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World?**

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The Financial Center Leverage Cycle: Does it Spread Around the World?

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Abstract

With a novel database, we examine the evolution of capital flows to the periphery since the collapse of the Bretton Woods System in the early 1970s. We decompose capital flows into global, regional, and idiosyncratic factors. In contrast to previous findings, which mostly use data from the 2000s, we find that booms and busts in capital flows are mainly explained by regional factors and not the global factor. We then ask, what drives these regional factors. Is it the leverage cycle in the financial center? What triggers the leverage cycle in the financial center? Is it a change in global investors' risk appetite? Or, is it a change in the demand for capital in the periphery? We link leverage in the financial center to regional capital flows and the cost of borrowing in international capital markets to answer these questions. Our estimations indicate that regional capital flows are driven by supply shocks. Interestingly, we find that the leverage in the financial center has a time-varying behavior, with a movement away from lending to the emerging periphery in the 1970s to the 1990s towards lending to the advanced periphery in the 2000s.

Keywords: International Borrowing Cycles. Global and Regional Factors. Push and Pull Factors of Capital Flows. Financial Center Leverage Cycles.

JEL Codes: F30, F34, F65

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I. Introduction

The research on capital flow cycles surged in the aftermath of the 2007-2009 U.S. Subprime Crisis. The focus of attention of these studies has been on the leverage cycle in the financial center and its spillovers on capital flow booms and busts around the world (Bruno and Shin 2015). Importantly, this research only studies one capital-flow cycle: the one around the U.S. financial crisis in the 2000s. However, capital flows restarted in the 1970s following a long hiatus since the Great Depression in 1931 when barriers to capital flows were erected around the world. The gap in research covering this longer period leaves many questions still unanswered. Does the leverage cycle in the financial center also explain boom-bust cycles in the periphery in earlier periods? In this longer episode (1970s to the present), are the spillovers around the periphery of a global or regional pattern? What triggers the leverage cycle in the financial center? Is it a change in global investors' risk appetite? Or, is it a change in the demand for capital in the periphery?

In this paper, we examine capital flow cycles since the restart of financial globalization in the 1970s following the collapse of the Bretton Woods System. Since the International Monetary Fund's (IMF) database on capital flows does not span this long period, we construct a new annual database on gross capital inflows from 1973 to 2017. Using the methodology in Kose, Otrok, and Whiteman (2003), we decompose capital flow cycles into global, regional, and idiosyncratic factors. We find that capital flow cycles in the periphery in our far longer sample are of a regional pattern, as opposed to earlier research (Rey 2015) that finds that capital flow cycles in the periphery are of only a global pattern. Still, consistent with previous literature, we find that shocks to leverage in the financial center spread to the whole periphery, but with a twist: they only affect the boom-bust cycles in the emerging periphery in the earlier period (the 1970s to 1990s) and only affect the boom-bust cycles in the advanced periphery in the most recent period (the 2000s). We then jointly examine the evolution of leverage in the financial center,

regional capital flows, and yield spreads in the periphery to assess the origin of these boom-bust cycles and find that supply shocks are at the core of regional capital flow cycles in the periphery.

II. The Data

The empirical research on capital flows mostly examines the boom-bust cycles starting in the late 1990s or even later because of limitations with the capital flows data collected by the IMF for the Balance of Payments Statistics. In this paper, we examine capital flows since the collapse of the Bretton Woods System in the early 1970s using data on bonds, syndicated loans, and equities issued in international capital markets by both public and private entities. The original database is granular and includes individual issues from the archives of the World Bank as well as from the Dealogic and Bloomberg Platforms. The individual issues were aggregated by country to construct series of capital flows spanning forty-five years.¹ The measure of capital flows used in this study is international gross primary issuance. This measure of capital flows captures gross capital inflows and is defined as purchases of domestic assets by foreign residents. This data allows us to capture the boom-bust cycles starting in the mid-1970s that affected countries in Africa, Asia, Eastern Europe, and Latin America; the boom-bust cycles in the mid-1990s that affected countries in Asia and Latin America; and the boom-bust cycles in the mid-2000s that affected countries in Europe.

In this paper, we study capital flows to advanced and emerging periphery countries that heavily tap international capital markets. We focus on 28 countries across three regions (Asia, Europe, and Latin America).² For each country, we constructed our measure of capital flows as (international gross primary issuance)/exports to capture each country's participation in international capital markets relative to the

¹ This database was initially collected by Kaminsky (2019) to study capital flow cycles for two hundred years and by Kaminsky, Medina, and Wang (2019) to estimate the global and regional factors.

² The countries in Asia are China, Indonesia, Malaysia, Philippines, Korea, Thailand, and Vietnam; the countries in Europe are Austria, Belgium, Denmark, Finland, France, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, and Sweden; and the countries in Latin America are Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay.

size of its economy.³

III. Global and Regional Factors

Our estimates of the global and regional factors for the 28 countries in our sample are from Kaminsky, Medina, and Wang (2019). In that paper, we used annual data from 1973 to 2017 to estimate the dynamic latent factor model developed by Kose, Otrok, and Whiteman (2003):

$$(1) \quad y_{i,t} = \alpha_i + \beta_i^G \cdot f_t^G + \beta_i^R \cdot f_t^R + \mu_{i,t}$$

$y_{i,t}$ is our (normalized)⁴ measure of capital flows of country i in year t , f_t^G is the unobserved global factor affecting all the countries in the sample, f_t^R is the unobserved regional factor affecting all the countries in a particular region, and $\mu_{i,t}$ is the unobserved (country-specific) idiosyncratic factor. All the factors (global, regional, and idiosyncratic) are independent by construction and follow autoregressive processes.

Figure 1 shows the evolution of the (normalized) measure of capital flows together with its decomposition into global, regional, and idiosyncratic components for all the countries in our sample. As shown in this figure, all booms and busts are mostly explained by the regional factors and not the global factor. In fact, over the whole sample, the global factor only explains 16 percent of the variance of capital flows across all countries while the regional factors explain 42 percent of the variance of capital flows across all countries; with the idiosyncratic factors explaining the remaining 42 percent.

Figure 2 shows the evolution of the estimated regional factors for Asia, Europe, and Latin America. The regional factors for Asia and Latin America capture two episodes of highly pronounced bonanzas and busts: one starting in the mid-1970s and the other in the early 1990s. The other boom-bust cycles in these regions (the ones in the 2000s) are far less pronounced. The regional factor for Europe captures the bonanzas and sudden stops of the early 1990s and the mid-2000s.

³ Exports can be volatile. For the (international gross primary issuance)/export ratio to only capture the volatility of capital flows, we use trend exports as the scale variable. We estimate trend exports with the Hodrick-Prescott filter.

⁴ To estimate the model, we need to normalize our capital flow series (international gross primary issuance/exports) to a zero-mean and unit-variance variable.

IV. The Role of the Financial Center

We use the Jordà (2005) Local Projections methodology together with the Ramey and Zubairy (2018) modifications to examine the effect of shocks to leverage in the financial center on the regional factors of Asia, Europe, and Latin America allowing for time-varying effects. Since most of the empirical research on the role of leverage in the financial center on capital flows to the periphery focuses on the boom-bust cycles in the 2000s, we want to examine whether there is a difference between these more recent capital flow cycles and the capital flow cycles in the earlier years of financial globalization. Since the allocation of capital in the 2000s may have been affected by the creation of the European Monetary Union in 1999, we estimate the effects of shocks to leverage in the financial center on capital flows to each of the three regions for two different periods: the earlier period starting in 1973 and ending in the year prior to the creation of the European Monetary Union, and the recent period from 1999 to 2017.

We estimate the following model separately for each regional factor at different horizons: $h = 0, 1, 2, 3,$ and 4 (years).

$$(2) \quad f_{t+h}^R = I^e [\alpha_h^e + \beta_h^e(L) \cdot f_{t-1}^R + \gamma_h^e \cdot fc_t] + I^r [\alpha_h^r + \beta_h^r(L) \cdot f_{t-1}^R + \gamma_h^r \cdot fc_t] + \varepsilon_{t+h}$$

f^R is the regional factor, $\beta_h(L)$ is a polynomial in the lag operator, and fc is the financial center leverage cycle. The coefficient γ_h gives the response of the regional factor at time $t + h$ to a shock to leverage in the financial center at time t . We allow all the coefficients of the model to vary between our two periods (the earlier (e) and the recent (r) periods). I^e (I^r) is a dummy variable that indicates the state of the economy when the shock hits and it is equal to 1 during the earlier (recent) period. We follow Bruno and Shin (2015) and capture the leverage in the financial center with the U.S. Broker-Dealer Leverage.⁵

Our results are shown in Figure 3. This Figure shows the local projections in the earlier period (shown in blue) and the local projections in the recent period (shown in red). Interestingly, when we allow

⁵ The leverage of the U.S. broker dealer sector is from the U.S. Flow of Funds series published by the Federal Reserve. We obtain the Financial Center Leverage Cycle by detrending the series using the Hodrick-Prescott filter.

for different responses in the earlier and recent periods, we find that, although shocks to leverage in the financial center affect all three regional factors, they affect the emerging and advanced periphery in different periods. Leverage shocks in the financial center only affect the regional factors in the emerging periphery during the earlier period but only affect the regional factor in the advanced periphery during the recent period. The results are not only statistically significant but also economically significant. For example, a one-standard deviation shock to the leverage cycle in the financial center in the early period leads to an immediate increase in Asia's regional factor from zero to one (equivalent to about 70 percent of the standard deviation of Asia's regional factor during the earlier period) which then declines over the next 4 years. A one-standard deviation shock to the leverage cycle in the financial center in the early period also leads to a persistent increase in Latin America's regional factor from zero to 0.6 (equivalent to about 45 percent of the standard deviation of Latin America's regional factor during the earlier period). Similarly, a one-standard deviation shock to the leverage cycle in the financial center in the recent period leads to an initial increase in Europe's regional factor which subsequently keeps increasing and peaks at 0.6 (equivalent to about 50 percent of the standard deviation of Europe's regional factor during the recent period) in the second year after the shock.

We next look at what triggers the boom-bust capital flow cycles in the periphery. If capital flow bonanzas are driven by an increase in the demand for capital, borrowing costs would increase as the level of capital inflows increases. On the other hand, borrowing costs would decline as capital inflows increase if they are fueled by an increase of global investors' risk appetite (a supply shock). To assess the origin of the boom-bust cycles, we examine the evolution of borrowing costs around the regional factor peaks in 1981, 1997, and 2007. Since we are studying the allocation of capital from the financial center to the

periphery, we capture borrowing costs by calculating the spreads between the yield of bonds and syndicated loans of each country in the periphery and the corresponding yield in the financial center.⁶

To shed light on whether regional capital flow cycles may have different triggers in the earlier and most recent episodes, we examine these episodes separately.⁷ Figure 4 shows the borrowing costs for a 10-year interval around the year of the peak in capital flows in each region. In each panel, the solid line represents the average borrowing costs across countries within a region (Asia, Europe, and Latin America) and the dotted lines denote the one-standard-error bands around the average.⁸ The evidence in Figure 4 indicates that the regional bonanzas in the emerging periphery in the earlier period and the regional bonanza in the advanced periphery in the recent period are fueled by a supply shock. As shown in Panels A and B, spreads for the emerging periphery during the bonanzas with peaks in 1981 and 1997 declined substantially: from a minimum of 35 percent (for Asian countries in the run-up to the 1997 crisis) to a maximum of 70 percent (for Latin American countries from the Tequila Crisis to the end of the capital flow bonanza in the region in 1997). The evidence from the advanced periphery in the recent period is quite similar to that of the emerging periphery during the earlier episode, with the average 10-year bond yield

⁶ Syndicated loans were basically the only instrument used in international capital markets in the 1970s and 1980s. Thus, for these earlier years, we construct country spreads using data on syndicated loans from both the primary and the secondary markets. For the years of the bonanza, we use information from the primary market and construct the country spread as the average spread of all syndicated loans for each country relative to the base interest rate (mostly the Libor rate). The spreads are from the World Bank and Dealogic. The syndicated loan market collapsed with the defaults in the emerging periphery countries in the early 1980s, with basically no issuance. Thus, for the years of the bust, we construct the spreads as the ratio of the face value of syndicated loans relative to their value in the secondary market. The prices in the secondary market are from Boehmer and Megginson (1990). Unfortunately, for Asia, there is only data on market prices for the Philippines. Since international bond issuance surged in the 1990s, we capture borrowing costs using bond spreads for the later years starting in 1990. For the emerging periphery, we use the J.P. Morgan EMBIG Spreads and for the advanced periphery, we use the 10-Year Bond Spreads, which we construct as the difference between each European country's 10-Year Bond Yield and Germany's 10-Year Bond Yield. These yields are from the OECD Database.

⁷ Since shocks to leverage cycles in the financial center only affect the boom-bust cycles in the emerging periphery in the earlier period and only affect the boom-bust cycles in the advanced periphery during the recent period, we only examine the evolution of the borrowing costs during the cycles of the 1970s-1980s and 1990s for the emerging periphery, and during the cycles of the 2000s for the advanced periphery.

⁸ The syndicated loan spreads until 1981 are in basis points while the syndicated loan spreads from 1985 to 1988, captured as the ratio of the face and market values of the loans, are in percent. The EMBIG and the 10-year bond spreads are in basis points.

in the advanced periphery continuously decreasing and becoming indistinguishable from the 10-year bond yield in Germany before the eruption of the U.S. Subprime Crisis in 2007.

Importantly, the evolution of borrowing costs in the aftermath of the bonanzas in these three regions, both during the earlier and the recent periods, also suggests the presence of supply shocks. In all these episodes, global investors withdrew from international capital markets and the cost of borrowing sharply increased amid a collapse in international capital flows.

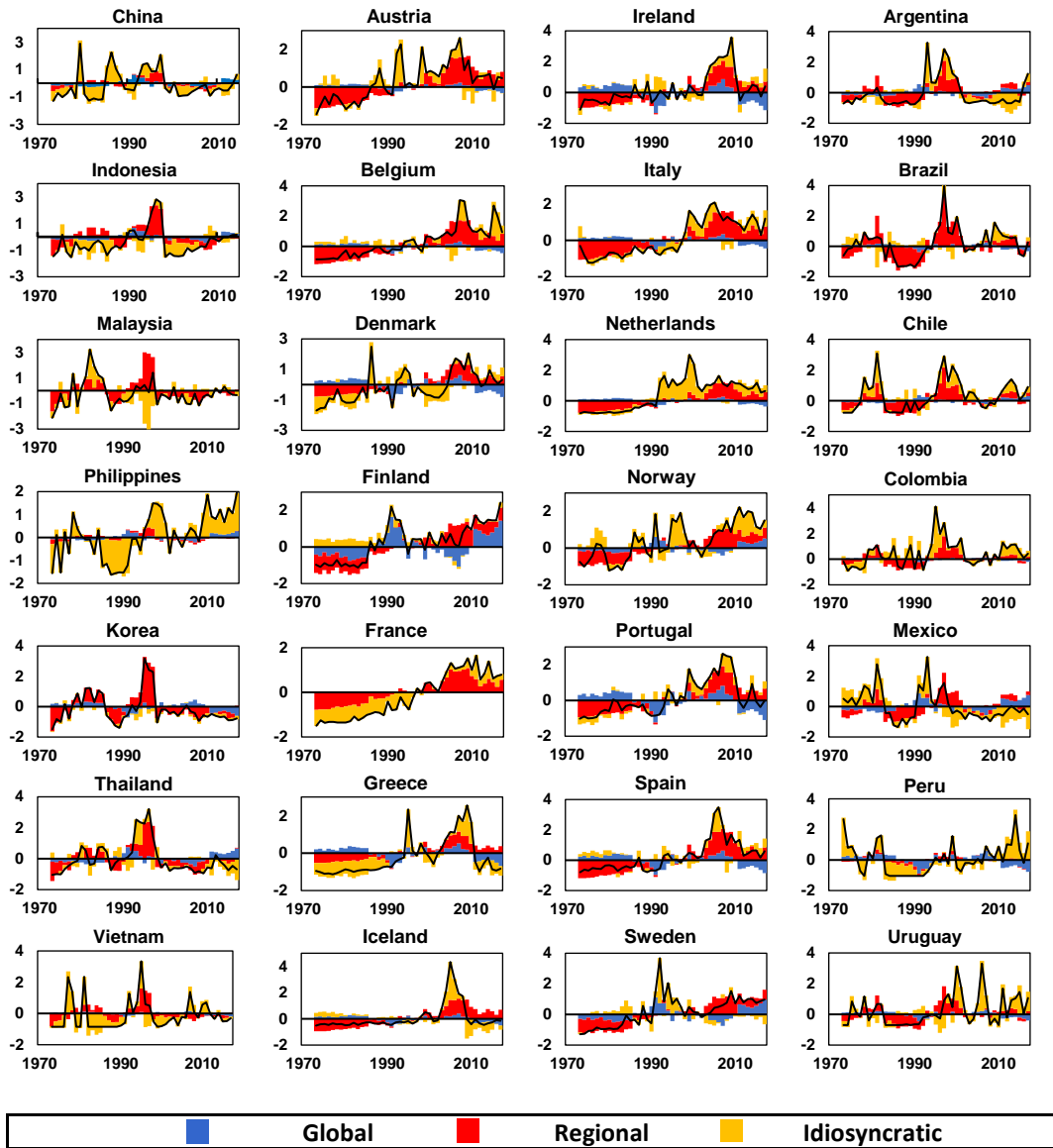
V. Conclusions

Our estimations indicate that capital flows around the world do not move in unison. Still, there is a supply shock at the core of all these regional capital flow cycles. We have left unanswered why there is a movement away from lending to the emerging periphery (in the earlier period) towards lending to the advanced periphery (in the 2000s). Future research needs to study the route through which leverage cycles in the financial center spread around the world.

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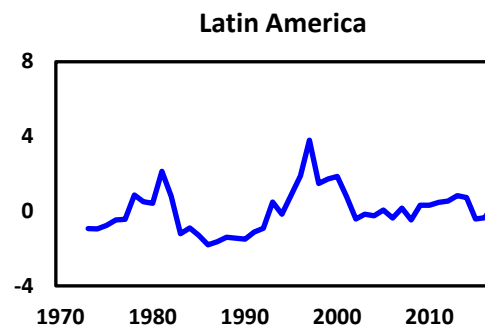
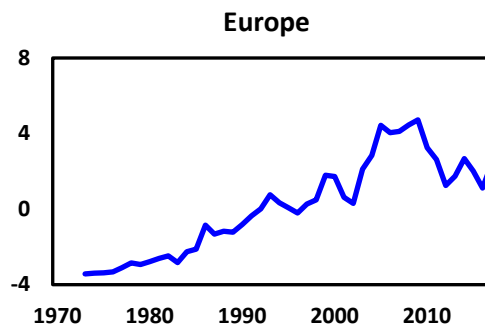
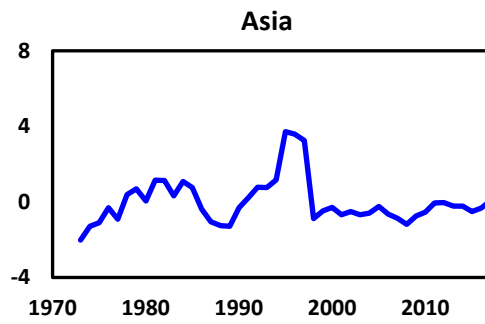
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Figure 1
The Role of Global, Regional, and Idiosyncratic Factors



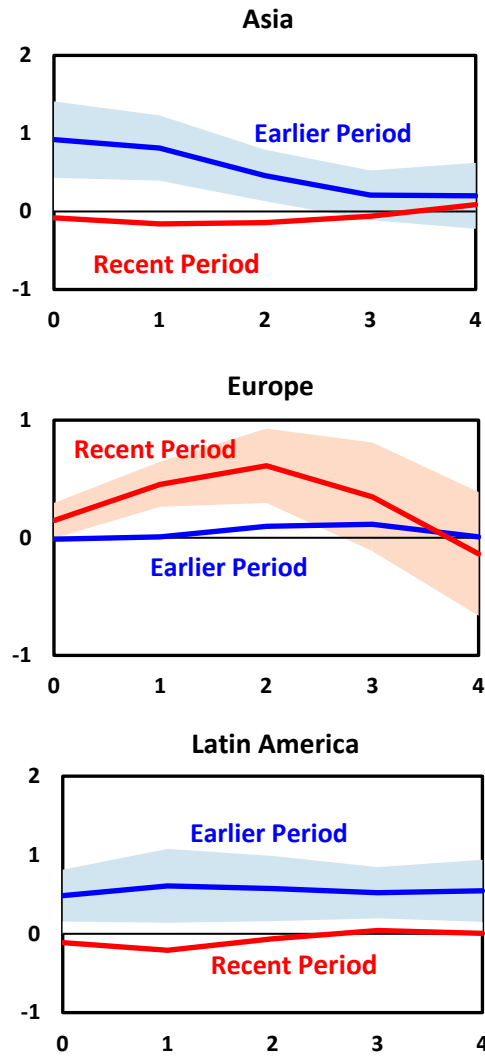
Notes: This Figure shows the role of the Global, Regional, and Idiosyncratic Factors on the evolution of the (normalized) Capital Flows/Exports (shown as a black line). Capital Flows are captured by International Gross Primary Issuance. For each country, we normalized Capital Flows/Exports to a zero-mean, unit-variance series prior to the estimation of the Dynamic Latent Factor Model.

Figure 2
Regional Factors



Notes: This Figure shows the Regional Factors estimated in Kaminsky, Medina, and Wang (2019) using a Dynamic Latent Factor Model.

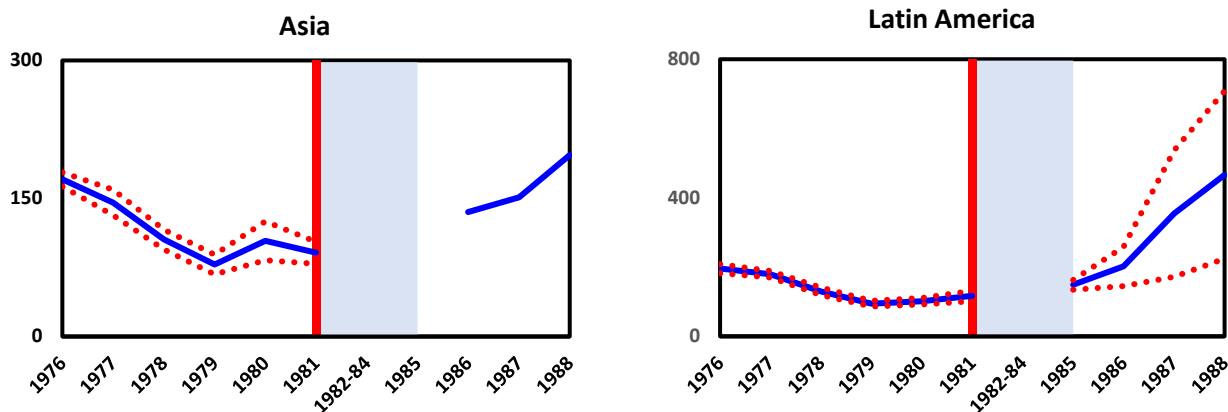
Figure 3
Effects of Leverage Shocks



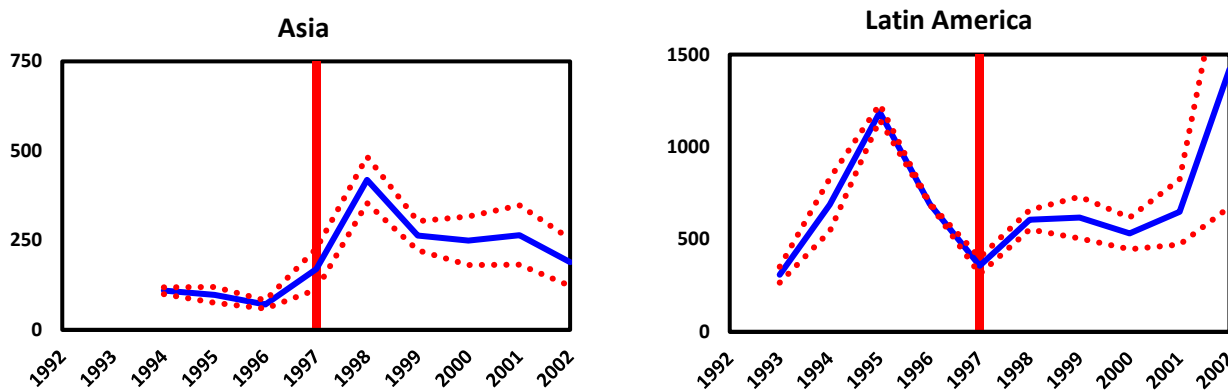
Notes: This Figure shows the response of the Regional Factors to a one-standard deviation shock to the Leverage Cycle in the Financial Center (at different horizons: 0, 1, 2, 3, 4 (years)) in the Earlier Period (1973 to 1998) and in the Recent Period (1999 to 2017). The shaded region is the 90% confidence interval.

Figure 4
Borrowing Costs

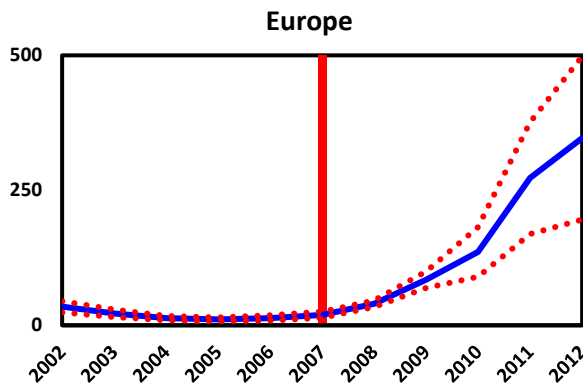
Panel A: Syndicated Loan Spreads
1976-1988



Panel B: EMBIG Spreads
1992-2002



Panel C: 10-Year Bond Spreads
2002-2012



Notes: This Figure shows the evolution of borrowing costs during the capital flow cycles with peaks in 1981, 1997, and 2007. Borrowing Costs are captured with Syndicated Loan Spreads (Panel A), with EMBIG spreads (Panel B), and with 10-Year Bond Yield Spreads (Panel C). The red vertical line indicates the year of the peak of the capital flow cycle and the blue shaded area in Panel A identifies the years with no data on spreads.