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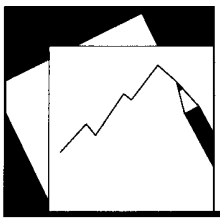

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Exchange Rate Flexibility and Credit during Capital Inflow Reversals:

Purgatory…not Paradise

Nicolas E. Magud and Esteban R. Vesperoni

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Prepared by Nicolas E. Magud and Esteban R. Vesperoni

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Abstract

We document the behavior of macro and credit variables during episodes of capital inflows reversals in economies with different degrees of exchange rate flexibility. We find that exchange rate flexibility is associated with milder credit growth during the boom but, even though smaller than in more rigid regimes, it cannot shield the economy from a credit reversal. Furthermore, we observe what we dub as a recovery puzzle: credit growth in economies with more flexible exchange rate regimes remains tepid well after the capital flow reversal takes place. This results stress the complementarity of macro-prudential policies with the exchange rate regime. More flexible regimes could help smoothing the credit cycle through capital surchages and dynamic provisioning that build buffers to counteract the credit recovery puzzle. In contrast, more rigid exchange rate regimes would benefit the most from measures to contain excessive credit growth during booms, such as reserve requirements, loan-to-income ratios, and debt-to-income and debt-service-to-income limits.

JEL Classification Numbers: F32, F41, E32.

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I. INTRODUCTION

Large capital inflows usually have an important impact on macroeconomic conditions—and in particular, on fluctuations in domestic credit. Capital inflows booms can finance investment and economic growth, and can also bolster the deepening of oftentimes shallow financial sectors. Banking sector credit usually expands and stimulates consumption. The volatility associated to these cycles, however, may pose significant macroeconomic challenges. Reversals in capital inflows could potentially result in credit busts and asset price deflation, with devastating effects on the macroeconomic conditions. Notably, the recent fluctuations in global risk aversion triggered by the Federal Reserve 'tapering' talk in 2013 are a reminder of the likelihood for reversals in large capital inflows. Consequently, these events strengthen the need for a proper debate about the policy framework and the corresponding policy mix needed to deal with large fluctuations in international capital flows. We tackle some of these issues here.

The impact of capital inflows bonanzas into the domestic credit cycle in emerging economies has prompted a renewed interest in academic and policy circles over recent years. This literature has shown that large capital inflows are associated with a deterioration in the current account, an appreciation of the real exchange rate, and oftentimes a rapid expansion in credit. The literature has also documented that large capital flows—especially those related to 'other non-portfolio investment' flows in the capital account—are good predictors of credit booms, and that these booms are more likely to end in credit crunches. More recently, Mendoza and Terrones (2008, 2012) and Magud et al (2011, 2014) looked at the role played by exchange rate flexibility in credit booms fueled by large capital inflows. The latter find that rapid expansions in domestic credit driven by large capital flows are particularly acute in less flexible exchange rate regimes; moreover, these regimes tilt the composition of domestic credit toward credit in foreign currency.

This paper contributes to the existing literature by looking at how economies with different degrees of exchange rate flexibility behave during capital inflows *reversals*. To this end, we construct a large data set comprising 179 countries for the period 1969–2012. Then, we use standard algorithms to identify reversal that are *conditional on following a bonanza in capital inflows*. This identification is the first contribution of the paper. In order to focus the analysis on (a more homogeneous group of) countries with relatively open capital accounts and access to international private capital flows, we then narrow our sample to emerging economies during the last 25 years, identifying about 130 reversal events. The second contribution is to document stylized facts during +5/-5-year windows centered in the reversals, and focus on differences between economies with relatively fixed and flexible exchange rate regimes. The last technical contribution results from running panel regressions to assess the specific role played by the flexibility of the exchange rate during capital inflows booms and reversals, controlling for a number of macroeconomic factors. The findings are then used to discuss potential policies to mitigate the effects of credit fluctuations that are driven by capital flows cycles.

All in all, the buffering role played by exchange rate flexibility during credit cycles looks like a ticket to purgatory, but no entrance to paradise. In effect, our results suggest that exchange rate

flexibility helps containing banking credit growth compared to more rigid exchange rates during capital inflows booms. Yet, the fall in credit growth in economies with more flexible exchange regimes suggests that flexibility cannot fully shield the economy during the reversal, even though the fall in credit growth rates are more modest than in fix regimes. Furthermore, we observe what we dub as a recovery puzzle: credit growth in more flexible exchange rate regimes remains tepid well after the capital flow reversal takes place.

Our findings suggest that flexible exchange rate regimes could be complemented by macro-prudential policies to smooth credit cycles—which could potentially raise systemic financial risks—during capital flows booms and reversals. It is often acknowledged that macro-prudential policies may find it challenging to control credit growth during booms. Comparatively, these policies seem to be more effective in building buffers to help the economy avoid a crunch in banking sector credit when—for whatever reason—the credit cycle reverses after the boom. Exchange rate flexibility can keep credit growth relatively at bay during bonanzas, and it could be complemented by measures like capital surcharges or countercyclical provisions during the credit expansion phase. By building buffers, these macro-prudential instruments can help deal with the recovery puzzle experienced by flexible exchange rate regimes during reversals. On the other hand, measures aimed at containing excessive credit growth—such as debt-to-income, debt service-to-income, and loan-to-value ratios, or reserve requirements—seem to be very relevant in the context of less flexible exchange rate regimes, as credit tends to grow faster than in more flexible exchange rate arrangements.

The importance of understanding the dynamics of capital flows cycles and the optimal policies to deal with them could not be timelier. Expansionary monetary policies in advanced countries have had significant spillovers from low international interest rates in emerging economies. These spillovers have been strong this time around because advanced economies have maintained exceptionally expansionary monetary policies—including unconventional measures embedded in the multiple quantitative and credit easing initiatives—for a longer period of time than in past "normal" business cycles, as these are external financing cycles. And given that the withdrawal of these unconventional monetary policies has recently started—even if at a slow rate—, discussing the appropriate policy responses in emerging markets becomes critical.

The paper is organized as follows. The next section presents a short literature review of some recent contributions. Section III describes the construction of the data set, while Section IV identifies the episodes of reversals in capital flows. Section V presents the stylized facts, which are tested through panel estimations in Section VI. Against this backdrop, Section VII discusses the policy implications and Section VIII concludes.

II. Selected (Recent) Literature Review

There is a growing literature focusing on the macroeconomic impact of capital inflows bonanzas in emerging economies, and in particular on the relationship between capital flows and credit booms. Cardarelli et al (2009), Elekdag and Wu (2011), and Forbes and Warnock (2012) document the

macroeconomic dynamics during capital flows surges. They notice the presence of real exchange rate appreciations and growth accelerations, which are forced into an abrupt reversal when capital inflows retrench. Mendoza and Terrones (2008, 2012) identify episodes of credit booms, and show that they are usually accompanied by large capital flows. In related work, Calderon and Kubota (2012) show that surges in capital inflows are good predictors of credit booms, particularly if driven by non-portfolio investment inflows, and that these credit booms are more likely to end in a crisis.

Some recent work has also focused on the role played by exchange rate flexibility in banking sector credit during capital inflow bonanzas. Magud et al (2011, 2014) document evidence from emerging economies in Asia, Latin America, and Emerging Europe since the early 1990s. They show that bank credit expanded more rapidly in more rigid exchange rate regimes, particularly foreign currency-denominated bank loans. Ghosh et al. (2014) find similar results and highlight the differences in how various degrees of exchange rate flexibility impact credit growth. They also show how the alternative degrees of exchange rate flexibility are more or less prone to different type of crises, noting that not only pure floating regimes, but also managed floats, reduce the likelihood of banking, financial, debt, and growth crises. IMF (2011) focuses on Asia and finds that credit booms that ended in crises tend to occur when large external financing is available, but also on the back of strong domestic factors, which appear to be stronger in that region. Exchange rate flexibility, though, mitigates the impact of external factors. Furceri et al. (2011) also find that in the presence of large capital inflows, the impact on credit expansions is less pronounced in countries with higher real exchange rate flexibility—measured as the standard deviation of the real exchange rate. Lane (2013) document boom-bust capital flows cycles in Europe.

The literature on capital inflow reversals is less extensive. Calvo et al. (2004, 2006) have documented the dynamics of sudden stops in capital inflows. In particular, they have focused on the role played by trade openness and balance sheet issues—i.e. liability dollarization—in the required adjustment in the real exchange rate, and in the macroeconomic impact of events in which capital flows suddenly dry out. Abiad et al. (2011), Calvo et al. (2006), and Elekdag and Wu (2011) also notice that economic recoveries preceded by both a credit booms and banking crises tend to be credit-less.

The literature on sudden stops, however, encompasses any sudden cut in external financing, regardless of having a boom in capital inflows as a pre-condition. This subtle difference is relevant, as our focus is on external financing *cycles*. By focusing on episodes of capital flows reversals that follow booms in capital flows, we can narrow the discussion of policy issues. This is important, as not every sudden stop episode is necessarily preceded by a boom in capital inflows. Furthermore, notice that the current environment is precisely that of a potential reversal of sustained capital inflows as the expansionary monetary policies that were deployed in advanced economies following the global crisis are now approaching its withdrawal stage.

III. DATA DESCRIPTION

The data set is constructed based on series from IMF's World Economic Outlook (WEO) and the International Financial Statistics (IFS). The time span of the data is 1969–2012. The frequency is annual, and the coverage comprises 179 countries.

The macroeconomic variables include real GDP, the real effective exchange rate, private sector consumption, investment, government expenditures, net exports, and domestic saving. The demand components, as well as saving, are computed as a share of GDP. The real exchange rate and real GDP are indexes, which are made equal to one at the time capital inflows reverse, without loss of generality. We also include the rate of inflation, which is used to approximate real growth rates when needed.

The financial variables focus on banking credit and broad money. For robustness, we also computed the loan-to-deposit ratios (LTDs). When necessary, the variables are expressed in growth rates (in nominal and real terms, as appropriate).

The exchange rate regime follows Reinhart and Rogoff (2004) and Ilzetzki et al. (2012). This enables to base our estimation on *de facto* exchange rate regimes, as opposed to *de jure* arrangements. This classification defines "coarse" and "fine" *de facto* exchange rate regimes. Table 1 shows the different exchange rate regimes. The fine classification disaggregates these coarse measures in slimmer bands. We use both classifications, obtaining similar results. For expositional purposes, we focus here on the results from the coarse classification only, which works as a semi-continuous series. To avoid misinterpretation of the role played by the exchange rate regime, we eliminate those observations classified as "free falling" and "dual markets with missing parallel markets" (regimes 5 and 6, respectively). Using the latter regimes might distort the results, as they could be counted as flexible exchange rates when using the semi-continuous classification. For details see Ilzetzki et al (2012) and Magud et al. (2011, 2014).

Table 1. Coarse Exchange Rate Classification

1	No separate legal tender
1	Pre announced peg or currency board arrangement
1	Pre announced horizontal band that is narrower than or equal to +/-2%
1	De facto peg
2	Pre announced crawling peg
2	Pre announced crawling band that is narrower than or equal to +/-2%
2	De factor crawling peg
2	De facto crawling band that is narrower than or equal to +/-2%
3	Pre announced crawling band that is wider than or equal to +/-2%
3	De facto crawling band that is narrower than or equal to +/-5%
3	Moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time)
3	Managed floating
4	Freely floating
5	Freely falling
6	Dual market in which parallel market data is missing.

Source: Reinhart and Rogoff (2004).

IV. IDENTIFYING CAPITAL FLOWS REVERSALS: METHODOLOGY

We define capital flows reversals as abrupt contractions in capital flows into a country, conditional on following a boom in capital inflows. Consequently, to identify these reversals, we first identify booms and then assess which of those ended with a substantial retrenchment of capital flows. We describe the methodology, and then present the salient features of the identified episodes.

A. Capital Inflows Booms

Capital inflows booms are defined according to alternative criteria, to increase the robustness of the identification process. The analysis of stylized facts and the panel regressions are conducted for these alternative identified samples. We use two approaches:

- *Distribution criteria*. In line with Reinhart and Reinhart (2008), for each country we identify capital inflows booms as those events that lie in the top 20th percentile of the distribution of the external financial account balance to GDP ratio. These are considered the country-specific episodes for which capital inflows are the largest. To avoid double-counting, if two or more consecutive years belong to the top quintile they are considered part of the same episode. Additionally, a minimum of two years in which the external financial account balance to GDP is not in the top 20th percentile is required for two events to be considered separate episodes.

- *Cyclical deviations criteria*. Mendoza and Terrones (2008, 2012) use an algorithm to identify credit booms. We follow their methodology to single out episodes of capital flows booms instead. Based on a Hodrick-Prescott filter, we compute the cyclical components of the external financial account balance (as a percentage of GDP). Against this backdrop, for an event to qualify as a capital inflows boom, the cyclical component of the financial account ratio has to be larger than or equal to a multiple m of the standard deviation of each country's series. For robustness, this criterion uses various parameterizations, namely m= 1.0, 1.5, 1.75, and 2.0.

B. Capital Flows Reversals

For each approach, we label as episodes of capital inflows reversals those events for which we observe a drop of x percent following the peak on inflows. As a benchmark, we take x=10 percent. Robustness checks for alternative values of x produce similar results. The identification requirements give us a wealth of alternative specifications to identify periods of capital inflows booms, and the reversals that follow them. As shown below, the results are consistent across identifying approaches, making the results robust. Below we present the main characteristics of the identified capital flows episodes.

C. Identification Results: Some Descriptive Statistics

As the algorithms used to identify capital flows reversal vary by approach, the number of identified reversals differs. Table 2 shows the number of episodes identified for the full sample in

each methodology, and the appendix lists them–including the year in which the reversal was triggered. The distribution criterion (RR henceforth) identifies over 700 events. In turn, using the cyclical deviations approach, the number of events decreases with the size of *m*. The larger *m* is, the more extreme the cyclical deviation value needs to achieve to be considered a boom in capital inflows. For this criterion (MT henceforth), the algorithm finds capital flow reversals ranging from close 550 events to just over 130 episodes. Table 2 also groups the reversal by the flexibility of its exchange rate regime. Defining as fixed exchange rate regimes those with coarse classifications 1 and 2 (see Table 1), and flex for classifications 3 and 4, we find that about 65 percent of the events are related to fixed exchange rate regimes in most cases.

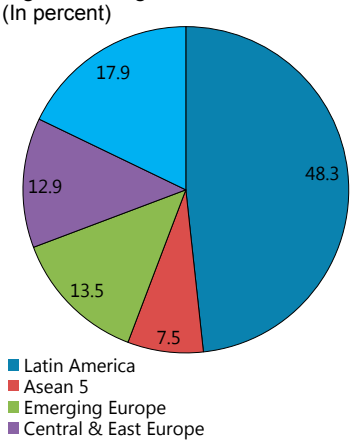
Table 2. Capital Inflow Reversal Events

	RR	MT1	MT2	MT3	MT4
Events	701	544	285	203	132
of which: since 1990 (percent of total)	18.5	21.7	20.4	18.7	15.2
Fixed Regimes (percent events after 1990)	68.5	67.8	67.2	63.2	50
Flexible Regimes (percent of events after 1990)	31.5	32.2	32.8	36.8	50

Sources: authors' calculations

The regional distribution shows a bias toward Latin America (Figure 1). About 48 percent of the sample belongs to this region. Emerging Europe accounts for about 13 percent of the identified episodes, of a similar order of magnitude as events identified in Central and East Asia. A smaller share of the reversals episodes occurs in Asia.

Figure 1. Regional Distribution
(In percent)



Sources: authors' calculations

We narrow the sample to analyze capital inflows reversals in emerging economies after the 1990s. Looking at the last 25 years allow us to focus on a period in which capital accounts in emerging economies became more open and received increasing private capital inflows. We eliminated developing and poor countries from the sample, as these countries present relatively close capital

accounts and depend on official financing. Interestingly, the sample shows that between 20 to 25 percent of the identified capital inflow reversals took place after 1990.

V. Event Analysis: Documenting Stylized Facts

We construct 11-year windows centered on reversals of capital inflows. The data is organized by event. For each episode, regardless of the actual year in which it took place, we label period *T* as the first year of the reversal. Hence, the data goes back to year *T-5* and forward to *T+5*. In this set up, we compute alternative "cross-section" statistical measures for each period in the interval (*T-5, T+5*). Of particular interest is the median, in each time period and for each series, as this measure is not influenced by outliers. The medians are then used to depict the dynamics of macroeconomic and financial variables.

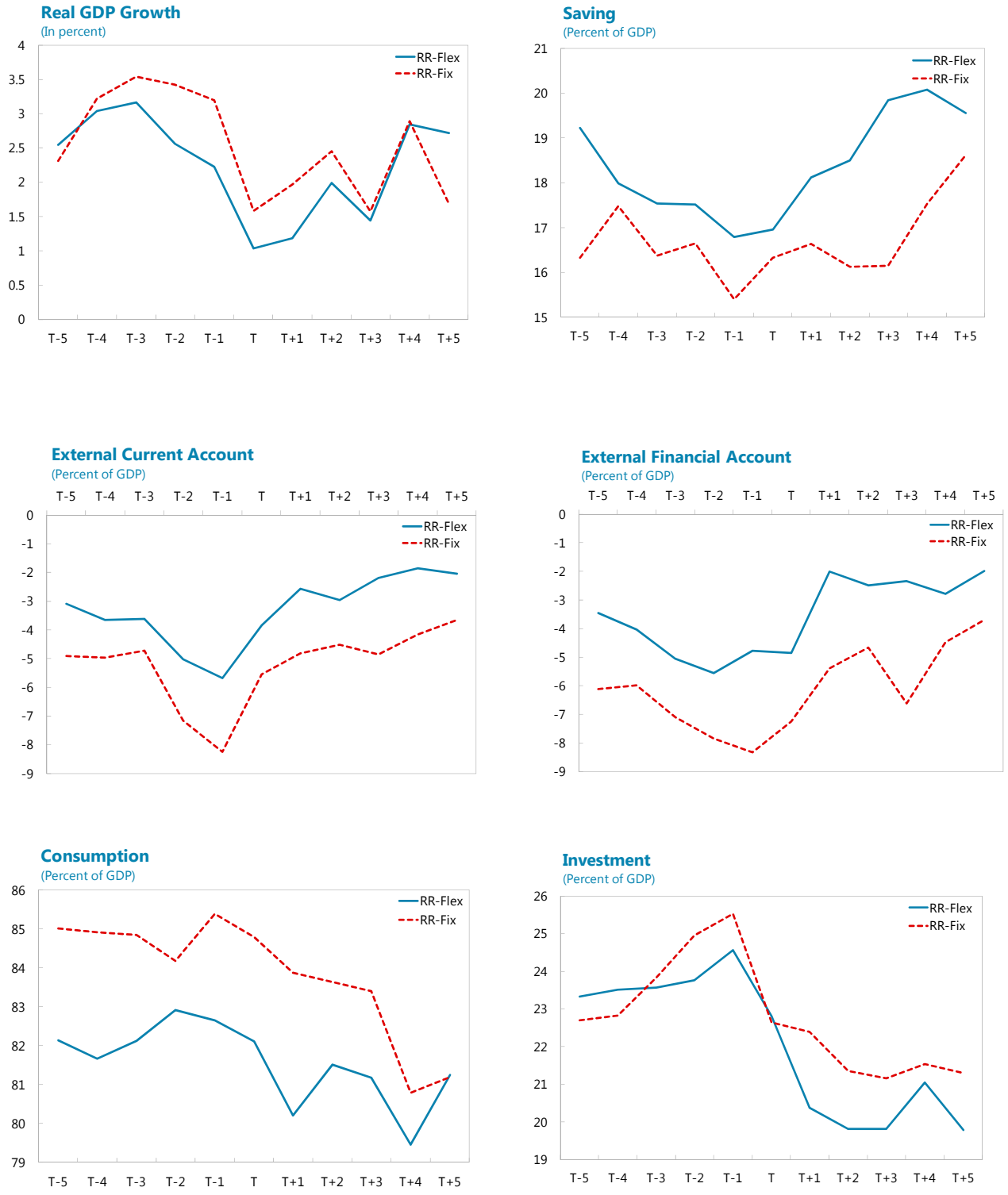
A. The Macroeconomic Environment

Capital inflow reversals are characterized by a collapse in economic activity and sharp adjustments in the current account (Figure 2). Economic activity picks up and the current account deteriorates during the capital inflow boom—the median GDP growth is about 2 percentage points lower in the year of the reversal compared to the peak during the boom, and the current account adjust by between 2 and 3 percent of GDP. The slowdown in growth is particularly strong during the first couple of years of the reversal, to recover gradually—although not monotonically—thereafter. Concurrently, as capital flows reverse, the current account adjusts, forcing the accommodation of domestic absorption.

Investment falls strongly during reversals. At the peak of capital inflow booms, investment is about 4-5 percentage points of GDP higher than during the reversal year. Moreover, its recovery is particularly sluggish. Even five years following the reversal, investment is still lower in terms of GDP than in the year of the reversal. Private consumption remains fairly stable during the boom, and even accelerates slightly prior to the reversal. As capital inflows retrench, however, consumption falls, consistent with the reduction in external financing. Additional issues—such as factors that might have an impact on banking sector credit, usually critical to the financing of consumption—could lie behind these dynamics.

We now focus on the differences between exchange rate regimes. We observe that investment dynamics are apparently not much affected by the exchange rate regime in a country during capital inflows reversals. Marginally, it appears that as the peak of the boom phase approaches, investment accelerates faster in more rigid exchange rate regimes. If anything, it might be signaling a potential misallocation of resources on the back of a misperceived sustainability of the cycle in the more rigid exchange rate arrangements.

Figure 2. Macroeconomic Variables



Sources: authors' calculations

The dynamics in economic activity and the current account do not differ markedly in countries with different exchange rate regimes. Yet, the external financing is larger in less flexible regimes. Domestic saving is larger in more flexible regimes throughout the boom and reversal, and accelerates faster after capital flows reverse. Measured as a share of GDP, consumption is significantly larger in less flexible exchange rate arrangements during capital inflow booms, and its adjustment during reversals substantially sharper. In contrast, consumption is more stable in more flexible regimes and shows a much milder adjustment during reversals. As a result, consumption tends to converge under different degrees of exchange rate flexibility as the capital flow cycle fades out. As we will see below, consumption, typically financed through banking system credit, reflects the behavior of banking credit under different exchange rate regimes.

B. Banking Sector Credit

Real growth in banking credit to the private sector collapses during capital inflow reversals (Figure 3). As showed in Magud et al. (2011, 2014), banking credit accelerates during capital inflow booms, and the real growth rate of credit peaks a couple of years before capital flows reverse. During the reversal stage of the cycle, however, real credit growth markedly slows down. We also observe that after capital flows reversal episodes end, real credit growth stabilizes at a rate substantially lower than that of the boom phase.

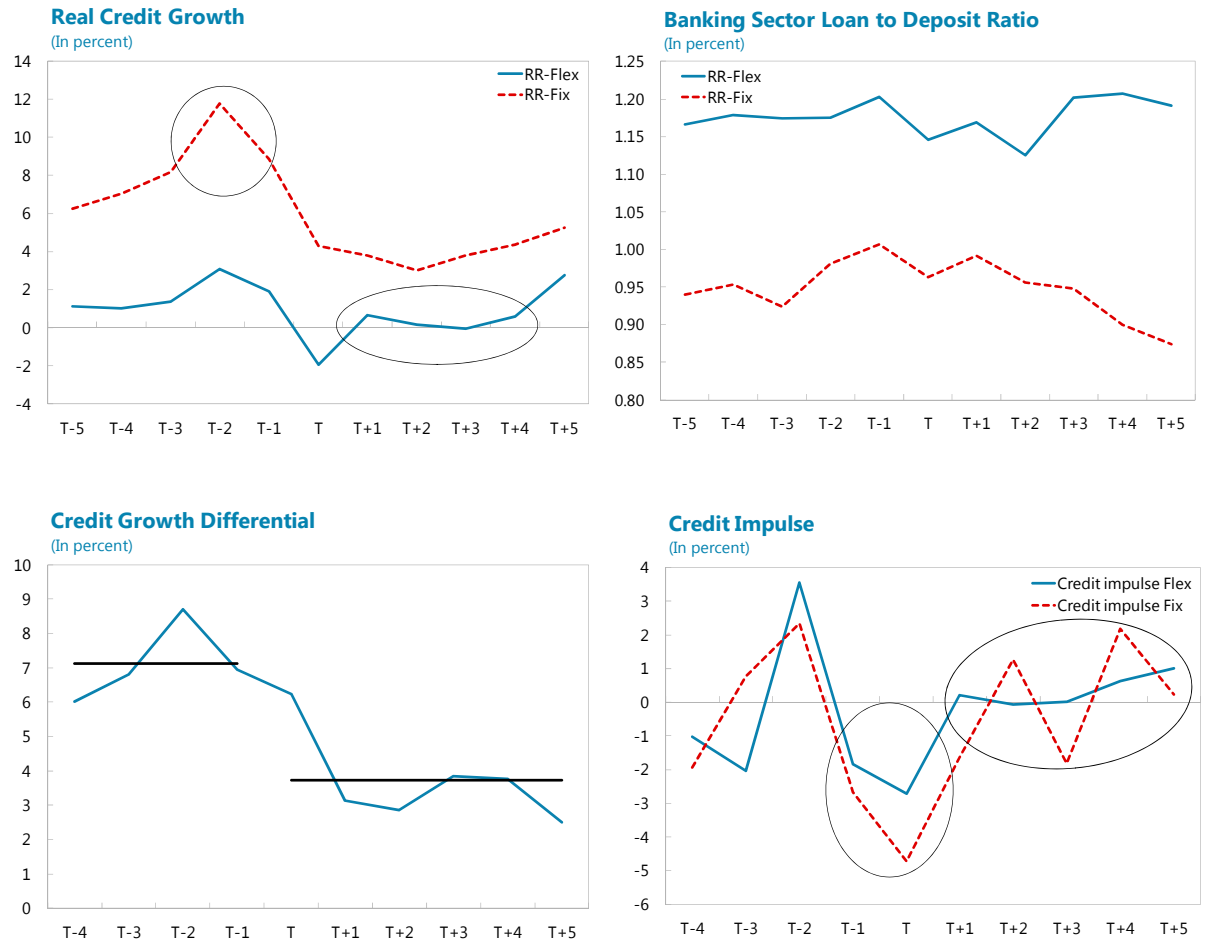
The dynamics of banking sector credit, however, show significant contrasts in economies with different exchange rate regimes. In particular:

- *Credit growth: consistently higher in fixed regimes, but less so during reversals.* Less flexible exchange rate regimes show consistently faster growth in domestic credit to the private sector during booms. The median of real growth in bank credit peaks at about 12 percent in fixed exchange rate regimes during capital inflow booms, while it does so at less than 3 percent for flexible regimes. The growth differential between regimes, however, falls significantly during reversals. Figure 3 shows that the average difference in median growth—i.e., credit growth in fixed regimes net of growth in flex regimes—falls from 9 percent during booms to 5 percent during reversals. Hence, even if partially, flexible exchange rate regimes show some more resilience during reversals as external financing dries up.

- *Containing credit growth during the boom is the key policy challenge for fixed regimes.* Credit growth in less flexible exchange rate regimes accelerates sharply during booms—its median doubles, from around 6 percent five years before the reversal to around 12 percent at the peak. In contrast, flexible regimes show a rather modest credit growth during capital inflow booms, with the median accelerating from slightly less than 2 percent during the initial stage of the boom to less than 3 percent at the peak. While differences in financial deepness makes it very complex to assess and compare credit growth among economies,

double-digit credit growth in fixed exchange rate regimes economies strikes as too high in the context of 3-3½ percent average GDP growth during booms years.[1] Economies with flexible exchange rate regimes show real credit growth in line with the expansion in economic activity.

Figure 3. Banking Sector Credit



Sources: authors' calculations

- *Supporting credit recovery seems to be a policy challenge for flexible regimes after reversals.* The fact that credit growth is more contained in economies with flexible exchange regimes during booms—and that loan-to-deposit ratios remain stable, see below—raises the question of whether the adjustment in credit growth during capital

[1] We looked at potentially different dynamics around capital inflows reversals for economies with different degrees of financial deepness—characterized by the size of bank and bond market credit compared to GDP. Results were not conclusive. They suggest that while credit growth rates are somewhat—although not clearly—higher for shallower financial markets in fixed exchange rate economies, this is not the case for economies under a flexible regime.

inflow reversals may be smoother. Furthermore, the slow recovery in credit growth for several years after the reversal—it is only towards the end of the capital flow cycle that credit growth rates significantly differ from zero—also raises questions. Why it is so difficult for banks to resume lending in a system that was characterized by a more contained pick-up in credit during the booms years? We dub this as the (credit) recovery puzzle.

- *Fixed regimes are exposed to sharp adjustments in non-deposit funding.* The LTDs can be considered as a proxy for banking sector external funding, as it reflects the share of total banking sector credit in excess of deposits. The sharp increase in LTDs in economies under fixed regimes suggests that capital inflows help finance the expansion of the lending portfolio through leverage. However, banks are forced to retrench this financing once these flows disappear—in fact, LTDs fall below the level attained at the initial stages of the capital inflows cycle. In contrast, in more flexible exchange rate regimes, although higher throughout, this ratio is fairly stable over the capital flows cycle.

- *The credit impulse is more procyclical in economies under fixed exchange rate regimes.* Using the change in credit to GDP as a proxy for credit impulse—or a measure of acceleration—we observe that following a positive impulse during the boom phase, a strongly negative impulse is observed as capital flows reverse, in particular for fixed regimes. The credit impulse also looks more volatile after the reversal in these economies.

Higher order moments of the distribution of credit growth rates during reversals also suggest that credit in fixed regimes are more volatile over the whole cycle. The standard deviation of real credit growth in fixed regimes equals 2.7 for the whole period, while for flexible regimes reaches about only half of that, at 1.4. It is worth noticing, though, that while the standard deviation is higher in fixed regimes during booms, it is nonetheless lower than in flex regimes during the reversal—suggesting that the sharp adjustment at the reversal plays an important role in the assessment of volatility over the entire window. We also find that the distribution of real credit growth for economies with flexible exchange rate regimes exhibits negative skewness, while the one for less flexible regimes shows positive skewness. This suggests that economies under fixed regimes tend to concentrate a larger part of the distribution in observations with larger growth rates.

Table 3. Real Credit Growth

	Fixed	Flex
Std. dev full sample	2.7	1.4
Std. dev boom	2.1	0.8
Std. dev full reversal	0.8	1.5
Skewness	1.0	-0.5

Source: authors' calculations

C. Robustness

While the results presented in this section are based on the RR identification process, they remain broadly similar under the MT identification process described above. Only small differences are found, and they only apply to the most stringent MT identification specifications—i.e. the ones using the highest deviation from the mean as the identification criteria. The latter shouldn't surprise, as the highest "*m*-values" are related to tail events. Yet, all the results, and consequently their dynamics and interpretation, remain unaltered.

VI. Econometric Analysis

In this section, we focus on the dynamics of credit during capital inflow reversals in the context of different exchange rate regimes. The latter, based on the panel regressions presented below, will inform the policy discussion in the next section.

A. Models

Panel Regressions

We model the following panel specification:

$$Y_{t,i} = \alpha X_{i,t} + \beta M_{t,i} + \gamma F_{t,i} + \delta R_i + \vartheta T_t + \varepsilon_{t,i} \qquad (1)$$

where sub-indices *t* and *i* stand for period and event respectively. $Y_{t,i}$ refers to the real growth rate of credit. $X_{i,t}$ denotes the main explanatory variable, the *de facto* exchange rate regime. As mentioned above, we use the coarse classification, which ranges from 1 to 4, as we leave out the free falling observations. Given this classification, the larger this variable is, the more flexible the exchange rate regime is—as a 4 refers to a free floating regime, while a 1 corresponds to pegs.

We introduce several controls. $M_{t,i}$ stands for the set of macroeconomic controls, which include real GDP growth and the real effective exchange rate. Other controls are aimed at correcting for financing conditions, namely $F_{t,i}$. These include financial deepness (proxied by the lagged ratio of banking credit to GDP), the real growth of broad money (M2), as well as the ratio of the balance of the (external) financial account to GDP, to control for external financing. Formally,

$$M_{t,i} = \begin{bmatrix} RGDPgrowth_{t,i} \\ REER_{t,i} \end{bmatrix}$$

$$F_{it,} = \begin{bmatrix} realBroadMongrowth_{t,i} \\ FinAccBal_{t,i} \\ Credit/GDP_{t-1,i} \end{bmatrix}$$

Equation (1) is the baseline regression model. Alternative specifications are added for robustness. We include dummy variables for each region, R_i, a sort of "fixed effect" control. We also test for

the impact of "time effects" by adding a period dummy, T_t. We also run an instrumental variables specification in which the financial account balances and the real growth rate of broad money are instrumented by their one-period lags. The data set, based on the series used in the event analysis above, is a balanced panel. It is worth stressing that the series are not a country panel, but an episode-based panel including a total of 129 events with a maximum of 11 observations each. Countries in the sample could have experienced more than one episode of capital inflow reversals.

Cross-Section Model

We also build a cross-section sample by computing the average of the series during the boom phase and the reversal stage of the capital flows cycles, respectively. Then, we compute the change in average real credit growth between the different stages. As we want to understand the factors behind the deceleration in credit during the reversal, and in particular the role played by the exchange rate regime, we run the following regression:

$$CredRev_i = \pi Z_i + \varphi W_i + \tau V_i + \omega_i \qquad (2)$$

where $CredRev_i$ stands for the change in average real credit growth between the boom and the reversal phases. Z_i stands for the exchange rate regime (again, based on the coarse classification, excluding free falling observations). The controls—W_i, V_i—stand for macroeconomic and financial variables respectively, and are given by the following vectors:

$$W_i = \begin{bmatrix} avgRGDP_i \\ avgREER_i \end{bmatrix}$$

$$V_i = \begin{bmatrix} avgFinAcc_i \\ avgRBrMongrowth_i \end{bmatrix}$$

The controls include the average growth rate of real GDP, and the average growth of the real effective exchange rate among the macroeconomic explanatory variables, and the average balance of the external financial account (as a percentage of GDP) and the average real growth rate of the growth of broad money as the financial variables. Variables in the right hand side of (2) are averages at the boom stage of the cycle, as we want to understand how much each of these boom-value levels conditions the change in real credit growth when capital flows reverse.

B. Results

The panel regressions suggest that credit growth is lower in economies with more flexible exchange rate regimes over the whole capital flow cycle. The coefficient for the exchange regime is negative and significant at the 1 percent level in every specification. Table 4, column 1 shows the baseline specification, which is corrected for heteroscedasticity. The baseline specification is checked for robustness by including regional and time dummies variables, as described above. Additionally, instrumental variable specifications are run by lagging broad money growth and the external financial account balance—not only in the baseline specification, but also when including

regional and time period dummies.[2] The controls show the expected signs, with faster growth of broad money or a more appreciated real exchange rate more conducive to stronger credit growth. More buoyant economic activity is also associated with faster credit growth. Furthermore, a higher credit to GDP ratio in the previous period (a standard proxy for financial deepness) has a negative sign as a higher stock of credit results in lower growth of credit, all else equal.

The cross-section regression suggests that the banking credit *cycle* is less severe in economies with more flexible exchange rate regimes. This exercise regresses the *change* in average banking sector credit growth between the boom and reversal periods against the boom-average values of the same factors as in the panel regression. It shows that the fall in credit growth in more flexible exchange rate regimes during reversals is less acute than in economies with less flexible regimes. This is captured by the negative coefficient in the regression in column 7, thus stressing the importance of exchange rate flexibility to smooth *credit adjustment* when capital flows recede.[3]

Consistent with the evidence in Table 4, a recursive analysis of the coefficients suggests that the difference in banking credit growth rates between exchange rate regimes is less significant during capital inflow reversals. To check the stability of the coefficient for the exchange rate regime in the panel estimations in Table 4, we apply the procedure described in Anttila-Hughes and Hsiang (2010). We estimate recursively the coefficients using two-year windows—starting five years before the reversal—and assessing them through 95 percent confidence intervals.[4]

Figure 4 shows the results of the estimations, with two issues worth mentioning. On the one hand, the coefficient on the exchange rate regime is consistently negative and significant. On the other hand, the coefficient gradually becomes more negative during the capital inflow boom, reversing its dynamics at the time of reversal. In effect, the coefficient peaks at about -4¼ during the boom, jumping to about -2 after the reversal. These results suggest that, to some extent, exchange rate flexibility may have been a buffer against higher volatility in the credit cycle, although credit growth is still higher in less flexible exchange regimes even during the reversal of the capital inflow bonanza. A change in the sign of this coefficient would have suggested that exchange rate flexibility is a much stronger buffer (paradise), but this is not being corroborated by the data (thus, just purgatory).

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[2] Alternative specifications have been run by: (i) defining the exchange rate regime as a dummy variable adopting the value of 1 for classifications 1 and 2, and 0 for classifications 3 and 4; and (ii) by including one different dummy variable for each exchange rate classification. All the results are in line with Table 4. The IV procedure is similar to Magud et al. (2014).

[3] For robustness, we also run these specifications in sample that excludes the episodes in which the exchange rate regime changed when capital flows reversed. All the results hold (see the appendix).

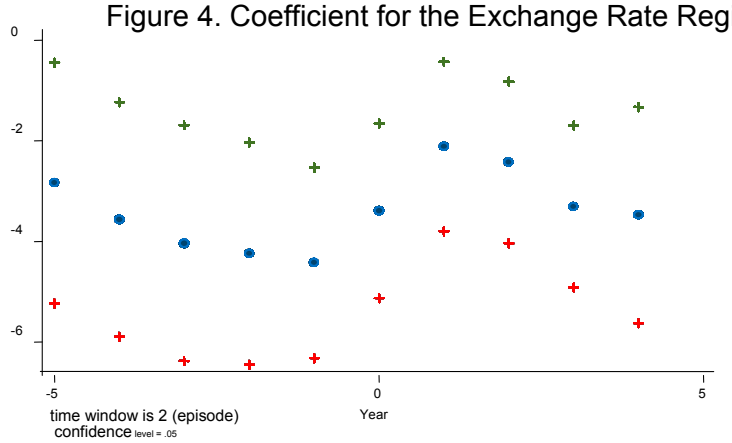
[4] That is, the first coefficient is the one associated with a regression of a panel including the fifth and fourth years before the capital inflow reversal. The second coefficient show results of a regression with the fourth and third years before the reversal. The remaining coefficients are estimated shifting the sample accordingly.

Table 4. Credit Growth and Exchange Rate Regime

R & R	Panel: credit growth						Cross-section
	Baseline	**Regional**	**Time effect**	**IV baseline**	**IV regional**	**IV period**	**Reversal**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	real credit growth	real credit growth	real credit growth	real credit growth	real credit growth	real credit growth	cred reversal
Financial account balance	0.000263*	0.000262*	0.000240*	8.85e-05	0.000206	0.000178	
	(0.000147)	(0.000145)	(0.000146)	(0.000181)	(0.000137)	(0.000137)	
Real GDP (RGDP) growth	1.763***	1.697***	1.712***	1.572***	1.734***	1.726***	
	(0.120)	(0.121)	(0.121)	(0.151)	(0.123)	(0.125)	
Broad money real growth	0.624***	0.605***	0.626***	1.428***	0.652***	0.665***	
	(0.0314)	(0.0318)	(0.0312)	(0.133)	(0.0327)	(0.0323)	
Real effective exchange rate (REER)	11.35***	12.98***	11.57***	9.152**	11.92***	10.50***	
	(3.450)	(3.445)	(3.430)	(4.251)	(3.734)	(3.736)	
Exchange rate regime	-3.155***	-3.740***	-3.197***	-2.645***	-3.836***	-3.080***	-2.093*
	(0.462)	(0.540)	(0.458)	(0.571)	(0.741)	(0.640)	(1.278)
Lagged credit/GDP 1/	-0.0532***	-0.0600***	-0.0506***	-0.0861***	-0.0879***	-0.0749***	
	(0.0109)	(0.0122)	(0.0108)	(0.0144)	(0.0150)	(0.0138)	
Latin America dummy		-9.214*			-11.14		
		(5.169)			(7.104)		
Emerging Europe dummy		-1.473			-2.368		
		(4.418)			(6.191)		
ASEAN 5 dummy		-2.966			-3.994		
		(5.302)			(7.284)		
Central & East Europe dummy		-4.677*			-6.113*		
		(2.793)			(3.632)		
Other advanced countries dummy		-7.149			-8.003		
		(5.223)			(7.180)		
Average RGDP growth during boom							1.377**
							(0.545)
Average finan. account bal boom							0.00546***
							(0.00122)
Average REER during boom							19.51
							(18.94)
Average real broad mon growth boom							0.551***
							(0.199)
Constant	-1.030	6.377	-0.426	4.000	10.63	2.010	-12.74
	(3.626)	(6.419)	(3.889)	(4.543)	(8.251)	(4.232)	(19.32)
Observations	1,148	1,148	1,148	1,141	1,141	1,141	124
R-squared				0.358	0.418	0.413	0.355
Number of countries	129	129	129	129	129	129	
Chi squared	749.2	793.3	783.3	361.7	796.9	800.0	
Log likelihood	-4636	-4622	-4625				-500.5

Source: authors' calculations.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
1/ The lagged credit to GDP ratio is a proxi for financial deepness in banking credit.

Figure 4. Coefficient for the Exchange Rate Regime



VII. POLICY IMPLICATIONS

In Magud et al (2011, 2014), we argued that lack of exchange rate flexibility may make the economy more vulnerable to reversals in capital flows, as credit expansions are more significant in economies with less flexible exchange regimes. The empirical evidence in those papers focused on periods of large capital inflows, and concluded that exchange rate flexibility could be instrumental in curving the effects of capital inflows on domestic credit. From a policy perspective, the paper suggested that relatively inflexible exchange rate regimes stood to benefit the most from regulatory policies to reduce banks' incentives to tap external markets and to lend/borrow in foreign currency. That paper acknowledged, though, that exploring the dynamics in credit markets during capital inflows reversals and their possible differences across exchange rate regimes was needed to properly assess the policy options to smooth credit cycles associated with large capital inflows.

The analysis of capital inflow reversals suggests that economies with more flexible exchange rate regimes may also face a credit cycle during swings in capital flows. It is indeed the case that containing credit growth during capital inflow booms and coping with sharp adjustments in non-deposit funding—as evidenced by the cycle in loan-to-deposit ratios in those economies—constitutes a policy challenge in economies with fixed exchange rate regimes. However, the credit recovery puzzle in flexible regimes raises issues as well, as suggested by the dynamics of credit after reversals take place. In effect, the fact that credit growth accelerates less in economies with flexible exchange regimes during booms would suggest that the adjustment in credit growth during capital inflow reversals could be smoother. Furthermore, the slow recovery in credit growth for several years after the reversal also raises the question of why it is so difficult for the banking system to resume lending if credit acceleration during the booms years was less acute than in less flexible regimes.

The credit recovery puzzle in economies with flexible exchange rate regimes offers an interesting new perspective to the policy implications that one can draw just from looking at capital inflow bonanzas. The slow recovery in credit suggests that different macro-prudential policies may be most useful at different stages of the capital flow cycle. Concretely, the main policy implications from the paper could be summarized as follows:

- Macro-prudential policies would be particularly relevant to contain credit growth during the capital inflow bonanza in economies with fixed exchange rate regimes. As the key policy challenge in these regimes is associated to the excesses during the boom, macro-prudential measures to contain excessive credit growth—such as loan-to-value ratios (LTV), debt-to-income (DTI) and debt-service-to-income (DSTI) limits—would be most relevant in these cases. Given the observed increase in LTDs in these economies during the boom, currency-dependent reserve requirements that reduce the incentives for banks to tap international markets would also be instrumental in curbing credit growth.

- Macro-prudential policies that help creating buffers to support credit during the reversal of capital inflows may be very relevant in economies with more flexible exchange rate regimes. To the extent that measures like capital surcharges (CS) or countercyclical provisioning (CP) help banks build buffers during the capital inflows phase, they can be particularly useful in maintaining the supply of credit when the economy has to cope with the capital flow reversal.

VIII. CONCLUDING REMARKS

The fluctuations in global risk aversion triggered by the Federal Reserve "tapering" talk in 2013 are a reminder that the potential for reversals in large capital inflows may have a significant impact on financial markets, including in the evolution of banking sector credit. This is particularly the case for emerging market economies.

We create a data set of capital flows reversals for 179 countries during 1960–2012 using standard algorithms to identify capital reversal events, conditional on following capital inflows bonanzas. Then we focus on countries with relatively open capital accounts during the last 25 years, and identify 129 reversal episodes and document the stylized facts for economies with relatively fixed and flex exchange rate regimes during 5-year windows before and after the events. We also run panel regressions to assess the role played by exchange rate flexibility during capital inflows booms, and particualrly during the reversals, controlling for a number of macroeconomic factors.

We find that exchange rate flexibility is associated with more contained banking credit growth during capital inflows booms. However, the fall in credit growth in economies with more flexible exchange regimes—albeit with a more modest drop than in fixed regimes—suggests that flexibility cannot fully shield the economy during the reversal. Furthermore, we observe what we dub as a recovery puzzle: credit growth in more flexible exchange rate regimes remains tepid well after the capital flow reversal takes place.[5]

From a policy perspective, our findings suggest that flexibility can be complemented by macro-prudential policies to manage capital flow cycles. It is often acknowledged that macro-prudential policies may find it challenging to control credit growth during booms; and that they seem to be more effective in building buffers to help the economy avoid a crunch in banking sector credit when—for whatever reason—the credit cycle reverses. Exchange rate flexibility can keep credit growth relatively at bay during bonanzas, and it could be complemented by measures like capital surcharges or countercyclical provisions during the credit expansion phase. These macro-prudential instruments, in turn, can help deal with the recovery puzzle experienced by flexible exchange rate regimes during reversals. More rigid exchange rate regimes are prone to faster credit growth during the boom phase of capital inflows. Hence, measures such as reserve requirements, loan-to-value ratios, and debt-to-income and debt-service-to-income limits would help mitigating an excessive expansion of credit before capital flows reverse.

[5] We leave for future research to explain why this puzzle takes place

Potential extensions to this initial evidence could look into the evolution of financial sector credit channeled outside the banking system. While the policy implications drawn from the evidence in this paper focus on bank credit cycles, it may well be the case that credit recoveries after capital flows reversal take place through other instruments. A thorough assessment of the evolution of total credit during booms and reversal would require, for example, a proper assesment of trends in bond and equity markets. Further analysis could also look into the role of interconnectedness of the country's financial system with international markets and the structure of the financial system—e.g., the presence of foreign banks and the presence of public sector banks which can support credit growth despite of the capital inflow reversal.We leave this for future research.

APPENDIX 1.

List of identified episodes, by each approach.

1. Reinhart and Reinhart

Identified episodes with Reinhart and Reinhart

Country	Year of reversal	Country	Year of reversal	Country	Year of reversal	Country	Year of reversal	Country	Year of reversal
South Africa	1972	China	1990	Guatemala	1979	Mali	2002	Singapore	1974
South Africa	1976	China	1994	Guatemala	1982	Mali	2009	Singapore	1977
Afghanistan	2007	China	1996	Guatemala	1985	Mali	2011	Singapore	1982
Albania	1991	Hong Kong SAR	1979	Guatemala	1988	Malta	1996	Singapore	1984
Albania	2009	Hong Kong SAR	1981	Guatemala	1993	Malta	2001	Slovak Republic	1997
Albania	2012	Hong Kong SAR	1998	Guatemala	1995	Malta	2007	Slovak Republic	1999
Algeria	1970	Colombia	1972	Guinea	1970	Mauritania	1981	Slovak Republic	2009
Algeria	1974	Colombia	1975	Guinea	1974	Mauritania	1983	Slovenia	2000
Algeria	1976	Colombia	1984	Guinea	1979	Mauritania	1986	Slovenia	2009
Algeria	1979	Colombia	1998	Guinea	1982	Mauritania	2006	Solomon Islands	2002
Algeria	1987	Comoros	1975	Guinea	1984	Mauritania	2013	Solomon Islands	2009
Algeria	1989	Comoros	1981	Guinea	1989	Mauritius	1980	Solomon Islands	2011
Angola	1994	Comoros	1985	Guinea-Bissau	1974	Mauritius	1982	Spain	1975
Angola	2000	Comoros	1987	Guinea-Bissau	1977	Mauritius	2009	Spain	1977
Angola	2002	Comoros	2012	Guinea-Bissau	1980	Mauritius	2012	Spain	1993
Angola	2004	Congo, Democratic Republic of	1971	Guinea-Bissau	1983	Mexico	1977	Spain	2009
Angola	2010	Congo, Democratic Republic of	1977	Guinea-Bissau	2001	Mexico	1982	Sri Lanka	1970
Antigua and Barbuda	1973	Congo, Democratic Republic of	2006	Guinea-Bissau	2003	Mexico	1995	Sri Lanka	1976
Antigua and Barbuda	1976	Congo, Democratic Republic of	2009	Guinea-Bissau	2013	Mexico	2001	Sri Lanka	1981
Antigua and Barbuda	1980	Congo, Republic of	1983	Guyana	1977	Moldova	1994	Sri Lanka	2001
Antigua and Barbuda	1987	Congo, Republic of	1985	Guyana	1982	Moldova	1998	Sri Lanka	2009
Antigua and Barbuda	2008	Congo, Republic of	1987	Guyana	1984	Moldova	2009	St. Kitts and Nevis	1972
Argentina	1979	Congo, Republic of	1991	Guyana	1987	Mongolia	2009	St. Kitts and Nevis	1974
Argentina	1981	Congo, Republic of	1995	Haiti	1976	Montenegro, Republic of	2009	St. Kitts and Nevis	2000
Argentina	1988	Congo, Republic of	1997	Haiti	1982	Morocco	1977	St. Kitts and Nevis	2002
Argentina	1995	Congo, Republic of	2004	Haiti	1992	Morocco	1982	St. Kitts and Nevis	2004
Argentina	1999	Congo, Republic of	2008	Haiti	2010	Morocco	1984	St. Lucia	1972
Armenia	1999	Costa Rica	1972	Honduras	1976	Morocco	1986	St. Lucia	1982
Armenia	2010	Costa Rica	1975	Honduras	1981	Morocco	1988	St. Lucia	2009
Australia	1975	Costa Rica	1981	Honduras	2009	Morocco	2013	St. Vincent and the Grenadines	1999
Australia	1987	Costa Rica	1991	Hungary	1979	Mozambique	1983	St. Vincent and the Grenadines	2007
Australia	1990	Costa Rica	2009	Hungary	1995	Mozambique	1988	St. Vincent and the Grenadines	2009
Australia	1996	Cote d'Ivoire	1980	Hungary	2000	Mozambique	1990	St. Vincent and the Grenadines	2012
Australia	2006	Cote d'Ivoire	1982	Hungary	2006	Myanmar	1999	Sudan	1975
Australia	2008	Cote d'Ivoire	1988	Hungary	2009	Myanmar	2002	Sudan	1982
Austria	1975	Cote d'Ivoire	1991	Iceland	1975	Myanmar	2011	Sudan	1990
Austria	1996	Cote d'Ivoire	1999	Iceland	2001	Namibia	1993	Sudan	2001
Austria	2000	Croatia	1998	Iceland	2007	Namibia	2002	Suriname	1984
Azerbaijan	1999	Croatia	2000	Iceland	2011	Namibia	2011	Suriname	1992
Azerbaijan	2005	Croatia	2004	India	1991	Nepal	1984	Suriname	1998
Bahamas, The	1999	Cyprus	1981	India	1997	Nepal	1990	Suriname	2000
Bahamas, The	2007	Cyprus	1984	India	2009	Nepal	1995	Suriname	2003
Bahamas, The	2011	Cyprus	1990	Indonesia	1972	Netherlands	1981	Suriname	2006
Bahrain, Kingdom of	1972	Cyprus	2009	Indonesia	1983	Netherlands	1997	Swaziland	1980
Bahrain, Kingdom of	1978	Czech Republic	1997	Indonesia	1987	New Zealand	1976	Swaziland	1982
Bahrain, Kingdom of	1988	Czech Republic	2001	Indonesia	1990	New Zealand	1983	Swaziland	2008
Bahrain, Kingdom of	1992	Czech Republic	2005	Indonesia	1992	New Zealand	1985	Swaziland	2010
Bahrain, Kingdom of	1995	Denmark	1971	Indonesia	1995	New Zealand	1998	Swaziland	2012
Bangladesh	1976	Denmark	1975	Indonesia	1997	New Zealand	2009	Sweden	1978
Bangladesh	1982	Denmark	1977	Iran, Islamic Republic of	1970	Niger	1979	Sweden	1980
Bangladesh	1985	Denmark	1986	Iran, Islamic Republic of	1982	Niger	1981	Sweden	1991
Bangladesh	1987	Denmark	1992	Iran, Islamic Republic of	1987	Niger	1983	Sweden	1993
Bangladesh	1989	Denmark	1994	Iran, Islamic Republic of	1990	Niger	2010	Sweden	1995
Barbados	1970	Djibouti	2009	Iran, Islamic Republic of	1992	Niger	2012	Sweden	2009
Barbados	1972	Djibouti	2013	Iran, Islamic Republic of	1998	Nigeria	1982	Switzerland	1974
Barbados	1974	Dominica	1972	Iraq	2005	Nigeria	1987	Switzerland	1980
Barbados	1982	Dominica	1990	Iraq	2010	Nigeria	1993	Syrian Arab Republic	1972
Barbados	2002	Dominica	1996	Ireland	2001	Nigeria	2000	Syrian Arab Republic	1977
Barbados	2006	Dominica	2001	Ireland	2005	Nigeria	2010	Syrian Arab Republic	1979
Barbados	2009	Dominica	2006	Ireland	2009	Norway	1978	Syrian Arab Republic	1981
Barbados	2011	Dominican Republic	1971	Ireland	2011	Norway	1987	Syrian Arab Republic	1984
Belarus	1995	Dominican Republic	1975	Israel	1980	Norway	1999	Syrian Arab Republic	1986
Belarus	2011	Dominican Republic	1983	Israel	1984	Oman	1974	Syrian Arab Republic	1995
Belgium	1978	Dominican Republic	1992	Israel	1996	Oman	1987	Syrian Arab Republic	2001
Belgium	1982	Dominican Republic	2001	Israel	2000	Oman	1994	Taiwan Province of China	1971
Belgium	2009	Dominican Republic	2009	Italy	1975	Oman	1999	Taiwan Province of China	1976
Belgium	2012	Dominican Republic	2011	Italy	1980	Pakistan	1971	Taiwan Province of China	1981
Belize	1970	Dominican Republic	2013	Italy	1992	Pakistan	1976	Tajikistan	1999
Belize	1974	Ecuador	1972	Italy	2007	Pakistan	1994	Tajikistan	2001
Belize	2002	Ecuador	1982	Italy	2011	Pakistan	1997	Tajikistan	2006
Belize	2004	Ecuador	1984	Jamaica	1974	Pakistan	2009	Tajikistan	2009
Benin	1981	Ecuador	1987	Jamaica	1976	Panama	1971	Tanzania	1975
Benin	2005	Ecuador	1989	Jamaica	1983	Panama	1975	Tanzania	1979
Benin	2009	Ecuador	1999	Jamaica	1986	Panama	1977	Tanzania	1996
Benin	2013	Ecuador	2003	Jamaica	2009	Panama	1980	Thailand	1982
Bhutan	1985	Egypt	1976	Jamaica	2012	Panama	2000	Thailand	1984
Bhutan	1987	Egypt	1980	Japan	1975	Paraguay	1970	Thailand	1992
Bhutan	1990	Egypt	1983	Japan	1981	Paraguay	1972	Thailand	1997
Bhutan	1994	Egypt	1985	Jordan	1972	Paraguay	1975	Togo	1979
Bolivia	1973	Egypt	1992	Jordan	2008	Paraguay	1977	Togo	1987
Bolivia	1976	Egypt	2002	Jordan	2013	Paraguay	2003	Togo	1989
Bolivia	1979	Egypt	2013	Kazakhstan	1993	Peru	1976	Togo	1998
Bolivia	1999	El Salvador	1975	Kazakhstan	1999	Peru	1996	Togo	2005
Bolivia	2003	El Salvador	1979	Kazakhstan	2008	Peru	1998	Togo	2007
Bosnia and Herzegovina	2006	El Salvador	1981	Kenya	1975	Peru	2009	Trinidad and Tobago	1971
Bosnia and Herzegovina	2009	El Salvador	1990	Kenya	1979	Philippines	1977	Trinidad and Tobago	1973
Botswana	1974	El Salvador	1999	Kenya	1982	Philippines	1983	Trinidad and Tobago	1984
Botswana	1976	El Salvador	2007	Kenya	1990	Philippines	1994	Trinidad and Tobago	1987
Botswana	1982	El Salvador	2009	Kenya	2009	Philippines	1996	Trinidad and Tobago	1998
Botswana	2003	Equatorial Guinea	1983	Kenya	2013	Philippines	1998	Tunisia	1978
Botswana	2010	Equatorial Guinea	1992	Korea, Republic of	1972	Poland	1975	Tunisia	1983
Brazil	1975	Equatorial Guinea	1997	Korea, Republic of	1975	Poland	1977	Tunisia	1985
Brazil	1981	Equatorial Guinea	1999	Korea, Republic of	1981	Poland	1982	Tunisia	1994
Brazil	1983	Equatorial Guinea	2002	Kuwait	1984	Poland	1985	Turkey	1994
Brunei Darussalam	2009	Estonia	1998	Kuwait	1992	Poland	1989	Turkey	2001
Bulgaria	1988	Estonia	2005	Kuwait	1995	Poland	1991	Turkey	2009
Bulgaria	1991	Estonia	2008	Kyrgyz Republic	1997	Portugal	1983	Turkey	2012
Bulgaria	1994	Ethiopia	2001	Kyrgyz Republic	1999	Portugal	2002	Uganda	1992
Bulgaria	2004	Ethiopia	2007	Kyrgyz Republic	2008	Portugal	2009	Uganda	2001
Bulgaria	2009	Ethiopia	2010	Lao, P.D.R.	1998	Qatar	1970	Uganda	2007
Burkina Faso	1978	Ethiopia	2013	Lao, P.D.R.	2006	Qatar	1992	Ukraine	1994
Burkina Faso	2001	Finland	1976	Latvia	2000	Qatar	1996	Ukraine	2009
Burkina Faso	2006	Finland	1985	Latvia	2008	Qatar	1999	United Kingdom	1989
Burkina Faso	2009	Finland	1988	Lebanon	1985	Romania	1991	United Kingdom	1991
Burundi	1984	Finland	1991	Lebanon	1989	Romania	1993	United Kingdom	1994
Burundi	1988	Finland	2009	Lebanon	1996	Romania	1997	United Kingdom	2000
Burundi	1997	Finland	2013	Lebanon	1998	Romania	2009	United Kingdom	2002
Burundi	2012	France	1975	Lebanon	2005	Russia	1993	United Kingdom	2006
Cambodia	1990	France	1981	Lesotho	1990	Rwanda	1983	United States	2001
Cambodia	2012	France	1992	Lesotho	1994	Rwanda	1994	United States	2004
Cameroon	1973	France	1994	Lesotho	1996	Rwanda	1999	United States	2007
Cameroon	1976	France	2007	Lesotho	1999	Rwanda	2004	United States	2009
Cameroon	1988	France	2010	Libya	1974	Rwanda	2010	Uruguay	1975
Cameroon	1994	France	2013	Libya	1982	Rwanda	2013	Uruguay	1981
Cameroon	2009	Gabon	1970	Libya	1984	Sao Tome and Principe	1983	Uruguay	1983
Canada	1976	Gabon	1974	Libya	1989	Sao Tome and Principe	2001	Uruguay	2003
Canada	1979	Gabon	1978	Libya	1994	Sao Tome and Principe	2007	Venezuela, Republica Bolivariana de	1979
Canada	1982	Gabon	1987	Lithuania	2000	Sao Tome and Principe	2009	Venezuela, Republica Bolivariana de	1983
Canada	2013	Gabon	1989	Lithuania	2009	Sao Tome and Principe	2012	Venezuela, Republica Bolivariana de	1987
Cape Verde	1971	Gabon	2009	Macedonia, FYR	1996	Saudi Arabia	1985	Venezuela, Republica Bolivariana de	1989
Cape Verde	1976	Gambia, The	1981	Macedonia, FYR	1998	Saudi Arabia	1988	Venezuela, Republica Bolivariana de	1993
Cape Verde	1978	Gambia, The	2002	Macedonia, FYR	2003	Saudi Arabia	1992	Venezuela, Republica Bolivariana de	1995
Cape Verde	1981	Gambia, The	2006	Macedonia, FYR	2009	Saudi Arabia	2010	Venezuela, Republica Bolivariana de	1997
Central African Republic	1976	Gambia, The	2009	Madagascar	1981	Senegal	1974	Venezuela, Republica Bolivariana de	1999
Central African Republic	1987	Gambia, The	2011	Madagascar	1991	Senegal	1982	Vietnam	1995
Central African Republic	1991	Georgia	2009	Madagascar	1993	Senegal	1984	Vietnam	1997
Central African Republic	2005	Germany	1974	Madagascar	2009	Senegal	2009	Vietnam	1999
Central African Republic	2008	Germany	1981	Malawi	1977	Serbia, Republic of	2005	Vietnam	2010
Central African Republic	2011	Germany	1995	Malawi	1993	Serbia, Republic of	2009	Yemen, Republic of	1993
Central African Republic	2013	Germany	2001	Malawi	1999	Seychelles	1973	Yemen, Republic of	1997
Chad	1976	Ghana	1984	Malawi	2002	Seychelles	1983	Yemen, Republic of	2000
Chad	1986	Ghana	1993	Malawi	2009	Seychelles	1987	Zambia	1972
Chad	1991	Ghana	2000	Malaysia	1976	Seychelles	1990	Zambia	1976
Chad	1994	Ghana	2009	Malaysia	1984	Seychelles	2008	Zambia	1979
Chad	2003	Greece	1986	Malaysia	1992	Seychelles	2011	Zambia	1982
Chile	1979	Greece	2001	Malaysia	1996	Sierra Leone	1976	Zambia	1987
Chile	1982	Greece	2009	Maldives	2006	Sierra Leone	1982	Zimbabwe	2009
Chile	1985	Grenada	1972	Maldives	2009	Sierra Leone	1991		
Chile	1994	Grenada	2003	Mali	1981	Sierra Leone	2001		
Chile	1999	Grenada	2006	Mali	1997	Sierra Leone	2012		
China	1986	Grenada	2009	Mali	2000	Singapore	1972		

2. Mendoza and Terrones, *m=1.0*

Identified episodes with Mendoza and Terrones for m = 1.0

Country	Year of reversal	Country	Year of reversal	Country	Year of reversal	Country	Year of reversal
South Africa	1976	Cote d'Ivoire	2009	Israel	2000	Paraguay	1975
Afghanistan	2007	Croatia	1993	Italy	1975	Paraguay	1987
Albania	1992	Croatia	1998	Italy	1980	Paraguay	1998
Albania	2009	Croatia	2000	Italy	1993	Paraguay	2003
Algeria	1976	Croatia	2007	Italy	2011	Peru	1976
Algeria	1979	Croatia	2009	Jamaica	1974	Peru	1996
Algeria	1999	Cyprus	1979	Jamaica	1983	Peru	1998
Angola	2000	Cyprus	1990	Jamaica	1986	Peru	2009
Antigua and Barbuda	1972	Cyprus	1993	Jamaica	1990	Philippines	1977
Antigua and Barbuda	1987	Cyprus	1998	Jamaica	2003	Philippines	1983
Antigua and Barbuda	2008	Cyprus	2009	Jamaica	2009	Philippines	1994
Argentina	1981	Czech Republic	1997	Japan	1975	Philippines	1996
Argentina	1995	Czech Republic	2005	Japan	1981	Philippines	1998
Argentina	1999	Denmark	1977	Japan	1990	Poland	1975
Armenia	1995	Denmark	1986	Jordan	1970	Poland	1989
Armenia	1999	Denmark	1992	Jordan	1972	Poland	1991
Armenia	2010	Denmark	1994	Jordan	1974	Portugal	1983
Australia	1975	Denmark	1999	Jordan	1978	Portugal	2010
Australia	1978	Denmark	2001	Jordan	2008	Qatar	1992
Australia	1990	Djibouti	1994	Jordan	2013	Qatar	1997
Australia	2008	Djibouti	2009	Kazakhstan	1993	Romania	1993
Austria	1975	Dominica	1972	Kazakhstan	2008	Romania	2009
Austria	1988	Dominica	1982	Kenya	1975	Rwanda	2004
Azerbaijan	1999	Dominica	1990	Kenya	1979	Sao Tome and Principe	2007
Azerbaijan	2005	Dominica	1996	Kenya	1990	Sao Tome and Principe	2009
Bahamas, The	1975	Dominica	2001	Kenya	1999	Saudi Arabia	1979
Bahamas, The	1982	Dominica	2006	Kenya	2006	Saudi Arabia	1985
Bahamas, The	1999	Dominican Republic	1975	Kenya	2009	Saudi Arabia	2010
Bahamas, The	2007	Dominican Republic	1983	Kenya	2013	Senegal	1982
Bahrain, Kingdom of	1978	Dominican Republic	1986	Korea, Republic of	1975	Senegal	2001
Bahrain, Kingdom of	1988	Dominican Republic	1992	Korea, Republic of	1981	Senegal	2009
Bahrain, Kingdom of	1995	Dominican Republic	1995	Korea, Republic of	1997	Serbia, Republic of	2009
Bahrain, Kingdom of	2004	Dominican Republic	2001	Kuwait	1992	Seychelles	1973
Bangladesh	1972	Dominican Republic	2009	Kyrgyz Republic	1997	Seychelles	1983
Bangladesh	1976	Dominican Republic	2011	Kyrgyz Republic	1999	Seychelles	1990
Bangladesh	1989	Ecuador	1972	Kyrgyz Republic	2008	Seychelles	2008
Bangladesh	2012	Ecuador	1984	Lao, P.D.R.	1988	Seychelles	2011
Barbados	1970	Ecuador	1987	Lao, P.D.R.	1999	Sierra Leone	2001
Barbados	1974	Ecuador	1989	Latvia	1996	Sierra Leone	2012
Barbados	1982	Ecuador	1999	Latvia	2000	Singapore	1972
Barbados	1984	Ecuador	2003	Latvia	2008	Singapore	1984
Barbados	1988	Egypt	1976	Lebanon	1985	Slovak Republic	1999
Barbados	1991	Egypt	1985	Lebanon	1990	Slovenia	2000
Barbados	2002	Egypt	1992	Lebanon	1996	Slovenia	2009
Barbados	2011	Egypt	2002	Lebanon	2005	Solomon Islands	2002
Belarus	1995	El Salvador	1979	Lesotho	2000	Solomon Islands	2009
Belarus	2011	El Salvador	1981	Lesotho	2003	Solomon Islands	2011
Belgium	1982	El Salvador	1990	Libya	1974	Spain	1975
Belgium	2009	Equatorial Guinea	1983	Libya	1976	Spain	1977
Belize	1972	Equatorial Guinea	1992	Libya	1982	Spain	1993
Belize	1983	Equatorial Guinea	1997	Lithuania	2008	Spain	2009
Belize	1992	Equatorial Guinea	1999	Macedonia, FYR	1998	Sri Lanka	1970
Belize	2002	Estonia	1998	Macedonia, FYR	2009	Sri Lanka	1976
Belize	2004	Estonia	2008	Madagascar	2006	Sri Lanka	1981
Benin	1981	Ethiopia	2001	Madagascar	2010	Sri Lanka	2001
Benin	1988	Finland	1976	Malawi	2009	Sri Lanka	2009
Benin	1996	Finland	1988	Malaysia	1984	St. Kitts and Nevis	1972
Benin	2003	Finland	1991	Malaysia	1992	St. Kitts and Nevis	1984
Benin	2005	Finland	2009	Malaysia	1996	St. Lucia	1972
Bhutan	1987	Finland	2013	Maldives	1978	St. Lucia	1983
Bhutan	1994	France	1975	Maldives	1982	St. Lucia	2009
Bolivia	1979	France	1981	Maldives	1994	St. Vincent and the Grenadines	1983
Bolivia	1999	France	1992	Maldives	2006	St. Vincent and the Grenadines	1999
Bolivia	2003	France	1994	Maldives	2009	Sudan	1975
Bosnia and Herzegovina	2006	France	2004	Mali	1981	Sudan	1990
Bosnia and Herzegovina	2009	France	2007	Mali	1984	Suriname	1984
Botswana	1982	France	2013	Mali	1997	Suriname	1992
Botswana	2003	Gabon	1978	Mali	2002	Suriname	1998
Botswana	2010	Gabon	1987	Mali	2009	Suriname	2000
Brazil	1975	Gabon	1989	Mali	2011	Suriname	2003
Brazil	1981	Gabon	2009	Malta	2001	Swaziland	1980
Brazil	1983	Gambia, The	1981	Malta	2007	Swaziland	1999
Brazil	2000	Gambia, The	2002	Mauritania	1970	Swaziland	2008
Brazil	2002	Gambia, The	2006	Mauritania	1983	Swaziland	2010
Brunei Darussalam	2011	Gambia, The	2009	Mauritania	1986	Sweden	1991
Bulgaria	1988	Gambia, The	2011	Mauritania	2006	Sweden	1993
Bulgaria	1991	Georgia	1996	Mauritania	2013	Sweden	2008
Bulgaria	1994	Georgia	2009	Mauritius	1980	Switzerland	1981
Bulgaria	2008	Germany	1981	Mauritius	1982	Syrian Arab Republic	2001
Burkina Faso	1978	Germany	1992	Mexico	1977	Taiwan Province of China	1976
Burkina Faso	2006	Germany	1995	Mexico	1982	Taiwan Province of China	1981
Burkina Faso	2009	Germany	2001	Mexico	1990	Tajikistan	1999
Burundi	2012	Ghana	1993	Mexico	1995	Tajikistan	2001
Cambodia	1989	Ghana	2000	Moldova	1994	Tajikistan	2006
Cameroon	1988	Ghana	2009	Moldova	1998	Tajikistan	2009
Cameroon	2006	Greece	1986	Moldova	2009	Tanzania	1975
Cameroon	2009	Greece	2001	Mongolia	1999	Tanzania	1979
Canada	1976	Greece	2009	Mongolia	2009	Tanzania	1996
Canada	1979	Grenada	1972	Montenegro, Republic of	2009	Tanzania	2000
Canada	1982	Grenada	1983	Morocco	1977	Thailand	1997
Canada	1994	Grenada	2003	Morocco	1986	Thailand	2006
Canada	1998	Guatemala	1982	Morocco	1988	Togo	1979
Cape Verde	1978	Guatemala	1988	Morocco	2001	Togo	1987
Cape Verde	1981	Guatemala	1993	Mozambique	1996	Togo	1998
Cape Verde	1987	Guatemala	1995	Mozambique	2002	Togo	2005
Cape Verde	1995	Guatemala	2001	Myanmar	1999	Togo	2007
Central African Republic	1976	Guinea	1974	Myanmar	2002	Trinidad and Tobago	1973
Central African Republic	1987	Guinea-Bissau	2013	Myanmar	2011	Trinidad and Tobago	1984
Central African Republic	1991	Guyana	1977	Namibia	1993	Trinidad and Tobago	1987
Central African Republic	1993	Guyana	1982	Namibia	2002	Trinidad and Tobago	1998
Central African Republic	2005	Haiti	1993	Namibia	2011	Trinidad and Tobago	2003
Central African Republic	2008	Haiti	2010	Nepal	1984	Tunisia	1978
Chad	2003	Honduras	1981	Nepal	1995	Tunisia	1983
Chile	1970	Honduras	1995	Nepal	1999	Tunisia	1985
Chile	1979	Honduras	2005	Nepal	2011	Tunisia	1994
Chile	1982	Honduras	2009	Netherlands	1981	Turkey	1994
Chile	1986	Hungary	1972	Netherlands	1997	Turkey	1998
Chile	1999	Hungary	1976	New Zealand	1976	Turkey	2001
Chile	2009	Hungary	1979	New Zealand	1985	Turkey	2012
China	1986	Hungary	1987	New Zealand	1993	Uganda	1992
China	1994	Hungary	1995	New Zealand	1996	Ukraine	1999
China	1996	Hungary	2009	New Zealand	1998	Ukraine	2009
Hong Kong SAR	1979	Iceland	2007	New Zealand	2009	United Kingdom	1989
Hong Kong SAR	1981	Iceland	2011	Niger	2010	United Kingdom	1991
Hong Kong SAR	1998	India	1972	Niger	2012	United Kingdom	1994
Colombia	1975	India	1991	Nigeria	1984	United Kingdom	2000
Colombia	1984	India	1997	Nigeria	1987	United States	1978
Colombia	1994	India	2001	Nigeria	2000	United States	1988
Colombia	1998	India	2006	Nigeria	2003	United States	2001
Comoros	1975	Indonesia	1983	Nigeria	2010	United States	2007
Comoros	1981	Indonesia	1987	Norway	1978	United States	2009
Comoros	1985	Indonesia	1995	Norway	1987	Uruguay	2003
Comoros	1995	Indonesia	1997	Norway	1999	Venezuela, Republica Bolivariana de	1979
Comoros	2012	Indonesia	2005	Oman	1974	Venezuela, Republica Bolivariana de	1983
Congo, Democratic Republic of	1977	Iran, Islamic Republic of	1973	Oman	1987	Venezuela, Republica Bolivariana de	1989
Congo, Democratic Republic of	2006	Iran, Islamic Republic of	1982	Oman	1994	Venezuela, Republica Bolivariana de	1997
Congo, Democratic Republic of	2009	Iran, Islamic Republic of	1992	Oman	1999	Venezuela, Republica Bolivariana de	1999
Congo, Republic of	1995	Iran, Islamic Republic of	1998	Oman	2010	Venezuela, Republica Bolivariana de	2010
Congo, Republic of	1997	Iran, Islamic Republic of	2004	Pakistan	1976	Vietnam	1995
Congo, Republic of	2004	Iraq	2005	Pakistan	1994	Vietnam	1997
Costa Rica	1975	Iraq	2010	Pakistan	1997	Vietnam	2010
Costa Rica	1980	Ireland	2001	Pakistan	2009	Yemen, Republic of	2000
Costa Rica	1982	Ireland	2009	Panama	1975	Zambia	1972
Costa Rica	1991	Ireland	2011	Panama	1980	Zambia	1976
Costa Rica	2009	Israel	1980	Panama	1988	Zambia	1999
Cote d'Ivoire	1982	Israel	1984	Panama	2000	Zimbabwe	2009

3. Mendoza and Terrones, *m=1.5*

Identified episodes with Mendoza and Terrones for m = 1.5

Country	Year of reversal	Country	Year of reversal	Country	Year of reversal
South Africa	1976	El Salvador	1990	Moldova	1998
Afghanistan	2007	Equatorial Guinea	1983	Montenegro, Republic of	2009
Albania	1992	Equatorial Guinea	1997	Morocco	1977
Algeria	1979	Estonia	2008	Morocco	1986
Algeria	1999	Finland	1988	Myanmar	1999
Antigua and Barbuda	1972	Finland	1991	Namibia	2002
Antigua and Barbuda	1987	Finland	2009	Nepal	1984
Armenia	1999	Finland	2013	Nepal	2011
Australia	1975	France	1992	New Zealand	1976
Australia	2008	France	1994	Niger	2010
Austria	1975	France	2004	Nigeria	1987
Azerbaijan	2005	Gabon	1978	Norway	1978
Bahamas, The	1975	Gabon	1987	Norway	1987
Bahamas, The	1982	Gabon	1989	Norway	1999
Bahamas, The	1999	Gabon	2009	Oman	1974
Bahamas, The	2007	Georgia	2009	Oman	1987
Bahrain, Kingdom of	1978	Germany	1981	Oman	1999
Bahrain, Kingdom of	1988	Germany	2001	Oman	2010
Bahrain, Kingdom of	1995	Ghana	2009	Pakistan	1997
Bangladesh	1972	Greece	2001	Pakistan	2009
Bangladesh	1989	Greece	2009	Panama	1980
Barbados	1970	Grenada	1972	Panama	1988
Barbados	1974	Grenada	2003	Panama	2000
Barbados	1982	Guatemala	1982	Paraguay	1975
Belarus	1995	Guatemala	1993	Paraguay	2003
Belarus	2011	Guinea	1974	Peru	1976
Belgium	1982	Guyana	1977	Peru	1998
Belgium	2009	Haiti	1993	Peru	2009
Belize	1972	Haiti	2010	Philippines	1983
Belize	1983	Honduras	1981	Philippines	1998
Belize	2002	Honduras	2009	Poland	1989
Belize	2004	Hungary	1979	Poland	1991
Benin	1981	Hungary	1995	Portugal	1983
Benin	2003	Hungary	2009	Qatar	1992
Benin	2005	Iceland	2007	Qatar	1997
Bhutan	1994	Iceland	2011	Romania	1993
Bolivia	1979	India	1991	Romania	2009
Bolivia	2003	India	1997	Sao Tome and Principe	2007
Botswana	1982	Indonesia	1983	Saudi Arabia	1985
Botswana	2003	Indonesia	1997	Saudi Arabia	2010
Brazil	1975	Indonesia	2005	Senegal	2009
Brazil	1983	Iraq	2010	Serbia, Republic of	2009
Bulgaria	1994	Ireland	2001	Seychelles	1973
Bulgaria	2008	Ireland	2009	Seychelles	2008
Burkina Faso	2009	Israel	1980	Sierra Leone	2001
Cambodia	1989	Israel	2000	Sierra Leone	2012
Cameroon	1988	Italy	1975	Singapore	1972
Canada	1976	Italy	2011	Slovak Republic	1999
Canada	1982	Jamaica	1983	Slovenia	2009
Cape Verde	1978	Jamaica	2009	Solomon Islands	2011
Cape Verde	1981	Japan	1975	Spain	2009
Central African Republic	1976	Japan	1981	Sri Lanka	1981
Central African Republic	1991	Jordan	1970	Sri Lanka	2009
Central African Republic	2005	Jordan	1972	St. Kitts and Nevis	1972
Central African Republic	2008	Jordan	1974	St. Lucia	1972
Chad	2003	Jordan	1978	St. Vincent and the Grenadines	1983
Chile	1982	Jordan	2008	St. Vincent and the Grenadines	1999
China	1986	Kazakhstan	1993	Sudan	1975
China	1994	Kenya	1975	Suriname	1992
Hong Kong SAR	1979	Kenya	1979	Suriname	2000
Hong Kong SAR	1981	Kenya	1990	Swaziland	1980
Colombia	1984	Kenya	2013	Swaziland	2008
Colombia	1998	Korea, Republic of	1975	Sweden	2009
Comoros	1981	Korea, Republic of	1997	Switzerland	1981
Comoros	1985	Kuwait	1992	Syrian Arab Republic	2001
Comoros	2012	Kyrgyz Republic	1997	Taiwan Province of China	1976
Congo, Democratic Republic of	2006	Kyrgyz Republic	2008	Taiwan Province of China	1981
Congo, Democratic Republic of	2009	Lao, P.D.R.	1988	Tajikistan	1999
Congo, Republic of	1995	Lao, P.D.R.	1999	Tajikistan	2009
Costa Rica	1982	Latvia	2000	Tanzania	1975
Costa Rica	1991	Latvia	2008	Thailand	1997
Cote d'Ivoire	1982	Lebanon	1985	Thailand	2006
Croatia	2000	Lebanon	1996	Togo	1979
Cyprus	1979	Lesotho	2000	Trinidad and Tobago	1984
Cyprus	2009	Libya	1974	Trinidad and Tobago	2003
Czech Republic	1997	Libya	1982	Tunisia	1978
Djibouti	2009	Lithuania	2008	Tunisia	1994
Dominica	1972	Macedonia, FYR	1998	Turkey	1994
Dominica	1982	Macedonia, FYR	2009	Turkey	2001
Dominica	1990	Madagascar	2010	Ukraine	1999
Dominica	2001	Malaysia	1984	Ukraine	2009
Dominican Republic	1983	Malaysia	1996	United Kingdom	1989
Dominican Republic	1992	Maldives	1978	United Kingdom	1991
Dominican Republic	1995	Maldives	1982	United States	1988
Dominican Republic	2001	Maldives	1994	United States	2007
Dominican Republic	2009	Maldives	2006	Uruguay	2003
Dominican Republic	2011	Mali	1981	Venezuela, Republica Bolivariana de	1979
Ecuador	1972	Mali	1997	Venezuela, Republica Bolivariana de	1983
Ecuador	1984	Mali	2011	Venezuela, Republica Bolivariana de	1989
Ecuador	1999	Malta	2001	Venezuela, Republica Bolivariana de	1997
Ecuador	2003	Mauritania	2006	Vietnam	1995
Egypt	1976	Mauritania	2013	Vietnam	2010
Egypt	1992	Mauritius	1982	Zambia	1972
El Salvador	1979	Mexico	1982	Zambia	1976
El Salvador	1981	Mexico	1995	Zimbabwe	2009

4. Mendoza and Terrones, *m=1.75*

Identified episodes with Mendoza and Terrones for m = 1.75

Country	Year of reversal	Country	Year of reversal	Country	Year of reversal
South Africa	1976	Finland	2009	Namibia	2002
Afghanistan	2007	Finland	2013	Nepal	1984
Albania	1992	France	1992	New Zealand	1976
Algeria	1979	France	1994	Norway	1978
Algeria	1999	France	2004	Norway	1987
Antigua and Barbuda	1972	Gabon	1978	Norway	1999
Antigua and Barbuda	1987	Gabon	1987	Oman	1974
Armenia	1999	Gabon	1989	Oman	1987
Australia	2008	Gabon	2009	Oman	1999
Austria	1975	Georgia	2009	Pakistan	2009
Azerbaijan	2005	Ghana	2009	Panama	1980
Bahamas, The	1975	Greece	2001	Panama	2000
Bahamas, The	1982	Greece	2009	Paraguay	1975
Bahamas, The	1999	Grenada	1972	Paraguay	2003
Bahamas, The	2007	Grenada	2003	Peru	1976
Bahrain, Kingdom of	1978	Guatemala	1982	Peru	1998
Bahrain, Kingdom of	1995	Guatemala	1993	Philippines	1983
Bangladesh	1989	Guinea	1974	Philippines	1998
Barbados	1982	Guyana	1977	Poland	1989
Belgium	1982	Haiti	1993	Poland	1991
Belgium	2009	Haiti	2010	Portugal	1983
Belize	1972	Honduras	2009	Qatar	1992
Belize	2004	Hungary	1979	Qatar	1997
Benin	1981	Hungary	1995	Romania	1993
Bolivia	1979	Iceland	2007	Romania	2009
Bolivia	2003	Iceland	2011	Saudi Arabia	1985
Botswana	2003	India	1997	Saudi Arabia	2010
Brazil	1975	Indonesia	1983	Senegal	2009
Brazil	1983	Indonesia	1997	Serbia, Republic of	2009
Bulgaria	1994	Iraq	2010	Seychelles	1973
Bulgaria	2008	Ireland	2001	Sierra Leone	2001
Burkina Faso	2009	Ireland	2009	Sierra Leone	2012
Cambodia	1989	Israel	2000	Singapore	1972
Cameroon	1988	Italy	1975	Slovak Republic	1999
Canada	1976	Italy	2011	Slovenia	2009
Canada	1982	Jamaica	1983	Spain	2009
Cape Verde	1978	Jamaica	2009	Sri Lanka	1981
Cape Verde	1981	Japan	1981	Sri Lanka	2009
Central African Republic	1976	Jordan	1970	St. Kitts and Nevis	1972
Chad	2003	Jordan	1972	St. Lucia	1972
Chile	1982	Jordan	1974	St. Vincent and the Grenadines	1983
China	1986	Jordan	1978	Sudan	1975
Hong Kong SAR	1979	Jordan	2008	Suriname	1992
Hong Kong SAR	1981	Kazakhstan	1993	Swaziland	1980
Colombia	1984	Kenya	1979	Swaziland	2008
Colombia	1998	Korea, Republic of	1975	Sweden	2009
Comoros	1985	Kuwait	1992	Syrian Arab Republic	2001
Congo, Democratic Republic of	2009	Kyrgyz Republic	2008	Taiwan Province of China	1981
Congo, Republic of	1995	Lao, P.D.R.	1999	Tajikistan	1999
Costa Rica	1982	Latvia	2000	Thailand	1997
Costa Rica	1991	Lebanon	1985	Togo	1979
Cote d'Ivoire	1982	Lithuania	2008	Trinidad and Tobago	1984
Croatia	2000	Madagascar	2010	Trinidad and Tobago	2003
Cyprus	1979	Malaysia	1984	Tunisia	1978
Cyprus	2009	Malaysia	1996	Turkey	1994
Czech Republic	1997	Maldives	1982	Turkey	2001
Djibouti	2009	Maldives	2006	Ukraine	2009
Dominica	1972	Mali	1981	United Kingdom	1989
Dominican Republic	1992	Mali	1997	United States	1988
Ecuador	1972	Mali	2011	Uruguay	2003
Ecuador	2003	Malta	2001	Venezuela, Republica Bolivariana de	1979
Egypt	1992	Mauritania	2006	Venezuela, Republica Bolivariana de	1989
El Salvador	1981	Mauritius	1982	Vietnam	1995
Equatorial Guinea	1983	Mexico	1982	Vietnam	2010
Equatorial Guinea	1997	Mexico	1995	Zambia	1972
Estonia	2008	Moldova	1998	Zambia	1976
Finland	1988	Montenegro, Republic of	2009	Zimbabwe	2009
Finland	1991	Myanmar	1999		

5. Mendoza and Terrones, *m=2.0*

Identified episodes with Mendoza and Terrones for m = 2.0

Country	Year of reversal	Country	Year of reversal
South Africa	1976	Jordan	1978
Albania	1992	Kazakhstan	1993
Antigua and Barbuda	1972	Korea, Republic of	1975
Antigua and Barbuda	1987	Kuwait	1992
Austria	1976	Lao, P.D.R.	1999
Azerbaijan	2005	Lebanon	1985
Bahamas, The	1999	Malaysia	1984
Bahrain, Kingdom of	1978	Maldives	1982
Bangladesh	1989	Maldives	2006
Barbados	1982	Mali	1997
Belgium	1982	Malta	2001
Belgium	2009	Mauritania	2006
Benin	1981	Mauritius	1982
Botswana	2003	Mexico	1982
Brazil	1975	Moldova	1998
Brazil	1983	Myanmar	1999
Bulgaria	2008	Nepal	1984
Cambodia	1989	New Zealand	1976
Canada	1982	Norway	1987
Cape Verde	1978	Norway	1999
Cape Verde	1981	Oman	1974
Central African Republic	1976	Oman	1987
Chad	2003	Oman	1999
Chile	1982	Pakistan	2009
China	1986	Panama	1980
Hong Kong SAR	1979	Paraguay	1975
Colombia	1998	Paraguay	2003
Comoros	1985	Peru	1976
Congo, Democratic Republic of	2009	Philippines	1983
Congo, Republic of	1995	Philippines	1998
Costa Rica	1982	Portugal	1983
Costa Rica	1991	Qatar	1992
Cote d'Ivoire	1982	Qatar	1997
Cyprus	2009	Romania	1993
Czech Republic	1997	Romania	2009
Djibouti	2009	Saudi Arabia	1985
Ecuador	1972	Serbia, Republic of	2009
Ecuador	2003	Sierra Leone	2001
Egypt	1992	Sierra Leone	2012
Equatorial Guinea	1983	Singapore	1972
Equatorial Guinea	1997	Slovenia	2009
Finland	1991	Spain	2009
Finland	2013	Sri Lanka	1981
France	1992	Sri Lanka	2009
France	1994	St. Kitts and Nevis	1972
Gabon	1987	St. Lucia	1972
Gabon	1989	St. Vincent and the Grenadines	1983
Gabon	2009	Sudan	1975
Georgia	2009	Suriname	1992
Ghana	2009	Swaziland	1980
Greece	2001	Swaziland	2008
Grenada	1972	Sweden	2009
Grenada	2003	Syrian Arab Republic	2001
Guinea	1974	Taiwan Province of China	1981
Honduras	2009	Thailand	1997
Iceland	2007	Togo	1979
Iceland	2011	Trinidad and Tobago	1984
Indonesia	1983	Tunisia	1978
Indonesia	1997	Turkey	1994
Ireland	2001	Turkey	2001
Ireland	2009	United States	1988
Italy	1975	Uruguay	2003
Italy	2011	Vietnam	2010
Jordan	1970	Zambia	1972
Jordan	1972	Zambia	1976
Jordan	1974	Zimbabwe	2009

Appendix 2

As a final robustness check, we re-run the econometric exercises using (i) the episodes selected by the Mendoza and Terrones (2008, 2012) algorithm, and (ii) a restricted sample in which we exclude the episodes in which the exchange rate regime switched when capital flows reversed.. Table A.1 shows that the results hold throughout the specifications for the Mendoza and Terrones algorith. Only the statistical significance of the exchange rate regime in the cross-section specification diminishes to 15 percent, probably reflecting the lower number of observations. Table A.2 presents the restricted sample regression, where all the results in Table 4 above remain unaltered.

Table A.1. Robustness I.

M & T	Panel: credit growth						Cross-section
	Baseline	**Regional**	**Time effect**	**IV baseline**	**IV regional**	**IV period**	**Reversal**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	real_credit_growth	real_credit_growth	real_credit_growth	real_credit_growth	real_credit_growth	real_credit_growth	cred_reversal
Financial account balance	0.000247	0.000243	0.000220	0.000160	0.000219	0.000189	
	(0.000200)	(0.000199)	(0.000199)	(0.000211)	(0.000196)	(0.000196)	
Real GDP (RGDP) growth	1.807***	1.806***	1.751***	1.804***	1.920***	1.874***	
	(0.146)	(0.146)	(0.147)	(0.163)	(0.156)	(0.158)	
Broad money real growth	0.488***	0.472***	0.491***	0.883***	0.445***	0.464***	
	(0.0377)	(0.0383)	(0.0374)	(0.139)	(0.0430)	(0.0424)	
Real effective exchange rate (REER)	5.864	6.540	6.054	4.529	7.961*	7.261	
	(4.118)	(4.159)	(4.087)	(4.715)	(4.669)	(4.641)	
Exchange rate regime	-4.549***	-5.027***	-4.602***	-4.308***	-5.225***	-4.790***	-2.261^
	(0.653)	(0.728)	(0.648)	(0.737)	(0.881)	(0.809)	(1.794)
Latin America dummy		-2.785**			-2.879*		
		(1.377)			(1.672)		
Emerging Europe dummy		4.549			6.665		
		(4.652)			(5.605)		
ASEAN 5 dummy		-0.762			-0.872		
		(2.170)			(2.636)		
Central & East Europe dummy		-2.236			-3.105		
		(4.587)			(5.534)		
Other advanced countries dummy		-1.652			-2.253		
		(1.810)			(2.191)		
Average RGDP growth during boom							1.934***
							(0.626)
Average finan. account bal boom							9.173
							(18.82)
Average REER during boom							0.00483***
							(0.00104)
							0.586***
							(0.211)
Constant	3.364	4.662	2.615	5.254	3.022	1.398	-4.710
	(4.268)	(4.425)	(4.670)	(4.904)	(5.015)	(5.220)	(19.44)
Observations	1,186	1,186	1,186	1,069	1,069	1,069	114
R-squared				0.224	0.258	0.263	0.364
Number of countries	118	118	118	118	118	118	
Chi squared	414.6	427.0	443.5	253.2	351.2	361.4	
Log likelihood	-5150	-5146	-5140				-471.3

Sources: authors' calculations.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1, ^ p<0.15

Table A.2. Robustness II

R & R--restricted sample 1/	Panel: credit growth						Cross-section
	Baseline	**Regional**	**Time effect**	**IV baseline**	**IV regional**	**IV period**	**Reversal**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	real credit growth	real credit growth	real credit growth	real credit growth	real credit growth	real credit growth	cred reversal
Financial account balance	0.000243	0.000246*	0.000218	0.000134	0.000202	0.000170	
	(0.000149)	(0.000148)	(0.000149)	(0.000161)	(0.000137)	(0.000137)	
Real GDP (RGDP) growth	1.821***	1.754***	1.766***	1.854***	1.865***	1.855***	
	(0.123)	(0.124)	(0.124)	(0.137)	(0.129)	(0.130)	
Broad money real growth	0.570***	0.548***	0.572***	1.114***	0.632***	0.646***	
	(0.0317)	(0.0324)	(0.0315)	(0.126)	(0.0350)	(0.0344)	
Real effective exchange rate (REER)	12.40***	12.98***	12.71***	12.44***	11.76***	10.99***	
	(3.492)	(3.471)	(3.476)	(4.036)	(3.954)	(3.975)	
Exchange rate regime	-3.286***	-3.708***	-3.319***	-3.278***	-3.461***	-3.348***	-2.364*
	(0.455)	(0.562)	(0.451)	(0.509)	(0.765)	(0.636)	(1.221)
Latin America dummy		-10.51**			-9.795		
		(5.029)			(6.889)		
Emerging Europe dummy		-1.843			-1.054		
		(4.296)			(5.988)		
ASEAN 5 dummy		-5.361			-5.128		
		(5.182)			(7.098)		
Central & East Europe dummy		-5.349**			-5.620		
		(2.706)			(3.535)		
Other advanced countries dummy		-9.881*			-10.40		
		(5.073)			(6.956)		
Average RGDP growth during boom							1.688***
							(0.525)
Average finan. account bal boom							0.00611***
							(0.00116)
Average REER during boom							14.49
							(19.56)
Average real broad mon growth boom							0.416**
							(0.190)
Constant	-4.465	4.987	-4.256	-3.791	5.030	-2.464	-8.996
	(3.629)	(6.292)	(3.895)	(4.200)	(8.142)	(4.388)	(19.94)
Observations	1,202	1,202	1,202	1,081	1,081	1,081	118
R-squared				0.350	0.393	0.389	0.333
Number of countries	123	129	123	123	123	123	
Chi squared	641.2	825.5	672.8	354.4	660.3	666.9	
Log likelihood	-4877	-5146	-4867				-471.7

Source: authors' calculations.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
1/ The sample excludes those episodes where the exchange rate regime switched at the time capital flows reversed.

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