, Cifuentes and Jara (2014) explore the determinants of the probability of capital repatriation during a sudden stop. Unlike that study, we do not differentiate between tranquil and crises times, analyzing the compensatory effect of domestic capital flows during the whole period. Additionally, this research is related to the sudden stop literature, because economies identified as vulnerable in this study, by definition, are exposed to events of extreme capital inflow reversals.

As our measure captures the cross-section differences of the average vulnerability to external financing over the sample period, we do not consider the role of cyclical factors as determinants of vulnerability.[10] Therefore, we explore policy and structural characteristics. As differentiating factors we choose exchange rate flexibility, financial and trade openness, net foreign assets (as percentage of GDP), stock of foreign direct investment (as percentage

[9] Moreover, these events come along with excess in credit, asset price bubbles and tendencies to experiment capital reversals in the future.

[10] A study of the evolution of vulnerability across time should include global cyclical factors, which are the main determinants of net and gross capital flows (Broto et al (2011), Forbes and Warnock (2012a and 2012b)). Domestic factors, such as current account deficit, real exchange rate appreciation, and credit and assets growth, should also be considered as determinants (Edwards (2007), Claessens and Kose (2013)).

of GDP), financial market depth and institutional quality. The exchange rate flexibility is measured as a dummy variable that takes the value of one if the economy has a flexible exchange rate regime and zero otherwise. Additionally, the exchange rate flexibility is reflected in the monetary independence variable, as economies with a managed exchange rate regime lose some control over its monetary policy. We use two measures of financial openness: Chinn and Ito's de-jure index and Milesi-Ferretti's de-facto ratio, calculated as the sum of external assets and liabilities as percentage of GDP. For financial depth, we use the stock of credit provided by banking sector over GDP. Finally, we include two variables that measure institutional quality: an institutional fragility index and the credit ranking.

Table 3: Determinants of Vulnerability of Changes in External Financing
(sample median)

	Resilient	Vulnerable	Kolmogorov-Smirnov p-value
Trade Openness (% GDP)	72.2	76.4	0.639
Financial Openness (Chinn-Ito)	1.0	0.4	0.000
Financial Openness (Milesi-Ferretti)	227.3	145.3	0.003
Exchange Rate Flexibility (% countries)	55.26	56.25	0.934[a]
Monetary Independence (Index)	0.47	0.50	0.766
Institutional Fragility (Index)	4.0	7.5	0.003
Credit Ranking (Index)	14.0	6.0	0.000
Credit (% GDP)	93.4	64.3	0.066
Net Foreign Assets (% GDP)	-11.9	-37.4	0.005
Stock of FDI (% GDP)	39.0	36.1	0.437

Note: [a] Pearson's chi-square p-value. Financial openness M-F, net foreign assets and FDI stock are calculated as the average between 2007 and 2011 of each variable. Trade openness is based on the last available data. Credit ranking is an index from 1 to 14, where lower values indicate worst S&P ratings. Monetary independence is measured as the reciprocal of the annual correlation between the monthly interest rates of the home country and the base economy. The third column tests the null hypothesis that both samples of countries come from the same distribution.
Source: Authors' calculations based on Center of Systemic Peace, Chin and Ito, IFS, S&P and WDI.

Table 3 compares the two groups of countries according to different policy and structural characteristics. The first and second columns show the median of each group of countries, while the third presents p-values that test the null hypothesis that both samples of countries come from the same distribution. We conclude that resilient economies are more financially

open (using both measures) and have a higher stock of foreign external assets, strong institutional framework, better credit ranking, and deeper financial markets. However, we cannot find significant differences between these two groups of economies in terms of trade openness, stock of foreign direct investment or exchange rate flexibility (using both measures).

Table 4: Probit Estimation of Vulnerability to Changes in the External Financing due to Global Factors

	De-Jure Financial Openness[+]				De-Facto Financial Openness[+]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade Openness	0.000	0.002	0.005	0.006	0.006	0.010*	0.009	0.012*
	[0.003]	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.006]	[0.006]
Financial Openness[+]	-1.597**	-2.050***	-1.774**	-1.750**	-0.001	-0.003**	-0.001	-0.002
	[0.649]	[0.739]	[0.754]	[0.784]	[0.001]	[0.001]	[0.001]	[0.002]
Monetary Independence	-1.189	-1.417	-1.447	-1.542	-0.638	-1.393	-0.633	-1.408
	[0.941]	[1.021]	[1.013]	[1.071]	[0.850]	[1.061]	[0.890]	[1.075]
Credit Ranking	-0.093**	-0.059	-0.087*	-0.061	-0.114***	-0.066	-0.122***	-0.072
	[0.046]	[0.053]	[0.047]	[0.054]	[0.044]	[0.051]	[0.045]	[0.053]
Net Foreign Assets (%GDP)		-0.005		-0.006		-0.007*		-0.007*
		[0.005]		[0.006]		[0.004]		[0.004]
Stock of FDI (%GDP)			-0.008	-0.011			-0.011	-0.011
			[0.008]	[0.010]			[0.010]	[0.012]
Constant	2.224***	2.096**	2.402***	2.094**	1.280*	1.086	1.363*	1.280
	[0.796]	[0.987]	[0.908]	[1.034]	[0.682]	[0.827]	[0.762]	[0.887]
Pseudo R2	0.276	0.334	0.326	0.353	0.246	0.310	0.265	0.322
N° of Countries	57	56	56	56	57	57	57	57

Note: [+] Columns 1 to 4 use the Chinn and Ito's de-jure index as financial openness variable, while, columns 5 to 8 use Milessi-Ferretti's de-facto measure. Net foreign assets and FDI stock are calculated as the average between 2007 and 2011 of each variable. Trade openness is based on the last available data. Monetary independence is measured as the reciprocal of the annual correlation between the monthly interest rates of the home country and the base economy. Credit ranking is an index from 1 to 14, where lower values indicate worst S&P ratings. (*) p<0.1, (**) p<0.05, (***) p<0.01. Standard deviations in brackets.

Source: Authors' calculations based on Center of Systemic Peace, Chin and Ito, IMF (AREAER, IFS, WEO), Milesi-Ferretti, S&P and WDI.

Next we estimate cross-section probit regressions to find factors that jointly determine the probability of being vulnerable. The dependent variable takes the value of one if the economy is vulnerable and zero otherwise (i.e. a resilient economy). **Table 4** shows the results of using our measure of vulnerability based on total gross inflows, while **appendix 2** replicates the analysis excluding foreign direct investment which is the more stable component of capital flows over time.

From the regression analysis we find that higher de-jure financial openness and better credit rating significantly decreases the probability of being a vulnerable economy. Nevertheless, using the de-facto measure of financial openness, results in weaker statistical significance depending on the specification chosen. Moreover, there is some statistical evidence that lower trade openness and higher stock of net foreign assets reduce the probability of being a vulnerable economy. We do not find that exchange rate flexibility reduces the probability of experiencing painful adjustments in the current account when foreign investment reverses due to global shocks.

Related literature finds similar results with some contrasts worth noting. First, while some papers also find that exchange rate flexibility does not significantly decrease the vulnerability to changes in capital flows (Calderón and Kubota, 2013), others conclude the opposite (Cifuentes and Jara (2013), Edwards (2007) and IMF (2013)). The source of this discrepancy can lie in the period analyzed. In general, papers that include the period before the nineties find that flexibility plays an important role. During this period many emerging economies experiencing financial disruptions had fixed exchange rate regimes.

Regarding financial openness and institutional quality, our results are consistent with the previous literature that find that these variables modify the composition of international capital flows towards more stable and productive sources, such as foreign direct investment (Furceri et al, 2011b). Nevertheless, while some papers conclude that a higher financial openness increases vulnerability (Calderón and Kubota, 2013, and Edwards, 2007), others find no relation (Forbes and Warnock, 2012a and 2012b). The lack of robustness in the literature could be explained by the existence of minimum levels of financial and institutional development. An economy that has not yet reached that minimum level would experience only risks until reaching the benefits associated to a greater financial openness (Kose et al, 2011).

Meanwhile, the evidence that lower trade openness tends to increase resilience, although weak, is consistent with findings of Broto et al (2011) and Calderón and Kubota (2013). On the other hand, the result for the stock of net foreign asset is consistent with Edwards (2007), Cifuentes and Jara (2014), and IMF (2013). Finally, the finding about the role of institutional quality matches IMF (2013) and Furceri et al (2011b).

V. CONCLUSIONS

Recent developments, such as more restrictive liquidity conditions on international financial markets and the U.S. Federal Reserve's decision to taper its large-scale asset purchases, have intensified the concerns about the effects of a reduction in capital inflows to emerging economies. To measure this issue this paper seeks to identify countries that might be vulnerable to stops or reversals of foreign capital flows. In order to do that, we

propose a measure that identifies countries where capital repatriation serves as a buffer against foreign capital flow reversions due to a global shock. We then compare the impact on GDP growth and real exchange rate of episodes of strong capital flow fluctuations in both resilient and vulnerable economies. Finally, we examine in more detail why some countries are more vulnerable. We look for policy and structural factors of differentiation between resilient and vulnerable economies according to our metric.

We conclude that vulnerable countries, according to our metric, are more sensitive to global shocks and exhibit higher and more volatile current account deficits. We also find that resilient economies do not experience significant changes in economic growth while facing a capital flow bonanza, while vulnerable countries grow more. Although real exchange rate appreciates in both groups of countries during these events, the effect is significantly stronger in vulnerable economies. In the case of sudden stops, we do not find evidence that real exchange rate depreciates in resilient economies, while vulnerable countries suffer a significant depreciation. In contrast, we find similar decreases in economic growth in both sets of countries.

Finally, we find that economies that are less financially open, and have lower credit rating and net foreign assets tend to experience more painful adjustments in the current account when foreign investment reverses due to global shocks. The implications of these results are that rather than trying to reduce the volatility of foreign investment trough capital controls a country should focus on building up a large stock of assets abroad that can buffer those inflows and lower the required real adjustment. Also a strong institutional framework can help enhancing the country's resilience to changes in external financing.

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APPENDIX 1

Effects of vulnerability to changes in the external financing during events of capital flow volatility

(percentage, 1970 – 2010)

	Economic Growth	Exchange Rate Appreciation^{+}
Real GDP Growth (t-1, %)		0.547**
		[0.219]
Log Per Capital Real GDP	-0.009*	0.027***
	[0.005]	[0.008]
Trade Openness (%GDP)	0.002	0.014
	[0.007]	[0.017]
Financial Openness (Chinn-Ito index)	-0.004	-0.007
	[0.005]	[0.011]
Exchange Rate Flexibility (dummy)	-0.002	-0.006
	[0.002]	[0.004]
Monetary independence (Chinn-Ito index)	-0.011*	0.022
	[0.007]	[0.025]
Monetary Policy Rate - Libor	-0.001***	0.000
	[0.000]	[0.001]
Term of Trade Growth (%)	0.013	0.054
	[0.014]	[0.051]
Trading Partners Real Growth (%)	0.637***	0.141
	[0.087]	[0.189]
Fiscal Balance (%GDP)	0.166***	-0.038
	[0.040]	[0.126]
M2 (% International Reserves)	0.000	0.002
	[0.000]	[0.001]
Vulnerability (dummy)	0.001	0.006
	[0.006]	[0.013]
Bonanza (dummy)	-0.012	1.195*
	[0.261]	[0.656]
Bonanza×Vulnerability	1.044**	1.956*
	[0.437]	[1.157]
Sudden Stop (dummy)	-1.328**	0.446
	[0.583]	[1.824]
Sudden Stop×Vulnerability	0.242	-5.242*
	[1.413]	[3.125]
Constant	0.057***	-0.123***
	[0.018]	[0.037]
R^2	0.202	0.075
N° of Countries	70	70
N° of Observations	1324	1319

Note: Panel regressions with random effects and robust standard errors adjusted by country level clusters. Income country level dummies are included in the estimation, but the output is omitted. The dummy variable for vulnerability takes the value one if there is a positive and significant correlation between gross capital inflows instrumented with global variables (VIX, regional EMBI) and the current account deficit. The dummy variable for bonanza (sudden stop) takes the value of one if the annual increase (decrease) in net capital inflows is greater than its average plus (less) one standard deviation. Averages and standard deviations are calculated in 5 years rolling windows. (*) p<0.1, (**) p<0.05, (***) p<0.01. Standard deviations in brackets.

Source: Authors' calculations based on Chinn and Ito, IMF (AREAER, DOT, IFS, WEO) and WDI.

APPENDIX 2
Probit Estimation of Vulnerability to Changes in non-FDI capital inflows due to Global Factors

	De-Jure Financial Openness+				De-Facto Financial Openness+			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade Openness	-0.002	-0.002	0.000	0.000	0.001	0.000	0.002	0.001
	[0.004]	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.005]	[0.006]
Financial Openness+	-1.356**	-1.789***	-1.558**	-1.622**	-0.001	-0.003	-0.001	-0.003
	[0.581]	[0.670]	[0.638]	[0.702]	[0.001]	[0.002]	[0.001]	[0.002]
Monetary Independence	-0.029	-0.369	-0.180	-0.525	-0.227	-0.542	-0.275	-0.642
	[0.420]	[0.462]	[0.442]	[0.515]	[0.420]	[0.462]	[0.434]	[0.487]
Credit Ranking	-0.074	-0.010	-0.057	0.007	-0.088**	-0.011	-0.088*	-0.003
	[0.045]	[0.057]	[0.047]	[0.062]	[0.045]	[0.059]	[0.045]	[0.061]
Net Foreign Assets (%GDP)		-0.008		-0.011		-0.009*		-0.010*
		[0.006]		[0.007]		[0.005]		[0.005]
Stock of FDI (%GDP)			-0.003	-0.010			-0.004	-0.009
			[0.007]	[0.013]			[0.009]	[0.013]
Constant	1.585***	1.247**	1.670***	1.270**	1.114**	0.853	1.149**	0.978*
	[0.495]	[0.591]	[0.515]	[0.604]	[0.479]	[0.553]	[0.503]	[0.589]
Pseudo R2	0.251	0.322	0.281	0.332	0.219	0.295	0.222	0.301
N° of Countries	56	55	55	55	56	56	56	56

Note: + As financial openness variable, columns 1 to 4 use the Chinn and Ito's de-jure index, while, columns 5 to 8 use Milessi-Ferretti's de-facto measure. Net foreign assets and FDI stock correspond to 2007-11 average of each variable. Trade openness corresponds to last available data. Monetary independence corresponds to reciprocal of annual correlation between monthly interest rate of the analyzed country and the base country. Credit ranking assigns low values for worst S&P ratings. Standard deviations in brackets. (*) $p<0.1$, (**) $p<0.05$, (***) $p<0.01$.

Source: Authors' calculations based on Center of Systemic Peace, Chin and Ito, IMF (AREAER, IFS, WEO), Milesi-Ferretti, S&P and WDI.

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