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ABSTRACT

We examine how financial expansion and contraction cycles affect the broader economy through their impact on eight real economic sectors in a panel of 28 countries over 1960-2005. Periods of accelerated growth of the financial sector are more likely to be followed by abrupt financial contractions. Sharp fluctuations in the financial sector have asymmetric effects, with the majority of real sectors adversely affected by contractions but not helped by expansions. The adverse effects of financial contractions are transmitted almost exclusively by the financial openness channel with foreign reserves mitigating these effects with a sizeable impact during sharp financial contractions.

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1. Introduction and overview

The risks associated with premature liberalization and external integration of the financial sector in emerging markets have been known at least since the documentation of the Southern Cone experience by Diaz-Alejandro (1985). However, the subprime mortgage crisis which began in 2006 in the U.S. and then morphed into the Great Recession of 2008-09 shows that financial systems even in the advanced economies are vulnerable. Notably, evidence in Philippon (2008) shows that the U.S. crisis was preceded by a massive and unprecedented expansion of the financial sector between 2002 and 2007. Philippon does not find an explanation for this expansion based on the needs of the corporate sector, although as others have pointed out, this may be because of the rise of household borrowing in connection with subprime mortgage loans combined with moral hazard and excessive risk-taking.

The point emerging from the above is that the financial sector must be assessed in terms of its impact on the growth of the real sector, which is where the social costs and benefits ultimately reside. For example, the authors of the 2010 Squam Lake Report (French et al. 2010) on fixing the U.S. financial sector note (p. 26) that "…effective financial regulations require that politicians, and ultimately, the public, have an adequate understanding of the financial system. The political turmoil surrounding the Crisis suggests the importance of disseminating expert knowledge about finance to a broader audience …" The starting point of conveying such understanding in order to gain support for regulatory reform must be an analysis of the links between the financial sector and growth in the nonfinancial sector. This paper contains such an analysis looking at 8 nonfinancial sectors in 28 countries over 1960-2005.

Real GDP growth is used frequently as a first order approximation of welfare gains. This induces us to use the value added of each sector as a proxy for its flow contribution to economic activity. As a key role of financial services is to support economic growth, our econometric specification accounts for the marginal contribution of lagged growth of financial services on the growth of other sectors, all measured in terms of their value added. The analysis focuses on the symmetry/asymmetry patterns of financial deepening cycles (slower increases, more abrupt collapses). Similar questions arise regarding the boom-bust cycles triggered by financial depth cycles, measured as discrete positive/negative jumps in the growth rate of real financial sector value-added. The presence of what Rajan (2006) dubbed the "hidden tail risk" manifests itself in negative skewness and high degree of kurtosis in the real growth rate of the financial sector. The asymmetries in the patterns of financial

deepening are evident in the statistical analysis of higher moments (skewness, kurtosis) of financial sector growth rates. Furthermore, we find that a higher rate of financial sector growth relative to GDP raises the likelihood of future financial contractions. Philippon (2008) pointed out that such a pattern is present in the GDP share of the financial industry in the U.S. At the aggregate level, Hassan, Sanchez and Yu (2011) study the association between financial deepening and economic growth while Cardarelli, Elekdag and Lall (2011) study determinants of financial stress transmission to the real sectors.

Given the negative skewness and "fat tail" feature of financial sector growth rates, we pay special attention to the asymmetric association between rare *sharp* financial expansions and contractions and the growth rates of the various sectors. This section complements earlier work by Rajan and Zingales (1998), Tong and Wei (2011) as well as a study by Do and Levchenko (2007) and two studies conducted by Aizenman and Sushko (2011a, 2011b), who examine how financial development and capital flows interact with external financial dependence of firms to contribute to their market values and growth. The present paper is unique in three ways: first, we focus explicitly on the determinants and the subsequent impact of "rare" events in financial sector development on the real economy; second, we analyze the impact of financial sector boom-bust cycles on different real economic sectors, allowing us to identify the ones that are most vulnerable; third, we examine how the adverse effect of such rare yet large events is amplified/mitigated by a country's financial openness and holdings of international reserves.

Our analysis proceeds in the following stages. First, we examine time-series dynamics of the financial sector. For robustness we use two different methodologies to identify financial sector shocks. The first is based on a band-pass filer where turning points in the cyclical component of value added series are identified. The second approach is based on identifying structural breaks in the growth rate of financial sector value added. We find that cycles in financial sector value added Granger-cause non-financial sector cycles with a negative sign. This may be because greater deviations of financial sector growth from the trend are associated with sharp reversions in the near term. We test for this possibility by applying a probit specification to negative structural breaks in the growth rate of financial sector value added. We find that abrupt financial contractions are more likely to take place following a period of accelerated growth of the financial sector. We validate the 'up by the stairs, down by the parachute' dynamics (see Breedon (2001) who coined in the expression "up by the stairs, down by the elevator" in the context of foreign exchange markets) – the faster the acceleration of the financial sector the greater its predictive power of a subsequent bust.

Next, we use financial contractions (expansions) identified as either structural breaks in the growth rate or turning points in the cyclical components of value added of the financial sector in each country as explanatory variable for the growth rates of non-financial sector value added. Overall, all sectors except for mining and public utilities are affected by sharp contractions in the financial sector within a year's time. The construction sector is the most sensitive. In contrast, virtually none of the sectors are affected by sharp expansions of the financial sector. The panel regressions also control for the lagged value added growth for all non-financial sectors (including a lagged dependent variable), the sector's productivity level, and country-level macro controls: banking and currency crisis dummies, the depth of financial sector in the economy, inflation, share of government spending in the economy, financial and trade openness, and the real interest rate. In addition to the baseline controls, we consider a specification that includes additional controls for structural and institutional features of each country, including the GDP shares of agriculture and industry, political stability, rule of law, and regulatory quality. This allows us to obtain rich results regarding the sensitivity of the sectors to financial expansions and contractions. We also assess cumulative economic impact of financial sector contractions on the real economy.

A key focus of our analysis is in identifying factors that magnify or mitigate the impact of financial contractions. We proceed by adding an interaction term between financial contractions and financial openness, and find that all the adverse effect of financial contractions on the real economy works through the financial openness channel. In addition, we include the international reserves to GDP ratio and its interaction with financial contractions. We find that reserves buffer the economy during episodes of sharp financial contraction, mitigating the adverse growth effects of financial busts. These findings are consistent with the notion that countries in which the severity of the financial shock is magnified by financial openness may rely on foreign exchange reserves to mitigate the adverse impact of such capital flight on the real sectors. The non-linear impact of reserves is most prominent in the sectors identified as most vulnerable to financial contractions: for construction sector, a 1 percentage point higher reserves to GDP ratio is associated with a 0.2 percentage point higher value added growth rate on average, but a 2.8 percentage point higher growth rate in times of financial contraction, hence partially offsetting the effect of financial contractions.

In order to examine the impact of particularly large contractions, we classify as contractions only those episodes in which the fall in the growth rate of the financial sector real value added exceeded the median of all contractions in absolute value. We find that the negative impact of financial openness and

the offsetting positive effect of the stock of foreign exchange reserves are magnified during particularly large financial contraction episodes. This applies to construction and other sensitive sectors (manufacturing, wholesale and retail, and transportation).

Section 2 overviews the data, section 3 examines cyclical dynamics and asymmetries in the growth rate of financial sector value added, and outlines the methodology for dating expansion and contraction episodes , section 4 conducts a panel regression analysis of the impact of financial contractions on the real sector and the transmission channels. Section 5 concludes.

2. Data

We obtain annual data on real value added and employment in 10 broad economic sectors covering a panel of 28 countries constructed by Timmer and de Vries (2009) through Groningen Growth and Development Centre (GGDC), 10-Industry Database (http://www.ggdc.net). The data cover the years 1947 through 2005; however, up to 1949 data on only 4 countries are available with the coverage jumping sharply to 26 in 1950 and to 28 in 1960. The 10 sectors are agriculture, mining, manufacturing, public utilities (electricity, gas, and water), construction, wholesale and retail (including hotels, restaurants); transport, storage, and communication; community, social, and personal services; government services, and finance, insurance, and real estate. Previous studies using the GGDC data include McMillan and Rodrik (2011). Following these authors, we increase the level of aggregation to 9 sectors by combing the data on community, social, and personal services with government services, because a number of countries, especially in Latin America, do not distinguish between the two when reporting employment or value added. We refer to the consolidated sector collectively as government.[1]

The additional controls, including real GDP per capita, domestic credit, inflation rates, real interest rates, and the agricultural and industrial shares of the economy, were obtained from World Bank's World Development Indicators (WDI) database. Political stability, rule of law, and regulatory quality indicators were obtained from the World Bank Governance Indicators database (http://www.govindicators.org) from indexes constructed by Kaufmann et al (2009). Data on government consumption as a share of GDP and annual value of imports and exports as a share of GDP

[1] As Timmer and de Vries (2007) point out, some activities in government services are nevertheless traded through markets. For example many personal services, but also private education and health services should be part of "market services". Government services may also include value added from public investment projects. However, the data is not detailed enough to distinguish market from non-market in these sectors.

were obtained from Penn World Tables (Heston, Summers and Aten (2009)). We construct de-facto financial openness measures using the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007) as the ratio of the sum of total financial assets and financial liabilities to GDP. Finally, we relied on Calvo and Reinhart (2000) to construct banking crisis and currency crisis.[2]

Table 1 [about here]

Table 1 shows pairwise correlation statistics for sectoral growth rates. The highest degree of contemporaneous correlation is observed between public utilities and financial sector followed by construction and financial sector (with correlation coefficients of 0.84 and 0.66 respectively).

3. Financial cycles and abrupt contractions

The focus on financial sector expansions and contractions necessarily assumes the existence of the so-called "financial cycle," with booms and busts possibly leading to serious consequences for the real economy. This section examines the cyclical dynamics in financial sector value added. We then use two methodologies to date the incidences of shocks to the financial sector. One is based on turning points in the cyclical component of the series (identified using a frequency filter) and the other is based on structural breaks in the series (identified using a unit root test). Section 4 then proceeds to estimate the impact of financial sector shocks on the reals sectors.

Following recent literature such as Aikman et al (2011) we use a frequency filter to extract the cycle component in the value added of each sector. We apply the band-pass filter suggested by Christiano and Fitzgerald (2003) to log-levels of annual value added series in constant (1995) prices. In parameterizing the filtering procedure we set the range for cycle duration rather wide, allowing it range from 2 years (lower bound of business cycle frequency) to 20 years (the frequeyncy found to capture the duration of the financial cycle better when measured by credit, Drehmann et al (2012))). Figure 1 (top panel) shows the results using Argentina as an example. Comparing the cycles in financial sector value

[2] The period from 2000 through 2005 represents a time of stable economic growth in most countries in our sample, also known as the "Great Moderation" (Stock and Watson (2002)). The exception to this is Argentina, where a crisis lasted from 1999 through 2002.

added with non-financial sector total (the sum of logs of the other series, excluding government), financial sector cycles appear more volatile and that volatility has been increasing over time.[3]

Table 2 presents the results of Granger-causality regressions based on 1-lag specification. The table shows the results in a panel setting, both using fixed effects and country dummies. The two left columns show results in levels of the filtered series while the right two columns show regression results in first differences. The coefficients on lagged deviations from trend in financial sector value added are negative in all four specifications and statistically significant at 10 percent or better in three out of four cases. The negative association between financial sector expansions and future real sector contractions is robust to controlling for lagged real sector growth. Positive coefficients on lagged dependent variable, in turn, indicate that expansions and contractions of the real sector tend to be fairly persistent.[4]

Table 2 [about here]

The negative association between in the cyclical component of financial sector and future real sector growth may be due to the notion that financial sector growth is subject to abrupt reversals, which are more likely to take place following period of accelerated growth ('up by the stairs, down by the parachute' dynamic). This feature of asymmetric booms and busts in financial industry was pointed out previously by Philippon (2008) for the U.S.

In order to address this possibility, we examine how greater financial sector value added growth affects the likelihood of future sharp financial contractions. Table 3 shows summary statistics for financial sector real value added growth rates (calculated as log differences of dollar amounts at 1995 prices) for each country. The mean growth rate for each country is positive; however, the series for 17 out of the 28 countries exhibit negative skewness. These countries, mostly emerging markets, are: Argentina; Bolivia; Chile; Colombia; Costa Rica; Denmark; Hong Kong SAR, China; India; Indonesia; Italy; Korea; Mexico; Philippines; Singapore; Sweden; Thailand; United States; and Venezuela. In contrast, as can be seen from Table 3, countries with positively skewed financial sector growth series

[3] Results for total non-financial sector (including government), and individual real sectors have been omitted for brevity but are available upon request.

[4] Table A1 shows analogous results for time-series regressions at country level. The top panes show results in level and bottom panes show results in first differences. While the association between financial and real cycles differs across countries, 12 out of 15 (11 out of 16) significant coefficients on lagged financial sector cyclical component in levels (first differences) are negative. Among advanced economies, the negative Granger-causality result is robust to both specifications in Spain, Sweden, and the U.S. Among emerging markets, the negative association holds in Argentina, Bolivia, Mexico, Philippines, Singapore, and Taiwan.

include mostly OECD economies. Furthermore, the average level of kurtosis is higher for countries with negative skew in the series (6.619 compared to 5.527).

Table 3 [about here]

Combined, the summary statistics indicate fat tails and higher frequency of occurrences of sudden declines in financial sector value added than predicted by a symmetric normal distribution, corroborating that notion that financial industry, while growing over the long-run, is subject to abrupt, periodic contractions. Furthermore, this feature is more pronounced in emerging markets and a sub-group of developed countries, namely Denmark, Italy, Sweden, and the United States.

We use a binary choice regression methodology in order to examine whether sharp financial sector contractions are more likely to follow a period of accelerated financial sector growth. We define financial contractions (expansions) as structural breaks in the growth rate of value added of financial sector in each country (identified according to the innovational outlier (IO) break unit-root test in Clemente, Montanes, Reyes (1998)) followed by positive (negative) growth. In order to examine the impact of particularly large contractions, we reclassify as contractions only those episodes in which the fall in the growth rate of the financial sector real value added exceeded the median of all contractions in absolute value (those exceeding the sample median of -9.34 percent drop in financial sector real value added over one year).[5] Using a probit model, for a country *k* we estimate the conditional probability of *LARGE* financial contractions, $FIN.CONTRACTION_{k,t}=1$, given the set of controls:

$$\Pr\left(FIN.CONTRACTION_{k,t} = 1 \middle| x_{k,t}, \boldsymbol{Controls}_{k,t}, \beta, \boldsymbol{\gamma}, \right) = 1 - \Phi(\beta x_{k,t} + \boldsymbol{Controls}_{k,t}{}' \boldsymbol{\gamma}) \quad (1)$$

[5] The cutoff is given by Argentina's contraction episode in 2000, when during the onset of the crisis the annual growth rate of the financial sector fell to -9.43 percent. The Argentine crisis lasted several years; however we are interested in the immediate impact of financial contractions on the real sector, as during the subsequent years of the crisis the channels of contagion are likely to multiply and become more complex. Moreover, only the initial phase of each crisis in our sample is characterized by a negative structural break in the financial sector growth rate, with subsequent years either exhibiting a reversal or a persistently low (or negative) growth rate, making it appropriate to rely on the quasi-event study approach employed in this paper with dummy variables for the year of structural break. Finally, to the extent that we control for currency and banking crises years, we are able to pick up the impact of financial contractions on the real sectors in isolation and irrespective of the cause of the underlying contraction or the duration of the crisis.

where $x_{k,t} \equiv \frac{1}{n}\sum_{s=1}^{n} dlog(Fin.\ value\ added_{t-s}) - \frac{1}{n}\sum_{s=1}^{n} dlog(GDP_{t-s})$, denotes the difference of either 3-year or 5-year average growth rate of financial sector real value added to the average GDP growth rate, one year before the contraction episode. Thus, the ratio captures the degree to which the growth rate of the financial sector exceeded the growth rate of GDP. A positive β would indicate that the likelihood of sharp financial contraction is increasing in the excess growth of financial sector relative to GDP 3 or 5 years prior. Φ( ) denotes the cumulative distribution function of a standard normal variable and the vector of controls includes currency crisis dummy and lagged logarithm of government spending one year prior.[6] We also repeat the exercise using a logit model, because it has the advantage of producing a better fit to the extremes of the distribution. The banking crisis dummy is dropped from the controls because it predicts the outcome of large financial contractions perfectly, that is all large negative financial sector shocks are also accompanied by banking crises in our sample. The estimation is conducted with robust standard errors clustered by country, as several countries in the sample undergo more than one contraction episode.

Table 4 [about here]

Table 4 shows the estimation results. Columns (1), (2), (5), and (6) show results based on probit while columns (3), (4), (7), and (8) show results based on logit regressions, with and without lagged government spending as a control variable. The top panel calculates the excess of the financial sector growth rate relative to GDP using 3-year averages while the bottom panel uses 5-year averages. As expected, the coefficients on currency crises are highly significant, indicating a strong association with sharp contractions in financial sector growth. Despite the inclusion of the crises dummies, the coefficients on growth rate of financial sector relative to GDP growth preceding sharp contractions are also significant, indicating that excess financial sector growth is a strong predictor of a large subsequent contraction. Both the magnitude and the level of significance of the coefficients are higher when 3-year rather than 5-year averages are used, indicating that is it the immediate acceleration of financial sector

[6] Under a logistical distribution: $\Phi = e^{-(\beta x_{k,t} + \boldsymbol{Controls}_{k,t}'\boldsymbol{\gamma})} / \left(1 + e^{-(\beta x_{k,t} + \boldsymbol{Controls}_{k,t}'\boldsymbol{\gamma})}\right)$

that has the highest probability of resulting in a bust. This finding applies universally to large number of developing and developed countries in our sample.[7]

Having obtained the coefficient vector, we can evaluate the marginal effect of financial sector growth accelerations on the conditional expectation of a *LARGE* financial contraction:

$$\frac{\partial E(FIN.CONTRACTION_{k,t}=1|x_{k,t},\boldsymbol{Controls}_{k,t},\hat{\beta},\hat{\gamma},)}{\partial x_{k,t}} = \Phi'(-(\hat{\beta}\bar{x}_{k,t} + \boldsymbol{Controls}_{k,t}{}'\hat{\boldsymbol{\gamma}}))\hat{\beta}. \qquad (2)$$

where the marginal contribution of each conditioning variable to the probability of $FIN.CONTRACTION_{k,t}=1$ is estimated at the sample average of government expenditures and currency crisis dummy set to 1. We use coefficient estimates of $\hat{\beta}$ from probit specification (2) and logit specification (4) in Table 4 to calculate lower and upper bounds of the marginal effect of excess financial sector growth on the probability of a future financial contraction according to equation (2). The marginal effect based on the probit specification (2) in Table 4 is 0.038 while that based on the logit specification (4) is 0.043, indicating financial contractions have approximately 4 percent greater probability of occurrence if during the preceding 3 years the growth rate of the financial sector value added was double that of the average GDP growth over the same period.

4. Impact of financial sector shocks on the real sectors

Our baseline regression model is based on Hassan, Sanchez and Yu (2011), but focusing on sectoral rather than aggregate growth rates. Let $GROWTH_{i,k,t}$ denote the real value added growth rate of sector *i* in country *k* in year *t*. Diminishing returns in the neoclassical growth model imply a positive convergence parameter λ such that:

$$GROWTH_{i,k,t} = \lambda\left[\left(\frac{Value\ Added}{Worker}\right)^{*}_{i,k} - \frac{Value\ Added}{Worker}_{i,k,t}\right] \qquad (3)$$

where $\left(\frac{Value\ Added}{Worker}\right)^{*}_{i,k}$ denotes the long-run real value added per worker implicitly determined by structural parameters in the economy. The growth rate of real sectors, (3), is expected to diminish as their value added per worker converges to the latent potential level of output per worker,

[7] The statistically significant positive association between size of government spending and financial contractions may have several interpretations, including : the crowding out of private investment and deficits financed through inflationary policies; we leave these questions for further research.

$\left(\frac{Value\ Added}{Worker}\right)^{*}_{i,k}$. Since the technological frontier in each sector in each country is unobservable, following Hassan, Sanchez and Yu (2011) we assume that it is a function of economic fundamentals in each country. Therefore, for each sector *i* we estimate the following model:

$$GROWTH_{i,k,t} = \beta_1 FIN.CONTRACTION_{k,t-1} + \beta_2 FIN.EXPANSION_{k,t-1} + \sum_i \emptyset_i\, GROWTH_{i,k,t-1}$$

$$+\boldsymbol{\gamma}'\, \boldsymbol{X}_{k,t} + \delta\left(\frac{Value\ Added}{Worker}_{i,k,t-3}\right) + \varepsilon_{i,k,t} \qquad (4)$$

The first two terms on the RHS are financial sector expansion and contraction dummies respectively. These terms capture perturbations due to abrupt changes in financial sector growth. The third term captures any persistence in the annual value added growth rate of sector *i* in country *k* as well as its association with lagged growth in other real sectors.[8] The fourth term (the vector of controls, $\boldsymbol{X}_{k,t}$) represents determinants of long-run growth and the country level (common to all sectors). The vector of country-level controls includes:

$$\boldsymbol{X} = \begin{bmatrix} banking\ crisis \\ currency\ crisis \\ \log\left(\frac{GDP}{cap}\right) \\ credit/GDP \\ \log(inflation) \\ \log(gov't\ spending) \\ de\ facto\ financial\ openness \\ \log(trade\ openness) \\ real\ interest\ rate \end{bmatrix}, \qquad (5)$$

where a country's level of financial deepening is controlled for using the credit to GDP ratio. As equation (5) shows, we control for exogenous economic downturns with banking and currency crises dummies. Following Hassan, Sanchez and Yu (2011) we also control for income, inflation, share of government spending in the economy, financial and trade openness defined, and the real interest rate. As explained in greater detail in the data section, we use de-facto measures for both financial and trade

[8] The Augmented Dickey-Fuller (ADF) panel unit root test to test the null unit root in first differences. Table A3 reports the results. The p-values indicate that the null of unit root is strongly rejected, indicating that the financial sector growth series is stationary. Furthermore, the p-values of intermediate ADF test results indicate that the null of unit root is rejected for each country in the sample in favor of stationarity.

openness. Financial openness is defined as the sum of a country's total foreign assets and liabilities relative to GDP while trade openness is defines as exports plus imports relative to GDP.

In addition to the baseline controls, we consider a specification that includes additional controls for economic and institutional features of each country:

$$\boldsymbol{X}_{\boldsymbol{additional}} = \begin{bmatrix} agricultural\ share\ of\ economy \\ industry\ share\ of\ economy \\ political\ stability \\ rule\ of\ law \\ regulatory\ quality \end{bmatrix} \quad (6)$$

Finally, following specification (3) we controls for an industry's relative output difference with the long-run level via the lagged real value added per worker term, $\left(\frac{Value\ Added}{Worker}_{i,k,t-3}\right)$. Since the dependent variable and the first term on the RHS are constructed using contemporaneous and up to 2nd lag value of real value added we include 3rd lag of real value added per worker in order to avoid serial correlation in the error term of regression (4).

Tables 5 and 6 report panel regression results based on equation (4), Table 5 identifies financial sector expansions and contractions as structural breaks in the growth rate of value added while Table 6 provides a robustness check using alternative methodology based on turning points in the cyclical components of the series. The results in Table 5 show that all sectors except for mining and public utilities are affected by sharp contractions in the financial sector within a year's time. The construction sector is the most sensitive. In contrast, none of the sectors are affected by sharp expansions of the financial sector[9]. The coefficients estimates indicate that on average a financial sector contraction episodes are associated with a 11.9 percent drop in construction sector value added in the following year. The sensitivities of other sectors are considerably lower with the estimates indicating approximately 3 percent drop in the value added in agriculture, manufacturing, wholesale & retails, and transportation in the year following a negative shock to the financial sector. The negative impact is robust to reclassifying financial sector ups and downs as turning points in the cyclical component extracted using a band-pass filter (Table 6). 6 out of 7 non-financial sectors show a significant negative response to financial contractions within a year, but only one sector shows a positive response to turning

[9] These results are robust to alternative lag structures of up to 5years

points leading to financial sector expansions. The lower values of coefficient estimates are consistent with the difference in the two methodologies used to identify financial sectors contraction and expansion episodes: the Clemente, Montanes, Reyes (1998) unit-root test based dating methodology (Table 5) identifies up to two largest structural breaks, whereas the Christiano and Fitzgerald (2005) band-pass filter results in as many turning points as cyclical deviations from tern identified in the series. Figure 1 shows an illustrative example for the case of Argentina. Hence, the results reported in Table 5 capture the impact of fewer but more severe downturns and upturns in the financial sector compared to the results reported in Table 6.

Tables 5 & 6 [about here]

Consistent with diminishing marginal returns of the convergence hypothesis on which our empirical specification rest, all the coefficients on the "convergence factor" are negative and statistically significant at 5 percent level of higher. The estimates range from -0.039 for the transportation sector to -0.017 for wholesale, retail and agricultural sectors.

The coefficients on banking and currency crises are negative in all the specifications; however, the sectors exhibit different degrees of sensitivity to such episodes. Currency crises have the most adverse impact on construction sector growth (coefficient of -0.028), while public utilities sectors are most affected by banking crises followed by the manufacturing sectors (coefficients of approximately -0.028). Manufacturing sector is the only one that exhibits significant negative response to banking and currency crises. The coefficients on remaining controls are generally consistent with theory. Inflation and government spending exhibit a negative association with sectoral value added growth, while trade openness has a positive association.[10][11]

Based on regression results it is also possible to calculate the cumulative effect of financial contractions. Since equation (4) contains a lagged endogenous variable, the cumulative effect of financial contraction on the growth rate of sector *i* in country *k* in period *t* can be expressed as $\hat{\beta}_{1,i}/(1-\emptyset_i)$, where the linear impact of contractions, $\hat{\beta}_{1,i}$, is adjusted for the AR(1) structure in the regression. In addition, we estimate the cumulative impact on the aggregate real sector growth rate as the

[10] The data on government spending obtained from Heston, Summers and Aten (2009), which includes collective consumption of government for public good type activities, like police (at constant prices).
[11] Tables A4 and A5 in the Appendix show analogous results based on regressions that include an expanded set of controls for economic and institutional features of each country.

sum across all *i* sectors of partial impact on each sector weighted by that sector's share in total real economy value added in country *k* in period *t*. The relative shares of each sector during financial contraction episodes are listed in Table 7. In computing the real value added shares, financial and government sectors are excluded from the denominator. India boasted the largest share of agricultural sector, at 53.1 percent of total real non-government sectors [when], followed by Latin American countries such as Colombia and Costa Rica (at 33.1 and 38.6 percent), and Asian economies such as Philippines and Malaysia (at 27.0 and 25.5 percent). In contrast, OECD countries such as United Kingdom and Sweden, as well as Taiwan, China, exhibit the largest relative shares of manufacturing sector value added, 40.6, 41.0, and 46.4 percent respectively. Wholesale and retail sector is another important component for a number of countries under consideration, especially Latin American economies such as Costa Rica and Argentina with relative weights of this sector at 31.7 and 28.6 percent respectively. Overall, construction sector ranks behind agriculture, manufacturing, and wholesale and retail sectors for most of the economies, occupying similar share as transportation and storage. As such, we expect the sensitivity of the construction sector to financial shocks to be dampened by its smaller size relative to other sectors, reducing the transmission of financial contractions when considering the entire real sector. Public utilities sector is the smallest in relative size for all cross-sections.

Table 7 [about here]

Table 8 shows the estimates of the cumulative impact of financial contractions on total non-financial sector value added growth rate. The third column of Table 8 shows the actual magnitude of the financial contraction in percentage changes relative to the previous year. The fourth column shows the cumulative impact on the real sector calculated as a weighted sum of cumulative effects on individual sectors. The firth column shows analogous estimates scaled by the size of the actual financial contraction relative to the sample mean. The financial contraction episodes associated with the largest predicted cumulative impact belong to 1982 Chile, 1997 Indonesia, 1983 Philippines, and 1983 Chile.

Table 8 [about here]

The association between financial openness of an economy and the degree to which sharp contractions in financial sector growth translate into contractions of the real economy is addressed in

results reported in Table 9.[12] This specification adds an interaction term between financial contractions and financial openness. Once the interaction term is included in the regressions, the coefficients on financial contraction dummies themselves become either insignificant or positive, indicating that the entire adverse effect of financial contractions on the real economy works through the financial openness channel. Again, the construction sector exhibits the highest sensitivity to financial contractions propagated through cross-border capital flows, with a coefficient of -0.233 (bottom panel of Table 9), followed by transportation (-0.156), wholesale and retail (-0.131), and manufacturing (-0.105).

In addition to the interaction with financial openness, the regression specification used in Table 9 includes the reserves to GDP ratio and its interaction with financial contractions. This extension is motivated by an extensive literature on foreign exchange reserves that points out the merits of reserve accumulation stemming from precautionary motives to mitigate the adverse effects of capital flight. The coefficients on both the linear reserves/GDP ratio and its interaction with financial contractions are positive – a higher reserves chest is associated with higher value added growth rates of the real sectors. Furthermore, comparing the coefficients on *Lag (reserves/gdp)* and on *Lag fin. contraction* × *(reserves/gdp)* in both top and bottom panels of Table 9, the coefficients on the interaction terms are 10 to 15 times greater in magnitude. Since the interaction term captures the association between foreign exchange reserves specifically in times of financial contractions (when *Lag financial contraction* dummy takes on the value 1), this indicates that the positive effect of reserves on real sector growth is especially prominent during the episodes of sharp financial contraction. This finding suggests that countries in which the severity of the financial shock is magnified by financial openness rely on foreign exchange reserves to mitigate the adverse impact of such capital flight on the real sectors. The non-linear impact of reserves is most prominent in the sectors identified as most vulnerable to financial contractions: for construction sector, a 1 percentage point higher reserves to GDP ratio is associated with 0.2 percent higher value added growth rate on average, but a 2.8 percent higher growth rate in times of financial contractions (hence partially offsetting the effect of financial contractions).[13] However, the

[12] For brevity, the coefficient estimates on the remaining controls have been omitted from the table, as they do not vary significantly when interaction terms are included. The complete results are available upon request.

[13] Regression coefficients on financial openness and the reserves-to-GDP ratio have different interpretations because of the way the data have been normalized: reserves-to-GDP ratio is in integer percentage points (1 unit increase in the variable represents a 1 percentage point rise) as in the WDI database, whereas other variables are in decimal percentage points (1 unit increase in the variable represents a 100 percentage point rise). The coefficient of 0.028 on interaction with the reserves-to-GDP ratio indicates that a 1 percentage point higher reserves relative to GDP during contractions is associated with 2.8 percent higher growth rate of construction sector real value added. In contrast, the coefficient of -0.233 on the interaction term with financial openness

contribution of reserves, while significantly positive, is not enough to eliminate the negative impact of financial openness as the propagation mechanism in the most sensitive sectors of construction and transportation. For instance, taking the case of Argentina in 1989 (which had total foreign financial assets and liabilities summing to approximately 130 percent of GDP), its stockpile of foreign exchange reserves is estimated to have reduced the decline in the construction industry from over 30 to less than 10 percent. Similar observations, albeit of differing magnitude, can be made regarding other financial contraction episodes.

The dominance of financial openness in accounting for the negative effect of financial contractions on the real economy suggests that most of the significant financial sector contractions during our sample period probably resulted from sharp reversals in foreign financial capital inflows, or sudden-stops. Table 10 lists year-country pairs of the financial contraction episodes along with the magnitude of the actual contraction (the percentage change in financial sector real value added relative to the previous year). The third column indicates whether that episode matches with an episode of sudden-stop identified by past literature. Of the 12 post-1980 financial contraction episodes, 9 are associated with a sudden-stop.

Table 9 [about here]

The economic literature on sudden stops was motivated by the 1994 Mexican crisis, with episodes of sudden-stops subsequently identified for many emerging market economies going back to the 1980s, the period of substantial cross-border private capital flow liberalization. The link between sudden stops and output loss has also been excessively investigated in recent years. In particular, consistent with short-run dynamics between financial contractions and drops in real sector value added growth rates identified in this paper, Hutchison and Noy (2006) find that sudden-stop crises have a large but short-lived negative effect on output over and above that of currency crises. Calvo and Reinhart (2000) attribute the link between sudden-stops and output collapses to the credit channel, whereby abrupt stops in foreign capital inflows cause local credit markets to dry up, thus reducing investment and domestic demand. A related channel, emphasized by Mendoza (2001), concerns the combined effect of sudden-stops and currency crises, whereby the deterioration of collateral in the financial sector causes

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indicates a 1 percentage point greater de-facto openness during contractions is associated with 0.2 percent lower growth rate of construction sector real value added. The economic significance of these offsetting effects depends not only on the elasticities, but on the average values of each variable as discussed later in the text.

debt deflation followed by real contraction. Against this theoretical backdrop, our regression results identify industries most susceptible to credit contractions and deteriorations in financial collateral values induced by a sudden-stop. The construction sector appears the most sensitive, followed by transportation (which also includes the highly credit-based shipping industry), wholesale and retail trade, and manufacturing.

Given the complex non-linear associations between financial contractions and real sector growth rates, we repeat the exercise of interacting financial contraction dummies with financial openness and foreign exchange reserves focusing only on the right-hand side of the distribution of financial contraction episodes, i.e., really big contractions. As Table 10 shows, the size of the contraction varies greatly by for each episode. Latin American economies experienced some of the largest drops in financial sector growth: with Venezuela experiencing a 35.9 percent drop in 1960, Costa Rica experiencing a 55.0 percent drop in 1959, and Chile experiencing a whopping 83.5 percent contraction in real financial sector value added in 1982. Several Asian economies also underwent large financial contractions, with Indonesia experiencing a 28.4 percent drop in 1997 during the Asian Financial Crisis. On the other hand, financial contractions in other, especially European economies, tended to be much smaller in magnitude. For instance, in 1951 Britain's financial sector growth rate simply declined to zero, while Sweden experienced mild contractions of 0.6 and 2.8 percent in 1975 and 1992 respectively.

Table 10 [about here]

In order to examine the impact of particularly large contractions, we reclassify as contractions only those episodes in which the fall in the growth rate of the financial sector real value added exceeded the median of all contractions in absolute value (those exceeding the sample median of -9.34 percent drop in financial sector real value added over one year). As the results in Table 11 show, the negative impact of financial openness and the offsetting positive effect of the stock of foreign exchange reserves are magnified during particularly large financial contraction episodes. In the construction sector regressions, the coefficient on the interaction of financial contraction with financial openness is -0.66 (compared to -0.23 when all negative structural breaks in financial growth are counted as contractions as in Table 9). Similarly, the coefficient on the interaction of financial contraction with the reserves to GDP ratio is 0.083 (compared to 0.028 in the unrestricted specification). A similar pattern is observed for

other sensitive sectors (manufacturing, wholesale and retail, and transportation), with the coefficient on the interaction terms doubling or tripling in absolute value.

Table 11 [about here]

5. Conclusion and future research

Our empirical study validates the asymmetric nature of financial intermediation whereby financial contractions are associated with a large decline in the value added of key real sectors but financial expansions do not seem to have much effect. This asymmetric feature was pointed out previously by Philippon (2008) for the U.S., and we find that it applies more universally to a large number of developing and developed countries. This finding is important, as the U.S.'s position as the supplier of the key global currency allows it to buffer its exposure to financial contractions by the FED's quantitative easing policies, *de facto* supplying the key reserve currency elastically. Emerging markets and developing countries, which lack this capacity, would therefore benefit by paying more attention to the factors magnifying and mitigating their exposure to costly financial contractions.

For this latter group of countries, our finding that the adverse effects of abrupt financial contractions are magnified by financial openness and mitigated by international reserves has special significance. Remarkably, 9 out of the 12 post-1980 financial contraction episodes were identified as sudden stops in capital flows, all except for Sweden in 1992 in emerging markets. This demonstrated vulnerability to capital account openness finds its echo in the prevalent "self-insurance" trend among emerging markets, where the growing financial integration of the last two decades exposed them to sudden stops and capital flight crises, propagating an unprecedented accumulation of international reserves to serve as a financial buffer in turbulent times [see Aizenman and Lee (2007) and Obstfeld, Shambaugh and Taylor (2010). Aizenman and Pinto (2011) review the policy lessons].

We also find that abrupt financial contractions are more likely to take place following periods of accelerated growth in the financial sector– the more immediate the acceleration of the financial sector, the greater its predictive power of a subsequent bust. Our analysis can be extended in numerous ways. With more detailed data, one would be able to evaluate the contribution of financial accelerations and contractions to the productivity of the economy, identifying more precisely the conditions under which too rapid expansion of financial intermediation is inefficient and destabilizing to the real economy.

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Tables and Figures

Table 1: Pairwise correlations of value added growth rates for the 9 sectors.

	Finance	Agriculture	Construction	Government	Mining	Manufacturing	Public utilities	Transportation
Agriculture	0.0533*	1						
	(0.0444)							
Construction	0.6573*	0.1091*	1					
	(0.0000)	(0.0000)						
Government	0.2544*	0.1084*	0.2766*	1				
	(0.0000)	(0.0000)	(0.0000)					
Mining	0.039	0.0419	0.0861*	0.1039*	1			
	(0.1410)	(0.1143)	(0.0012)	(0.0001)				
Manufacturing	0.1699*	0.1537*	0.4036*	0.3125*	0.1745*	1		
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)			
Public utilities	0.8433*	0.0284	0.5896*	0.2001*	0.0723*	0.2069*	1	
	(0.0000)	(0.2838)	(0.0000)	(0.0000)	0.0064	(0.0000)		
Transportation	-0.1583*	0.1147*	0.1195*	0.2897*	0.1018*	0.5314*	-0.1714*	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	
Wholesale, retail	-0.4761*	0.0918*	-0.0777*	0.3582*	0.1084*	0.4539*	-0.4989*	0.6070*
	(0.0000)	(0.0005)	(0.0034)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: * indicates correlation coefficients significant at 10 percent level of higher, p-values in parentheses. The highest degree of contemporaneous correlation is observed between public utilities and financial sector followed by construction and financial sector (with correlation coefficients of 0.84 and 0.66 respectively).

Table 2: Granger-causality regressions between the cyclical component of financial sector value added and the non-financial sector.

Dep. Var.: CF(Non-fin. Value added)	Levels		First differences	
	(1)	(2)	(3)	(4)
Lag CF(Fin. Value added)	-0.048*	-0.048**		
	(0.024)	(0.022)		
Lag CF(Non-fin. Value added)	0.788***	0.788***		
	(0.039)	(0.030)		
Lag Change in CF(Fin. Value added)			-0.033***	-0.033
			(0.012)	(0.028)
Lag Change in CF(Non-fin. Value added)			0.593***	0.593***
			(0.026)	(0.038)
Constant	0.005***	0.172***	0.000***	0.000
	(0.001)	(0.015)	(0.000)	(0.004)
Fixed effects	yes	no	yes	no
Country dummies	no	yes	no	yes
Observations	1,423	1,423	1,395	1,395
R-squared	0.467	0.991	0.256	0.257
Number of countries	28		28	

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Cyclical component identified using the band-pass filter suggested by Christiano and Fitzgerald (2005) to log-levels of annual value added series in constant (1995) prices. In parameterizing the filtering procedure we set the range for cycle duration rather wide, allowing it range from 2 years (lower bound of business cycle frequency) to 20 years.

Table 3: Summary statistics for yr/yr % chng. in value added (1995 prices) of financial sector.

Country	Mean	Max	Min.	Std. Dev.	Skew.	Kurt.	Obs.
Argentina	0.022	0.185	-0.220	0.076	-0.382	4.255	55
Bolivia	0.038	0.347	-0.405	0.118	-0.615	5.782	55
Brazil	0.054	0.231	-0.084	0.065	0.159	2.801	55
Chile	0.050	0.650	-0.835	0.172	-1.833	16.186	55
Colombia	0.061	0.247	-0.152	0.070	-0.404	5.097	55
Costa Rica	0.061	0.341	-0.550	0.120	-2.204	14.817	55
Denmark	0.040	0.140	-0.034	0.032	0.763	4.240	58
France	0.039	0.101	-0.008	0.028	0.561	2.350	55
Germany	0.060	0.116	0.025	0.023	0.565	2.503	41
Hong Kong SAR, Chin	0.068	0.189	-0.070	0.061	-0.132	3.126	31
India	0.081	0.195	-0.100	0.059	-0.568	3.375	55
Indonesia	0.095	0.542	-0.284	0.131	-0.209	6.926	43
Italy	0.034	0.071	-0.007	0.020	-0.092	2.149	54
Japan	0.068	0.358	-0.191	0.079	0.550	7.044	51
Korea, Rep.	0.047	0.131	-0.075	0.041	-0.347	3.308	52
Malaysia	0.112	0.550	-0.019	0.092	3.071	15.946	35
Mexico	0.060	0.148	-0.084	0.048	-0.417	3.768	55
Netherlands	0.050	0.253	-0.031	0.043	2.443	12.883	45
Peru	0.050	0.222	-0.117	0.062	0.336	4.364	55
Philippines	0.047	0.148	-0.216	0.077	-1.588	6.415	34
Singapore	0.090	0.171	-0.026	0.048	-0.347	2.303	45
Spain	0.044	0.142	-0.018	0.035	0.524	3.192	58
Sweden	0.031	0.065	-0.028	0.016	-1.008	5.808	55
Taiwan	0.095	0.261	-0.025	0.069	0.280	2.509	44
Thailand	0.093	0.437	-0.399	0.144	-1.073	6.074	54
United Kingdom	0.034	0.090	-0.011	0.021	0.226	2.961	58
United States	0.042	0.070	0.000	0.015	-0.707	3.560	58
Venezuela, RB	0.049	0.332	-0.359	0.117	-0.341	4.888	55

Notes: The table shows summary statistics for real value added growth rates (calculated as log differences of dollar amounts at 1995 prices) for each country for financial sector. Note that the GGDC 10-Industry Database includes insurance and real estate services into the financial sector. The mean growth rate for each country is positive; however, the series for 17 out of the 28 countries exhibit negative skewedness. Furthermore, the average level of kurtosis is higher for countries with negative skew in the series (6.619 compared to 5.527). Combined, the summary statistic indicate fat tails and higher frequency of occurrences of sudden declines in financial sector value added then predicted by a symmetric normal distribution, corroborating that notion that financial industry, while growing in the long-run, is subject to abrupt periodic contractions.

Table 4: Higher financial sector growth as a determinant of future contractions.

	Probit		Logit	
dependent variable: *LARGE* financial contraction	(1)	(2)	(3)	(4)
lag dlog(value added fin.)-dlog(GDP), 3-yr. avg.	0.306**	0.297**	0.744***	0.717***
	(0.147)	(0.150)	(0.260)	(0.265)
currencycrisis	1.410***	1.376***	3.667***	3.472***
	(0.273)	(0.267)	(0.737)	(0.810)
lag log(govt spending)		0.804*		1.438
		(0.471)		(1.315)
Constant	-2.907***	-5.176***	-6.298***	-10.257***
	(0.215)	(1.274)	(0.691)	(3.427)
Pseudo R2	0.222	0.243	0.221	0.232
	(5)	(6)	(7)	(8)
lag dlog(value added fin.)-dlog(GDP), 5-yr. avg.	0.256*	0.247*	0.625**	0.601**
	(0.132)	(0.136)	(0.255)	(0.265)
currencycrisis	1.407***	1.373***	3.656***	3.462***
	(0.273)	(0.268)	(0.738)	(0.811)
lag log(govt spending)		0.804*		1.441
		(0.470)		(1.313)
Constant	-2.904***	-5.173***	-6.289***	-10.256***
	(0.216)	(1.272)	(0.691)	(3.422)
Pseudo R2	0.220	0.242	0.220	0.231
Clustering by country	yes	yes	yes	yes
Observations	1,119	1,089	1,119	1,089

Notes: Probit and logit regression estimation results with clustering by country and robust standard errors in parentheses. *, **, and *** indicate coefficients significant at 10%, 5%, and 1% level respectively. Banking crisis dummy excluded from the control vector because it predicts outcomes perfectly. The top panel calculates the excess of the financial sector growth rate relative to GDP using 3-year averages while the bottom panel uses 5-year averages.

Table 5: Panel regressions of the effect of sharp financial sector contractions and expansions – structural breaks – on real value added growth rates of non-financial sectors.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent var.: value added growth rate	agriculture	construction	mining	manufacturing	public utilities	wholesale, retail	transportation
lag financial contraction	**-0.028***	**-0.119*****	-0.020	**-0.030***	-0.005	**-0.029***	**-0.032****
	(0.016)	**(0.031)**	(0.033)	**(0.016)**	(0.017)	**(0.015)**	**(0.013)**
lag financial expansion	-0.008	0.021	-0.012	0.013	0.014	0.011	0.013*
	(0.009)	(0.017)	(0.017)	(0.008)	(0.009)	(0.008)	(0.007)
convergence (value added per worker)	**-0.017****	**-0.022***	**-0.022*****	**-0.028*****	**-0.028*****	**-0.017*****	**-0.039*****
	(0.008)	**(0.013)**	**(0.007)**	**(0.009)**	**(0.006)**	**(0.006)**	**(0.008)**
banking crisis	-0.012	-0.026	0.004	**-0.029*****	**-0.032*****	**-0.018***	-0.009
	(0.011)	(0.022)	(0.022)	**(0.011)**	**(0.012)**	**(0.010)**	(0.009)
currency crisis	-0.003	**-0.028***	0.005	**-0.014***	-0.012	-0.008	-0.010
	(0.008)	**(0.015)**	(0.015)	**(0.007)**	(0.008)	(0.007)	(0.006)
log(gdp/cap)	**1.313*****	**1.463***	-0.269	-0.594	**-1.068****	0.183	**0.733***
	(0.469)	**(0.822)**	(0.824)	(0.480)	**(0.480)**	(0.374)	**(0.386)**
wdi_credit	**-0.019****	**-0.047*****	-0.016	**-0.014***	-0.006	**-0.027*****	-0.009
	(0.008)	**(0.015)**	(0.016)	**(0.008)**	(0.008)	**(0.008)**	(0.007)
log(inflation)	**-0.438****	**-1.201*****	-0.512	**-1.032*****	-0.247	**-0.865*****	-0.230
	(0.172)	**(0.332)**	(0.344)	**(0.167)**	(0.177)	**(0.158)**	(0.142)
log(govt spending)	-0.845	-3.533	0.479	**-1.919***	-1.893	**-1.737***	**-2.051****
	(1.141)	(2.192)	(2.276)	**(1.105)**	(1.181)	**(1.050)**	**(0.942)**
de-facto financial openness	0.488	0.573	0.801	-0.361	1.001	-0.094	0.386
	(0.877)	(1.637)	(1.694)	(0.818)	(0.871)	(0.775)	(0.700)
log(trade openness)	**-1.868****	**-3.922****	0.900	0.437	0.450	-0.742	**1.782****
lagged value added growth:	**(0.924)**	**(1.771)**	(1.860)	(0.863)	(0.940)	(0.824)	**(0.752)**
agriculature	**-0.284*****	-0.068	0.048	-0.019	0.014	0.033	0.015
	(0.033)	(0.063)	(0.066)	(0.032)	(0.034)	(0.030)	(0.027)
construction	0.010	**0.136*****	0.009	-0.002	0.034	-0.009	0.023
	(0.020)	**(0.039)**	(0.040)	(0.020)	(0.021)	(0.019)	(0.017)
government	0.002	0.018	-0.011	-0.004	0.011	0.004	0.020
	(0.022)	(0.042)	(0.044)	(0.021)	(0.023)	(0.020)	(0.018)
mining	-0.009	-0.003	**0.169*****	-0.003	0.014	-0.009	-0.007
	(0.017)	(0.033)	**(0.034)**	(0.016)	(0.017)	(0.016)	(0.014)
manufacturing	**0.115****	0.061	-0.034	**0.197*****	0.067	**0.136*****	**0.109*****
	(0.049)	(0.094)	(0.098)	**(0.047)**	(0.050)	**(0.045)**	**(0.041)**
public utilities	-0.014	0.004	-0.079	-0.003	-0.050	0.025	0.013
	(0.031)	(0.060)	(0.063)	(0.030)	(0.032)	(0.029)	(0.026)
transportation	-0.039	**0.167***	-0.007	**-0.087***	-0.073	-0.050	0.062
	(0.049)	**(0.093)**	(0.097)	**(0.047)**	(0.050)	(0.044)	(0.041)
wholesale, retail	-0.023	**0.185***	-0.051	-0.011	0.024	**0.099****	0.038
	(0.052)	**(0.101)**	(0.105)	(0.051)	(0.054)	**(0.048)**	(0.043)
Constant	**0.084****	**0.276*****	**0.132***	**0.270*****	**0.326*****	**0.193*****	**0.146*****
	(0.040)	**(0.091)**	**(0.078)**	**(0.040)**	**(0.041)**	**(0.043)**	**(0.034)**
Observations	911	911	911	911	911	911	911
R-squared	0.105	0.170	0.061	0.240	0.214	0.189	0.173
Number of countries	23	23	23	23	23	23	23
Country fixed effects	yes	yes	yes	yes	yes	yes	yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Financial contractions (expansions) defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Motanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative (positive) growth rate.

Table 6: Panel regressions of the effect of sharp financial sector contractions and expansions – turning points in the cyclical component – on real value added growth rates of non-financial sectors.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent var.: value added growth rate	agriculture	construction	mining	manufacturing	public utilities	wholesale, retail	transportation
lag financial contraction	0.003	**-0.020****	**0.028*****	**-0.009****	**-0.009***	**-0.014*****	**-0.008***
	(0.005)	**(0.009)**	**(0.010)**	**(0.005)**	**(0.005)**	**(0.004)**	**(0.004)**
lag financial expansion	-0.002	**0.019****	-0.009	0.008	0.006	0.006	0.002
	(0.005)	**(0.010)**	(0.010)	(0.005)	(0.005)	(0.005)	(0.004)
convergence (value added per worker)	**-0.017****	**-0.026****	**0.022*****	**-0.028*****	**-0.028*****	**-0.016*****	**-0.038*****
	(0.008)	**(0.013)**	**(0.007)**	**(0.009)**	**(0.006)**	**(0.006)**	**(0.008)**
banking crisis	-0.013	-0.020	0.002	**-0.027****	**-0.030****	-0.016	-0.007
	(0.011)	(0.022)	(0.022)	**(0.011)**	**(0.011)**	(0.010)	(0.009)
currency crisis	-0.004	**-0.032****	0.003	**-0.015****	-0.013	-0.009	**-0.011***
	(0.008)	**(0.015)**	(0.015)	**(0.007)**	(0.008)	(0.007)	**(0.006)**
log(gdp/cap)	**0.013*****	**0.014***	-0.003	-0.007	**-0.011****	0.001	**0.007***
	(0.005)	**(0.008)**	(0.008)	(0.005)	**(0.005)**	(0.004)	**(0.004)**
wdi_credit	**-0.000****	**-0.000*****	-0.000	-0.000	-0.000	**-0.000*****	-0.000
	(0.000)	**(0.000)**	(0.000)	(0.000)	(0.000)	**(0.000)**	(0.000)
log(inflation)	**-0.005*****	**-0.013*****	-0.005	**-0.011*****	-0.003	**-0.009*****	**-0.003***
	(0.002)	**(0.003)**	(0.003)	**(0.002)**	(0.002)	**(0.002)**	**(0.001)**
log(govt spending)	-0.008	-0.031	0.009	-0.018	-0.018	-0.015	**-0.019****
	(0.011)	(0.022)	(0.023)	(0.011)	(0.012)	(0.010)	**(0.009)**
de-facto financial openness	0.005	0.003	0.007	-0.005	0.009	-0.002	0.002
	(0.009)	(0.016)	(0.017)	(0.008)	(0.009)	(0.008)	(0.007)
log(trade openness)	**-0.018***	**-0.036****	0.010	0.006	0.005	-0.006	**0.019****
lagged value added growth:	**(0.009)**	**(0.018)**	(0.019)	(0.009)	(0.009)	(0.008)	**(0.008)**
agriculture	**-0.281*****	-0.071	0.042	-0.021	0.010	0.029	0.015
	(0.033)	(0.063)	(0.066)	(0.032)	(0.034)	(0.030)	(0.027)
construction	0.009	**0.137*****	0.017	0.000	**0.035***	-0.006	0.024
	(0.020)	**(0.039)**	(0.040)	(0.020)	**(0.021)**	(0.018)	(0.017)
government	0.002	0.016	-0.014	-0.005	0.010	0.003	0.020
	(0.022)	(0.042)	(0.044)	(0.021)	(0.023)	(0.020)	(0.018)
mining	-0.008	-0.001	**0.173*****	-0.002	0.014	-0.007	-0.006
	(0.017)	(0.033)	**(0.034)**	(0.016)	(0.017)	(0.016)	(0.014)
manufacturing	**0.122****	0.045	-0.039	**0.188*****	0.057	**0.126*****	**0.108*****
	(0.049)	(0.095)	(0.098)	**(0.048)**	(0.051)	**(0.045)**	**(0.041)**
public utilities	-0.012	0.021	-0.071	0.002	-0.047	0.031	0.017
	(0.031)	(0.060)	(0.062)	(0.030)	(0.032)	(0.029)	(0.026)
transportation	-0.033	**0.174***	-0.007	**-0.088***	-0.077	-0.051	0.062
	(0.049)	**(0.093)**	(0.097)	**(0.047)**	(0.050)	(0.044)	(0.041)
wholesale, retail	-0.023	**0.187***	-0.064	-0.010	0.024	0.097**	0.036
	(0.053)	**(0.101)**	(0.105)	(0.051)	(0.054)	(0.048)	(0.044)
Constant	**0.078****	**0.280*****	0.123	**0.270*****	**0.329*****	**0.188*****	**0.143*****
	(0.040)	**(0.091)**	(0.077)	**(0.040)**	**(0.041)**	**(0.043)**	**(0.034)**
Observations	911	911	911	911	911	911	911
R-squared	0.102	0.164	0.070	0.241	0.217	0.195	0.168
Number of countries	23	23	23	23	23	23	23
Country fixed effects	yes	yes	yes	yes	yes	yes	yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Cyclical component identified using the band-pass filter suggested by Christiano and Fitzgerald (2003) to log-levels of annual value added series in constant (1995) prices. In parameterizing the filtering procedure we set the range for cycle duration rather wide, allowing it range from 2 years (lower bound of business cycle frequency) to 20 years.

Table 7: Percentage shares of real value added within the total non-government, real economy sectors during financial contraction episodes.

Year	Country	Agriculture	Construction	Mining	Manufacturing	Public Utilities	Wholesale, Retail	Transportation
1951	United Kingdom	3.03%	9.38%	12.43%	40.58%	1.87%	23.11%	9.59%
1956	Colombia	33.10%	10.02%	4.96%	20.98%	1.82%	19.71%	9.41%
1959	Costa Rica	28.59%	7.33%	0.13%	23.61%	1.85%	31.70%	6.79%
1960	Venezuela	4.49%	9.07%	54.86%	12.70%	0.29%	14.87%	3.72%
1973	India	53.05%	6.46%	2.17%	16.32%	1.49%	14.31%	6.20%
1975	Sweden	7.53%	10.49%	1.09%	41.03%	4.05%	24.01%	11.80%
1979	Bolivia	20.37%	7.64%	17.00%	28.56%	1.64%	15.27%	9.51%
1981	Chile	7.89%	15.91%	11.42%	33.35%	4.61%	18.39%	8.43%
1982	Bolivia	22.84%	5.77%	18.24%	24.40%	2.12%	15.84%	10.79%
1982	Chile	9.15%	14.21%	14.21%	30.81%	5.39%	17.49%	8.74%
1982	Taiwan	9.58%	7.52%	2.80%	46.35%	2.83%	22.50%	8.42%
1983	Phillippines	26.98%	13.10%	1.72%	32.42%	2.94%	16.74%	6.09%
1983	Chile	9.12%	12.40%	14.18%	32.35%	5.72%	17.62%	8.62%
1985	Malaysia	25.52%	6.53%	16.81%	23.15%	3.20%	16.50%	8.29%
1988	Bolivia	24.22%	4.60%	13.51%	24.36%	2.34%	17.64%	13.34%
1989	Argentina	10.09%	9.53%	2.63%	33.50%	3.30%	28.63%	12.32%
1992	Sweden	6.24%	10.29%	0.70%	37.21%	6.63%	22.89%	16.04%
1997	Indonesia	17.24%	9.49%	13.60%	32.18%	0.56%	21.19%	5.75%
2000	Argentina	9.83%	9.37%	3.20%	28.76%	4.80%	28.61%	15.43%

Notes: Financial contractions defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Motanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative growth rate.

Table 8: Estimated cumulative effect of financial contractions on total non-financial sector value added growth.

Year	Country	Fin. Cont.	Comulative imact	
		Size	Dummy effect only	Proportional to size
1973	India	-10.02%	-3.31%	-2.32%
1975	Sweden	-0.59%	-4.29%	-0.18%
1979	Bolivia	-1.15%	-3.36%	-0.27%
1981	Chile	-7.16%	-4.47%	-2.23%
1982	Bolivia	-18.64%	-3.06%	-3.98%
1982	Chile	-83.53%	-4.15%	-24.19%
1982	Taiwan	-1.73%	-3.97%	-0.48%
1983	Phillippines	-21.59%	-4.34%	-6.54%
1983	Chile	-20.73%	-3.96%	-5.72%
1985	Malaysia	-1.86%	-3.12%	-0.41%
1988	Bolivia	-1.97%	-3.07%	-0.42%
1989	Argentina	-5.48%	-4.10%	-1.57%
1992	Sweden	-2.82%	-4.19%	-0.82%
1997	Indonesia	-28.37%	-3.75%	-7.42%
2000	Argentina	-9.34%	-3.99%	-2.60%

Notes: Financial contractions defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Montanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative growth rate. The partial cumulative effect of financial contraction on real economy total is calculated as the sum of cumulative effects in individual sectors weighted by each sector's value added shares (see Table 10).

Table 9: Panel regressions of the effect of sharp financial contractions on sectoral real value added growth rates; controlling for financial openness and reserve accumulation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent var.: value added growth rate	agriculture	construction	mining	manufacturing	public utilities	wholesale, retail	transportation
				Baseline			
Lag financial contraction	-0.023	-0.007	0.016	-0.010	0.027	**0.059***	**0.051***
	(0.041)	(0.072)	(0.073)	(0.037)	(0.037)	**(0.035)**	**(0.030)**
Lag fin. contraction × fin. openness	-0.015	**-0.205*****	-0.073	**-0.088****	-0.033	**-0.084****	**-0.147*****
	(0.038)	**(0.066)**	(0.067)	**(0.034)**	(0.034)	**(0.033)**	**(0.027)**
Lag (reserves/gdp)	**0.001****	**0.001***	0.000	**0.001*****	-0.000	**0.001*****	0.000
	(0.000)	**(0.001)**	(0.001)	**(0.000)**	(0.000)	**(0.000)**	(0.000)
Lag fin. contraction × (reserves/gdp)	0.001	**0.015***	0.008	**0.010****	0.000	0.001	**0.010*****
	(0.005)	**(0.008)**	(0.008)	**(0.004)**	(0.004)	(0.004)	**(0.003)**
Observations	813	813	813	813	813	813	813
R-squared	0.099	0.169	0.092	0.184	0.122	0.138	0.194
Number of countries	24	24	24	24	24	24	24
				Additional controls			
Lag financial contraction	-0.036	-0.056	-0.020	-0.053	0.067	-0.023	**0.079***
	(0.071)	(0.118)	(0.118)	(0.059)	(0.059)	(0.055)	**(0.043)**
Lag fin. contraction × fin. openness	0.003	**-0.233*****	-0.065	**-0.105*****	-0.057	**-0.131*****	**-0.156*****
	(0.046)	**(0.077)**	(0.077)	**(0.039)**	(0.039)	**(0.036)**	**(0.028)**
Lag (reserves/gdp)	**0.001****	**0.002****	-0.000	**0.002*****	0.000	**0.002*****	**0.001****
	(0.001)	**(0.001)**	(0.001)	**(0.000)**	(0.000)	**(0.000)**	**(0.000)**
Lag fin. contraction × (reserves/gdp)	-0.003	**0.028****	0.012	**0.019*****	0.000	**0.022*****	**0.009***
	(0.008)	**(0.013)**	(0.013)	**(0.007)**	(0.007)	**(0.006)**	**(0.005)**
Observations	590	590	590	590	590	590	590
R-squared	0.115	0.176	0.097	0.199	0.122	0.207	0.257
Number of countries	24	24	24	24	24	24	24

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients on controls in each specification omitted for brevity. Financial contractions defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Montanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative growth rate.

Table 10: Contraction episodes in financial sector growth rates

Year	Country	Contraction	Sudden Stop	Source:
1951	United Kingdom	0.00%		
1956	Colombia	-13.54%		
1959	Costa Rica	-55.01%	Most countries in the sample, except for	
1960	Venezuela	-35.94%	U.K. and Sweden, closed to private capital	
1973	India	-10.02%	flows in the pre-1980 period.	
1975	Sweden	-0.59%		
1979	Bolivia	-1.15%		
1981	Chile	-7.16%	Yes	Calvo and Reinhart (2000)
1982	Bolivia	-18.64%	No	
1982	Chile	-83.53%	Yes	Calvo and Reinhart (2000)
1982	Taiwan	-1.73%	No	
1983	Phillippines	-21.59%	Yes	Hutchison and Noy (2006)
1983	Chile	-20.73%	Yes	Calvo and Reinhart (2000)
1985	Malaysia	-1.86%	Yes	Hutchison and Noy (2006)
1988	Bolivia	-1.97%	No	
1989	Argentina	-5.48%	Yes (1991)	Calvo and Reinhart (2000)
1992	Sweden	-2.82%	Yes	Calvo, Izquierdo, Mejia (2004)
1997	Indonesia	-28.37%	Yes	Calvo, Izquierdo, Mejia (2004)
2000	Argentina	-9.34%	Yes	Calvo, Izquierdo, Mejia (2004)

Notes: Financial contractions defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Montanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative growth rate.

Table 11: Panel regressions of the effect of LARGE sharp financial contractions (above the median in absolute value) on sectoral real value added growth rates; controlling for financial openness and reserve accumulation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
dependent var.: value added growth rate	agriculture	construction	government	mining	manufacturing	public utilities	wholesale, retail	transportation
				Baseline				
Lag financial contraction	-0.016	-0.050	-0.029	-0.002	-0.036	-0.005	-0.025	0.050
	(0.054)	(0.095)	(0.086)	(0.097)	(0.049)	(0.049)	(0.046)	(0.039)
Lag fin. contraction × fin. openness	0.093	**-0.503*** **	-0.106	-0.021	**-0.201*** **	-0.012	**-0.342*** **	**-0.218*** **
	(0.063)	**(0.111)**	(0.100)	(0.113)	**(0.058)**	(0.057)	**(0.054)**	**(0.046)**
Lag (reserves/gdp)	**0.001** **	**0.001***	0.000	0.000	**0.001*** **	-0.000	**0.001*** **	0.000
	(0.000)	**(0.001)**	(0.001)	(0.001)	**(0.000)**	(0.000)	**(0.000)**	(0.000)
Lag fin. contraction × (reserves/gdp)	**-0.030** **	**0.085*** **	0.012	-0.002	**0.037*** **	-0.001	**0.070*** **	**0.025*** **
	(0.013)	**(0.023)**	(0.021)	(0.023)	**(0.012)**	(0.012)	**(0.011)**	**(0.010)**
Observations	813	813	755	813	813	813	813	813
R-squared	0.110	0.176	0.024	0.091	0.193	0.122	0.173	0.194
Number of countries	24	24	24	24	24	24	24	24
				Additional controls				
Lag financial contraction	-0.132	0.218	0.088	-0.001	0.061	0.113	**0.168** **	**0.199*** **
	(0.112)	(0.187)	(0.192)	(0.188)	(0.094)	(0.096)	**(0.085)**	**(0.069)**
Lag fin. contraction × fin. openness	**0.182***	**-0.656*** **	-0.207	-0.056	**-0.264*** **	-0.087	**-0.455*** **	**-0.289*** **
	(0.094)	**(0.156)**	(0.161)	(0.157)	**(0.079)**	(0.079)	**(0.071)**	**(0.058)**
Lag (reserves/gdp)	**0.001** **	**0.002** **	-0.000	-0.000	**0.002*** **	0.000	**0.002*** **	**0.001** **
	(0.001)	**(0.001)**	(0.001)	(0.001)	**(0.000)**	(0.000)	**(0.000)**	**(0.000)**
Lag fin. contraction × (reserves/gdp)	**-0.037*** **	**0.083*** **	0.019	0.008	**0.038*** **	0.001	**0.070*** **	**0.021** **
	(0.014)	**(0.024)**	(0.024)	(0.024)	**(0.012)**	(0.012)	**(0.011)**	**(0.009)**
Observations	590	590	578	590	590	590	590	590
R-squared	0.131	0.190	0.031	0.096	0.208	0.121	0.252	0.265
Number of countries	24	24	24	24	24	24	24	24

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients on controls in each specification omitted for brevity. Financial contractions defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Montanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by a 9.34 percent (sample median) or greater contraction.

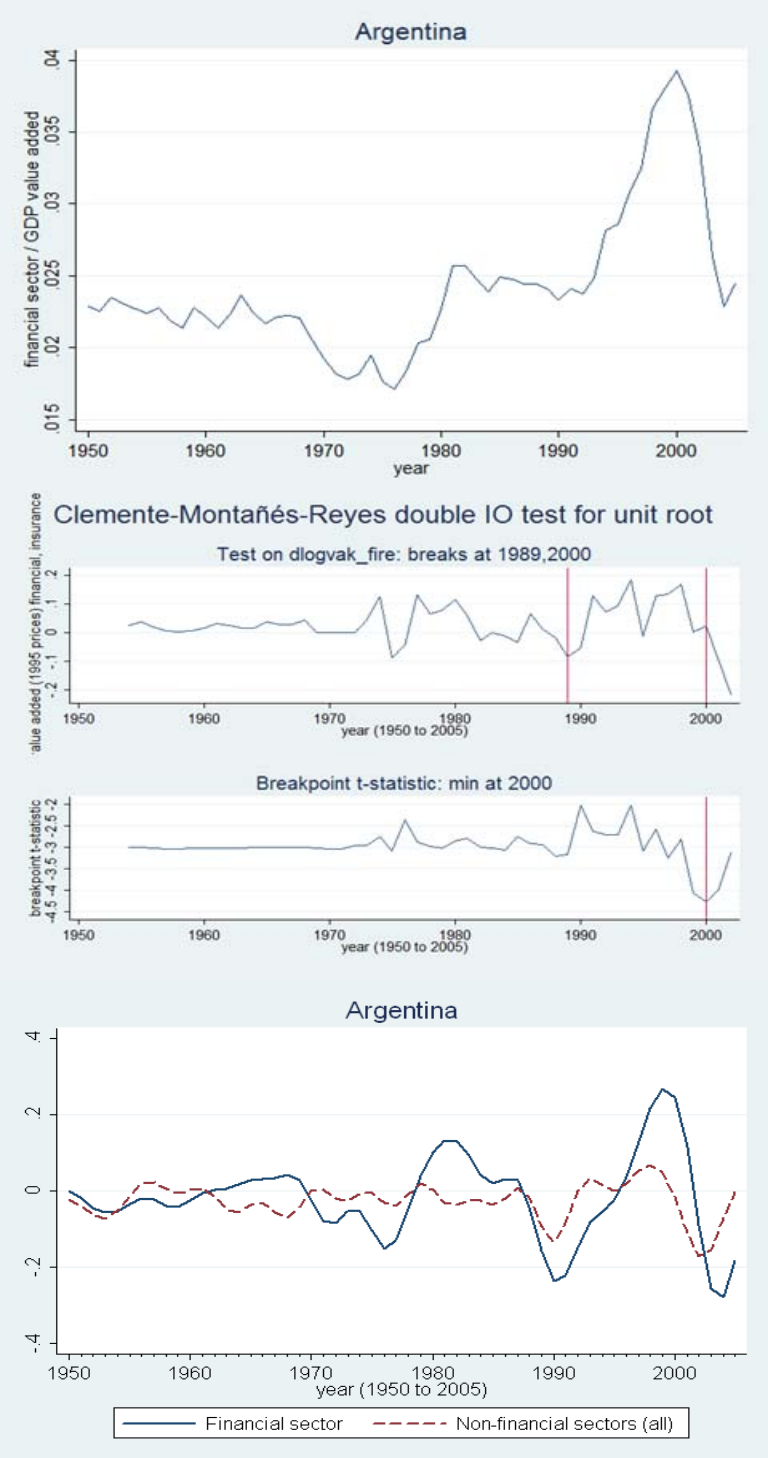

Figure 1: Argentina SAMPLE – Financial sector value added to GDP ratio (top panel); structural breaks in the growth rate (center panel), and cyclical components of financial sector and non-financial sectors total value added (bottom panel).

Appendix

Table A1: Country-level granger-causality regressions between the cyclical component of financial sector value added and the non-financial sector. Top panel in levels; bottom panel in first differences.

Country	ARG	BOL	BRA	CHL	COL	CRI	DEU	DNK	ESP	FRA	GBR	HKG	IDN	IND
Lag CF(Fin. Value added)	-0.137***	-0.051***	0.075	0.039	0.018	0.094***	0.105	-0.189***	-0.198***	0.038	0.050	0.106***	-0.088**	-0.671***
	(0.046)	(0.018)	(0.078)	(0.031)	(0.033)	(0.018)	(0.192)	(0.056)	(0.067)	(0.063)	(0.091)	(0.031)	(0.037)	(0.166)
Lag CF(Non-fin. Value added)	0.888***	0.900***	0.719***	0.712***	0.811***	0.617***	0.526***	0.656***	0.990***	0.473***	0.489***	0.345**	0.919***	2.685***
	(0.098)	(0.067)	(0.088)	(0.114)	(0.109)	(0.100)	(0.121)	(0.063)	(0.077)	(0.070)	(0.073)	(0.143)	(0.145)	(0.616)
Constant	-0.006	-0.004	-0.007*	-0.009	-0.007*	-0.008*	0.253***	0.222***	0.076***	-0.012***	0.209***	-0.524***	0.008	0.023
	(0.004)	(0.003)	(0.004)	(0.006)	(0.004)	(0.004)	(0.058)	(0.030)	(0.020)	(0.002)	(0.034)	(0.123)	(0.008)	(0.014)
Observations	55	55	55	55	55	55	41	58	58	55	58	31	45	55
R-squared	0.637	0.726	0.639	0.571	0.667	0.605	0.579	0.648	0.766	0.489	0.530	0.269	0.413	0.330
Country	ITA	JPN	KOR	MEX	MYS	NLD	PER	PHL	SGP	SWE	THA	TWN	USA	VEN
Lag CF(Fin. Value added)	0.139	0.016	-0.163	-0.323***	-0.126	0.067	0.016	-0.158*	-0.271***	-0.281**	-0.042	-0.059**	-0.899***	0.086*
	(0.100)	(0.032)	(0.111)	(0.058)	(0.091)	(0.051)	(0.158)	(0.085)	(0.060)	(0.134)	(0.030)	(0.023)	(0.171)	(0.044)
Lag CF(Non-fin. Value added)	0.494***	0.652***	0.809***	0.951***	0.876***	0.517***	0.713***	1.018***	1.031***	0.703***	0.928***	0.641***	0.943***	0.697***
	(0.077)	(0.078)	(0.094)	(0.081)	(0.144)	(0.072)	(0.206)	(0.166)	(0.074)	(0.070)	(0.097)	(0.114)	(0.093)	(0.085)
Constant	-0.009***	-0.157***	-0.218***	-0.008***	-0.009	0.015***	-0.006	-0.005	0.006*	-0.014***	-0.002	0.015***	0.442***	-0.007
	(0.003)	(0.034)	(0.056)	(0.003)	(0.007)	(0.003)	(0.006)	(0.008)	(0.003)	(0.003)	(0.003)	(0.004)	(0.060)	(0.005)
Observations	54	51	52	55	35	45	55	34	45	55	54	44	58	55
R-squared	0.437	0.619	0.559	0.738	0.643	0.568	0.535	0.648	0.768	0.695	0.698	0.441	0.628	0.633
Country	ARG	BOL	BRA	CHL	COL	CRI	DEU	DNK	ESP	FRA	GBR	HKG	IDN	IND
Lag Change in CF(Fin. Value added)	-0.170**	-0.104***	0.240**	-0.011	0.005	0.088***	0.181	-0.039	-0.188***	-0.019	-0.090	0.105*	-0.045	-0.184
	(0.080)	(0.024)	(0.094)	(0.032)	(0.036)	(0.020)	(0.217)	(0.064)	(0.069)	(0.084)	(0.121)	(0.057)	(0.048)	(0.134)
Lag Change in CF(Non-fin. Value added)	0.710***	0.755***	0.583***	0.711***	0.767***	0.471***	0.319**	0.477***	0.886***	0.406***	0.386***	0.248	0.534**	1.278***
	(0.131)	(0.088)	(0.100)	(0.141)	(0.125)	(0.117)	(0.120)	(0.070)	(0.107)	(0.083)	(0.080)	(0.162)	(0.259)	(0.436)
Constant	0.000	-0.001	0.000	0.001	0.000	0.000	0.000	-0.000	0.000	-0.000	-0.000	0.001	0.005	-0.001
	(0.004)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.004)	(0.007)	(0.008)
Observations	54	54	54	54	54	54	40	57	57	54	57	30	44	54
R-squared	0.376	0.521	0.518	0.441	0.516	0.363	0.246	0.402	0.519	0.291	0.290	0.138	0.123	0.101
Durbin-Watson	1.274	0.878	0.628	0.796	0.693	0.974	1.387	0.944	1.073	1.196	1.082	1.289	1.032	1.010
Country	ITA	JPN	KOR	MEX	MYS	NLD	PER	PHL	SGP	SWE	THA	TWN	USA	VEN
Lag Change in CF(Fin. Value added)	0.268**	0.071**	-0.019	-0.340***	-0.158*	-0.004	-0.002	-0.307**	-0.221**	-0.394***	-0.081***	-0.081**	-0.855***	0.040
	(0.100)	(0.027)	(0.192)	(0.058)	(0.084)	(0.038)	(0.159)	(0.134)	(0.082)	(0.127)	(0.030)	(0.031)	(0.154)	(0.047)
Lag Change in CF(Non-fin. Value added)	0.400***	0.528***	0.426***	0.800***	0.697***	0.450***	0.626***	1.224***	0.747***	0.510***	0.842***	0.480***	0.722***	0.508***
	(0.076)	(0.077)	(0.143)	(0.103)	(0.145)	(0.084)	(0.198)	(0.295)	(0.085)	(0.089)	(0.130)	(0.124)	(0.099)	(0.137)
Constant	-0.000	-0.000	-0.000	0.000	-0.001	0.000	-0.000	-0.000	-0.001	0.000	-0.000	0.000	0.001	0.001
	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.004)	(0.004)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)	(0.004)
Observations	53	50	51	54	34	44	54	33	44	54	53	43	57	54
R-squared	0.370	0.474	0.178	0.539	0.424	0.409	0.395	0.517	0.537	0.427	0.503	0.298	0.437	0.270
Durbin-Watson	0.858	0.932	1.322	1.093	1.122	0.854	0.916	0.830	1.052	1.138	0.945	0.935	1.201	1.143

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Cyclical component identified using the band-pass filter suggested by Christiano and Fitzgerald (2003) to log-levels of annual value added series in constant (1995) prices. In parameterizing the filtering procedure we set the range for cycle duration rather wide, allowing it range from 2 years (lower bound of business cycle frequency) to 20 years

Table A2: Augmented Dickey-Fuller (ADF) Panel Unit Root Test Results

Method	Statistic	Prob.**
ADF - Fisher Chi-square	1010.22	0.0000
ADF - Choi Z-stat	-28.7669	0.0000

Notes: Null Hypothesis: Unit root (individual unit root process). ** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality. 1388 total number of observations with 28 cross-sections. The number of augmenting lags (p) is determined by minimizing the Schwartz Bayesian information criterion. Exogenous variables: Individual effects. The p-values indicate that the null of unit root is strongly rejected, indicating that the financial sector growth series is stationary.

Table A3: Intermediate ADF test results

Cross section	Prob.	Lag	Max Lag	Obs
Argentina	0.000	0	10	54
Bolivia	0.000	0	10	54
Brazil	0.000	0	10	54
Chile	0.000	0	10	54
Colombia	0.000	0	10	54
Costa Rica	0.000	0	10	54
Denmark	0.000	2	9	38
France	0.000	1	10	56
Germany	0.000	0	10	57
Hong Kong SAR, China	0.000	0	10	54
India	0.000	0	10	57
Indonesia	0.001	0	6	30
Italy	0.000	0	9	44
Japan	0.000	1	10	53
Korea, Rep.	0.000	0	10	53
Malaysia	0.000	0	10	50
Mexico	0.000	0	10	51
Netherlands	0.000	0	10	54
Peru	0.000	0	8	34
Philippines	0.000	0	9	44
Singapore	0.000	0	10	54
Spain	0.001	0	7	33
Sweden	0.005	0	9	44
Taiwan	0.000	1	10	53
Thailand	0.000	1	10	52
United Kingdom	0.000	0	9	43
United States	0.000	1	10	56
Venezuela, RB	0.000	0	10	54

Notes: Null Hypothesis: Unit root (individual unit root process). The number of augmenting lags (p) is determined by minimizing the Schwartz Bayesian information criterion. Exogenous variables: Individual effects. The p-values indicate that the null of unit root is strongly rejected, indicating that the financial sector growth series is stationary.

Table A4: Additional controls: the effect of sharp financial sector contractions and expansions – structural breaks – on real value added growth rates of non-financial sectors.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent var.: value added growth rate	agriculture	construction	mining	manufacturing	public utilities	wholesale, retail	transportation
lag financial contraction	**-0.056*** **	**-0.118*** **	-0.023	**-0.037***	-0.007	-0.016	**-0.046*** **
	(0.021)	(0.040)	(0.039)	(0.019)	(0.019)	(0.018)	(0.014)
lag financial expansion	-0.010	0.013	-0.016	0.015	0.005	0.001	-0.001
	(0.014)	(0.026)	(0.025)	(0.013)	(0.012)	(0.012)	(0.009)
convergence (value added per worker)	**-0.032** **	-0.020	**-0.054*** **	-0.023	**-0.031*** **	**-0.073*** **	**-0.090*** **
	(0.014)	(0.020)	**(0.012)**	(0.016)	**(0.008)**	**(0.014)**	**(0.012)**
banking crisis	-0.001	-0.001	0.008	-0.013	**-0.040*** **	-0.005	0.011
	(0.016)	(0.030)	(0.029)	(0.015)	**(0.014)**	(0.014)	(0.011)
currency crisis	-0.001	**-0.048** **	-0.006	**-0.019***	**-0.025** **	-0.009	**-0.012***
	(0.011)	**(0.020)**	(0.020)	**(0.010)**	**(0.010)**	(0.009)	**(0.007)**
log(gdp/cap)	**1.720***	**4.089** **	-1.982	-0.086	-0.101	**3.771*** **	**3.067*** **
	(0.935)	**(1.760)**	(1.609)	(0.956)	(0.846)	**(0.834)**	**(0.658)**
wdi_credit	-0.008	**-0.059** **	**0.046***	-0.016	0.004	**-0.031*** **	-0.010
	(0.013)	**(0.024)**	**(0.025)**	(0.012)	(0.012)	**(0.011)**	(0.009)
log(inflation)	**-0.709** **	**-1.063***	-0.599	**-1.515*** **	-0.203	**-1.231*** **	**-0.566*** **
	(0.307)	**(0.581)**	(0.563)	**(0.283)**	(0.279)	**(0.263)**	**(0.205)**
log(govt spending)	-1.112	-0.976	-6.881	-3.130	-1.471	-0.404	**-5.062*** **
	(2.335)	(4.386)	(4.358)	(2.156)	(2.133)	(2.012)	**(1.556)**
de-facto financial openness	0.125	-1.652	1.753	-1.385	-0.546	**-3.029** **	-1.641
	(1.544)	(2.852)	(2.808)	(1.441)	(1.394)	**(1.361)**	(1.021)
log(trade openness)	0.205	0.954	5.169	**5.677*** **	0.701	-0.404	**3.456*** **
lagged value added growth:	(1.927)	(3.465)	(3.419)	**(1.712)**	(1.685)	(1.610)	**(1.241)**
agriculature	**-0.277*** **	-0.038	-0.027	-0.022	0.032	0.032	-0.028
	(0.044)	(0.082)	(0.080)	(0.040)	(0.040)	(0.038)	(0.029)
construction	0.014	**0.158*** **	0.033	-0.010	0.029	-0.015	0.022
	(0.027)	**(0.053)**	(0.051)	(0.025)	(0.025)	(0.024)	(0.018)
government	0.006	0.029	-0.007	-0.009	0.002	0.002	0.014
	(0.024)	(0.045)	(0.044)	(0.022)	(0.022)	(0.021)	(0.016)
mining	-0.006	-0.023	0.067	-0.019	0.018	-0.016	**-0.026***
	(0.024)	(0.045)	(0.045)	(0.022)	(0.022)	(0.021)	**(0.016)**
manufacturing	**0.122***	0.142	-0.048	**0.166*** **	-0.011	**0.154*** **	**0.159*** **
	(0.066)	(0.124)	(0.122)	**(0.061)**	(0.060)	**(0.057)**	**(0.044)**
public utilities	-0.038	**0.195** **	-0.056	0.053	-0.080*	0.058	0.009
	(0.049)	**(0.092)**	(0.090)	(0.045)	(0.045)	(0.042)	(0.033)
transportation	-0.039	0.036	**-0.400*** **	**-0.241*** **	-0.034	**-0.143** **	-0.078
	(0.074)	(0.139)	**(0.136)**	**(0.068)**	(0.067)	**(0.064)**	(0.050)
wholesale, retail	-0.026	0.078	0.119	0.067	0.071	0.028	0.031
	(0.074)	(0.141)	(0.137)	(0.069)	(0.068)	(0.064)	(0.050)
real interest rate	-0.025	0.004	**0.082***	-0.006	0.007	-0.014	-0.019
	(0.024)	(0.045)	**(0.044)**	(0.022)	(0.022)	(0.021)	(0.016)
agricultural share of economy	**0.277***	**0.573** **	0.113	**0.412*** **	**0.221***	**0.318** **	0.089
	(0.144)	**(0.280)**	(0.264)	**(0.132)**	**(0.130)**	**(0.124)**	(0.096)
industry share of economy	**0.184***	0.297	0.244	**0.212** **	-0.028	0.138	-0.027
	(0.098)	(0.186)	(0.185)	**(0.090)**	(0.089)	(0.084)	(0.065)
political stability	-1.342	-2.629	0.187	-2.335	-0.066	1.226	**2.100***
	(1.746)	(3.292)	(3.226)	(1.622)	(1.592)	(1.528)	**(1.168)**
rule of law	0.411	3.999	4.953	**5.434** **	2.206	-1.415	**-3.887***
	(2.965)	(5.419)	(5.282)	**(2.733)**	(2.628)	(2.560)	**(1.991)**
regulatory quality	0.141	2.000	-1.099	0.552	1.050	2.972**	**1.745***
	(1.401)	(2.551)	(2.474)	(1.323)	(1.233)	(1.316)	**(0.960)**
Constant	-0.064	-0.384	0.304	-0.091	0.207	-0.001	**0.211** **
	(0.141)	(0.267)	(0.259)	(0.131)	(0.129)	(0.126)	**(0.096)**
Observations	551	551	551	551	551	551	551
R-squared	0.116	0.166	0.120	0.194	0.129	0.203	0.266
Number of countries	23	23	23	23	23	23	23
Country fixed effects	yes	yes	yes	yes	yes	yes	yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Financial contractions (expansions) defined as structural breaks in the growth rate of value added of financial sector in each country (identified according to Clemente, Motanes, Reyes (1998) innovational outlier (IO) break unit-root test) followed by negative (positive) growth rate.

Table A5: Additional controls; the effect of sharp financial sector contractions and expansions – turning points in the cyclical component – on real value added growth rates of non-financial sectors.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent var.: value added growth rate	agriculture	construction	mining	manufacturing	public utilities	wholesale, retail	transportation
lag financial contraction	0.005	**-0.026****	**-0.030****	**-0.013****	-0.004	**-0.018*****	**-0.010****
	(0.007)	**(0.013)**	**(0.012)**	**(0.006)**	(0.006)	**(0.006)**	**(0.004)**
lag financial expansion	-0.001	**0.026****	-0.008	0.010	**0.012***	0.009	0.005
	(0.007)	**(0.013)**	(0.012)	(0.006)	**(0.006)**	(0.006)	(0.005)
convergence (value added per worker)	**-0.032****	-0.026	**-0.055*****	-0.025	**-0.030*****	**-0.072*****	**-0.088*****
	(0.014)	(0.020)	**(0.012)**	(0.016)	**(0.008)**	**(0.014)**	**(0.012)**
banking crisis	-0.001	0.002	0.006	-0.011	**-0.040*****	-0.005	0.012
	(0.016)	(0.030)	(0.029)	(0.014)	**(0.014)**	(0.013)	(0.011)
currency crisis	-0.004	**-0.051****	-0.007	-0.019*	**-0.025****	-0.009	**-0.013***
	(0.011)	**(0.020)**	(0.020)	(0.010)	**(0.010)**	(0.009)	**(0.007)**
log(gdp/cap)	**0.017***	**0.043****	-0.020	0.000	-0.001	**0.037*****	**0.030*****
	(0.009)	**(0.018)**	(0.016)	(0.010)	(0.008)	**(0.008)**	**(0.007)**
wdi_credit	-0.000	**-0.001****	**0.000***	-0.000	0.000	**-0.000*****	-0.000
	(0.000)	**(0.000)**	**(0.000)**	(0.000)	(0.000)	**(0.000)**	(0.000)
log(inflation)	**-0.008****	**-0.011***	-0.005	**-0.015*****	-0.002	**-0.012*****	**-0.006*****
	(0.003)	**(0.006)**	(0.006)	**(0.003)**	(0.003)	**(0.003)**	**(0.002)**
log(govt spending)	-0.012	-0.008	-0.063	-0.030	-0.015	-0.002	**-0.049*****
	(0.024)	(0.044)	(0.043)	(0.022)	(0.021)	(0.020)	**(0.016)**
de-facto financial openness	-0.002	-0.024	0.014	-0.017	-0.006	**-0.032****	**-0.019***
	(0.016)	(0.028)	(0.028)	(0.014)	(0.014)	**(0.013)**	**(0.010)**
log(trade openness)	0.003	0.010	0.054	**0.057*****	0.007	-0.003	**0.035*****
lagged value added growth:	(0.019)	(0.035)	(0.034)	**(0.017)**	(0.017)	(0.016)	**(0.012)**
agriculature	**-0.271*****	-0.038	-0.030	-0.022	0.028	0.028	-0.027
	(0.044)	(0.082)	(0.080)	(0.040)	(0.039)	(0.037)	(0.029)
construction	0.008	**0.135****	0.028	-0.018	0.026	-0.020	0.015
	(0.028)	**(0.053)**	(0.050)	(0.025)	(0.025)	(0.023)	(0.018)
government	0.005	0.023	-0.012	-0.011	0.002	-0.000	0.011
	(0.024)	(0.045)	(0.044)	(0.022)	(0.022)	(0.020)	(0.016)
mining	-0.008	-0.028	0.066	-0.020	0.017	-0.017	**-0.028***
	(0.024)	(0.045)	(0.045)	(0.022)	(0.022)	(0.020)	**(0.016)**
manufacturing	**0.133****	0.102	-0.059	**0.147****	-0.027	**0.131****	**0.150*****
	(0.067)	(0.125)	(0.122)	**(0.061)**	(0.060)	**(0.057)**	**(0.045)**
public utilities	-0.036	**0.229****	-0.045	0.068	-0.073	**0.070***	0.021
	(0.049)	**(0.092)**	(0.090)	(0.045)	(0.045)	**(0.042)**	(0.033)
transportation	-0.021	0.072	**-0.388*****	**-0.231*****	-0.034	**-0.140****	-0.062
	(0.075)	(0.138)	**(0.134)**	**(0.068)**	(0.067)	**(0.062)**	(0.050)
wholesale, retail	-0.025	0.109	0.127	0.079	0.078	0.040	0.040
	(0.075)	(0.141)	(0.136)	(0.069)	(0.068)	(0.064)	(0.050)
real interest rate	-0.000	0.000	**0.001****	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	**(0.000)**	(0.000)	(0.000)	(0.000)	(0.000)
agricultural share of economy	**0.003***	**0.006****	0.001	**0.004*****	0.002	**0.003****	0.001
	(0.001)	**(0.003)**	(0.003)	**(0.001)**	(0.001)	**(0.001)**	(0.001)
industry share of economy	**0.002***	0.003	0.002	**0.002****	-0.000	0.001	-0.000
	(0.001)	(0.002)	(0.002)	**(0.001)**	(0.001)	(0.001)	(0.001)
political stability	-0.013	-0.024	0.006	-0.023	-0.000	0.014	**0.022***
	(0.018)	(0.033)	(0.032)	(0.016)	(0.016)	(0.015)	**(0.012)**
rule of law	0.006	0.037	0.044	**0.052***	0.022	-0.017	**-0.039***
	(0.030)	(0.054)	(0.053)	**(0.027)**	(0.026)	(0.025)	**(0.020)**
regulatory quality	-0.000	0.022	-0.010	0.007	0.011	**0.030****	**0.017***
	(0.014)	(0.025)	(0.025)	(0.013)	(0.012)	**(0.013)**	**(0.010)**
Constant	-0.053	-0.365	0.299	-0.089	0.207	-0.005	**0.213****
	(0.142)	(0.266)	(0.258)	(0.131)	(0.129)	(0.124)	**(0.096)**
Observations	551	551	551	551	551	551	551
R-squared	0.104	0.166	0.129	0.198	0.137	0.224	0.260
Number of countries	23	23	23	23	23	23	23
Country fixed effects	yes	yes	yes	yes	yes	yes	yes

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Cyclical component identified using the band-pass filter suggested by Christiano and Fitzgerald (2003) to log-levels of annual value added series in constant (1995) prices. In parameterizing the filtering procedure we set the range for cycle duration rather wide, allowing it range from 2 years (lower bound of business cycle frequency) to 20 years.