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# IMF Working Paper

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## Credit Cyclicalities in Chile: A Cross-Country Perspective

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**IMF Working Paper**

Western Hemisphere Department

**Credit Cyclicalities in Chile: A Cross-Country Analysis**

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Authorized for distribution by Martin Mühleisen

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**Abstract**

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This paper analyzes the determinants of credit cyclicalities. It constructs a financial development index and studies whether it affects the amplitude of impulse responses to shocks to output, terms of trade, global liquidity, and global risk appetite. The paper uses both country-specific VARs for cross-country analyses and panel VARs to compare impulse responses between various country groupings. The study finds evidence that financial development—especially stronger creditor rights—can mitigate credit cyclicalities, given that the response of credit to output or terms of trade shocks is stronger in countries with weaker financial systems.

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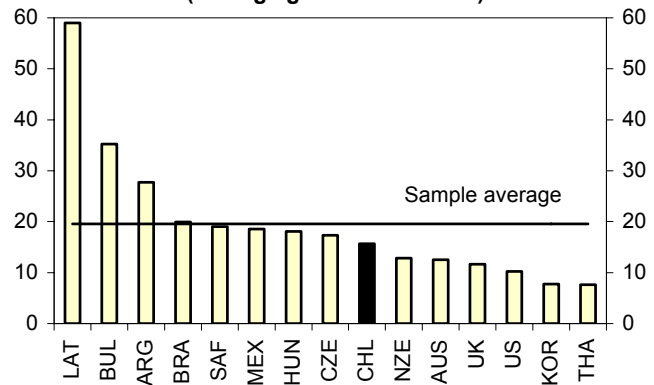
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## I. INTRODUCTION

Credit growth has taken off around the globe in recent years, especially in emerging markets. While this has contributed to the economic expansion in many countries, there have also been concerns that some credit growth may have been excessive, possibly contributing to macroeconomic imbalances, overheating, and banking sector vulnerabilities. In Latin America, nominal credit growth to the private sector expanded by 32 percent on average in the seven largest countries in 2006, the third year of strong credit expansion in the region (Figure 1). Private credit in Chile has also increased at a brisk pace in 2006 (at 18 percent), but the acceleration of credit started earlier and has been more gradual than in many other emerging market economies. The supply of credit to households has expanded strongly amid strong competition among lenders and a continuing search for market share. While banks remain the biggest suppliers of credit, the role of non-banks is expanding, not least with department stores penetrating deeper into low-income segments.

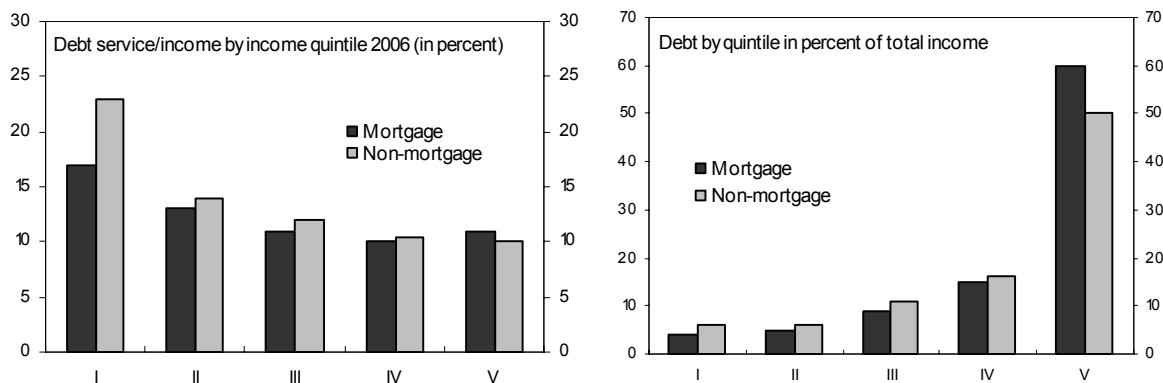
**Figure 1: Credit to the private sector  
(average growth 2004-2006)**



Source: IFS

Credit expansion in Chile has taken place amid strong financial fundamentals, and macroeconomic risks emanating from household balance sheets seem low. Household debt has increased only moderately, and although the increase has been larger for the poorest segment of borrowers, the latter represents only a small fraction of total debt (Figure 2). The banking sector's share of non-performing loans (NPLs) in total loans remain in the low single digits, NPLs are fully covered by provisions, and banks enjoy strong capitalization. From the point of view of non-banks, systemic risk appears marginal since these institutions do not

**Figure 2: Household debt indicators**

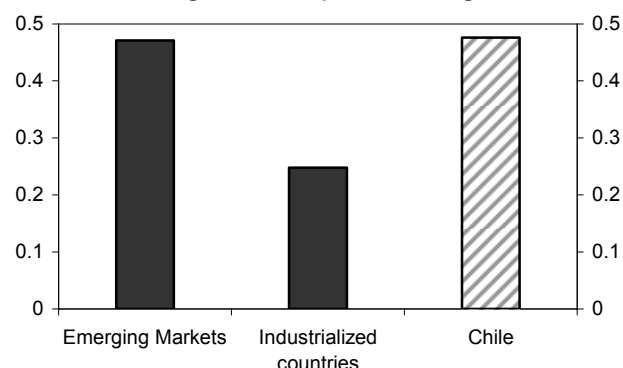


Source: Central Bank of Chile

take deposits. Perhaps more importantly, department stores and other providers of credit cards have extensive information on their borrowers and have used it to extend credit in a prudent and gradual manner.

Leaving aside financial stability aspects, there is also a broader question whether strong credit cyclicity may be contributing to increased economic volatility. The pro/counter-cyclical nature of credit could be important for the amplitude of the overall economic cycle, as highly procyclical credit could create “small shocks, large cycles” effects (Bernanke, Gertler and Gilchrist, 1996). Figure 3 shows that the average correlation between credit growth and GDP growth in emerging markets (including Chile) is substantially higher than in industrialized countries. Although credit procyclicality in emerging markets is certainly not the only reason for greater economic volatility, for policy purposes it seems worth investigating how the Chilean credit cycle compares with that in other countries, and what factors are driving credit cyclicity.

**Figure 3: Correlation, real GDP growth - real private credit growth**



EMs: ARG, BRA, CHL, COL, CZH, EST, HUN, INS, LAT, LIT, MAL, MEX, PER, POL, SLK, SLV, THA, VEN

Ind. Ctries: AUS, AUT, BEL, CAN, DEN, FIN, FRA, GER, GRE, ICL, IRE, ITA, JAP, LUX, NED, NZL, NOR, POR, SPA, SWE, SUI, GBR, USA

Source: IFS, Haver, and author's calculations.

In this context, it is important to distinguish between procyclicality *per se* and the impact procyclical credit on the economy. Obviously, all other things equal, the more widely credit is being used, the stronger is the impact of the credit cycle on the overall economy. Braun and Larrain (2005) show that credit-dependent sectors are more sensitive to economy-wide recessions. They also find—after controlling for credit dependency—that the impact of recessions is less severe for sectors that have a natural capacity to pledge collateral, and in countries with stronger creditor rights and better financial information standards. In other words, they find both evidence of the existence of a credit channel through which shocks are amplified, and indications that financial frictions can make this amplifying effect stronger.

The latter aspect is the focus of this study. The objective of this paper is to explore whether financial development—that is, the reduction of financial frictions—in Chile and elsewhere could help mitigate economic volatility and strengthen economic resilience to domestic and external shocks:

- The determinants of credit cyclicity are analyzed within a Vector Auto Regression (VAR) framework similar to Miniane and Rogers (2003). For comparability, the sample consists of 18 emerging and advanced economies with some degree of comparability to Chile (a small open commodity exporter and inflation targeter).

Larger countries, such as the U.S., U.K., Japan, and Euro area economies were not considered, and neither were countries with insufficient data availability.

- We construct a financial development index and study whether it affects the amplitude of impulse responses to shocks to output, terms of trade, global liquidity, and global risk appetite. We use both country-specific VARs for cross-country analyses, and panel VARs to compare impulse responses between various country groupings.<sup>1</sup>

The study finds evidence that financial development—especially stronger creditor rights—can mitigate credit cyclicalities, given that the response of credit to output or terms of trade shocks is stronger in countries with weaker financial systems. However, a well-developed financial system does not appear to shield economies from global financial shocks. The evidence is more clear-cut for household credit than for corporate credit. In the case of Chile, while the analysis suggests that credit is relatively little affected by the domestic cycle or shocks to the terms of trade, there appears to be some scope for improvement, especially with regard to creditor rights and capital markets development.

## **II. THEORETICAL PREMISE: FINANCIAL FRICTION AND THE FINANCIAL ACCELERATOR**

The basic premise of this study is a financial accelerator framework, whereby financial frictions affect credit growth in a way that amplifies the business cycle. A simple example helps to convey the intuition. Assume that the value of collateral or the strength of household balance sheets depends on the state of the economy. A downturn leads to a weakening of balance sheets or collateral values, constraining people’s ability to borrow for consumption or investment, which in turn feeds back into the downturn, amplifying it.

At the core of the issue is lenders’ lack of trust in borrowers, either because they have no leverage over defaulting borrowers, they have little information about their clients, or they are unable to manage credit risk effectively. This would be the case if creditor rights are weak or hard to enforce, lenders do not share credit information in an effective way, or capital markets are poorly developed. This lack of trust introduces credit frictions, by prompting lenders to rely heavily on collateral or other “safety margins”. These type of frictions could also arise if borrowers tend to be over-indebted or otherwise have weak balance sheets. Hence, we shall investigate whether procyclicality of credit could be reduced by making default less probable or less costly, or by developing deeper capital markets, allowing better risk-sharing among lenders.<sup>2</sup>

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<sup>1</sup> The panel VAR program was developed by Inessa Love and first used in Love and Ziccino (2006).

<sup>2</sup> A related issue that is not explored in this paper concerns the role of financial supervision, notably the appropriateness of banks’ risk measurement techniques.

Previous studies in this direction include Kiyotaki and Moore (1997), who present a theoretical model in which financial frictions and asset prices (and thus collateral values) interact to amplify shocks via the credit channel. Partly based on Kiyotaki and Moore (1997), Bernanke, Gertler and Gilchrist (1996) show that endogenous changes in credit conditions over the business cycle may magnify the economic cycle. They present an array of empirical evidence in support of the existence of a financial accelerator. Galindo and Micco (2001) bring these ideas into a model where stronger creditor rights tend to dampen the degree of pro-cyclicality of credit, and support this with empirical evidence. Braun and Larrain (2005) provide empirical evidence that better creditor rights and financial information diminish the impact of recessions on credit-dependent sectors.

The IMF's September 2006 World Economic Outlook (IMF, 2006) shows that the sensitivity of household consumption to income is lower in financial systems characterized by strong competition, strong creditor rights, and publicly available financial information, than in systems based on established lender-borrower relationships. IMF (2006) finds the opposite for corporate investment. This ambiguous effect of "arm's length lending" is not entirely surprising; on one hand, more complete and sophisticated financial markets should permit better risk sharing and put competitive pressure on lenders. On the other hand, established relations may favor lending through dips in the business cycle.

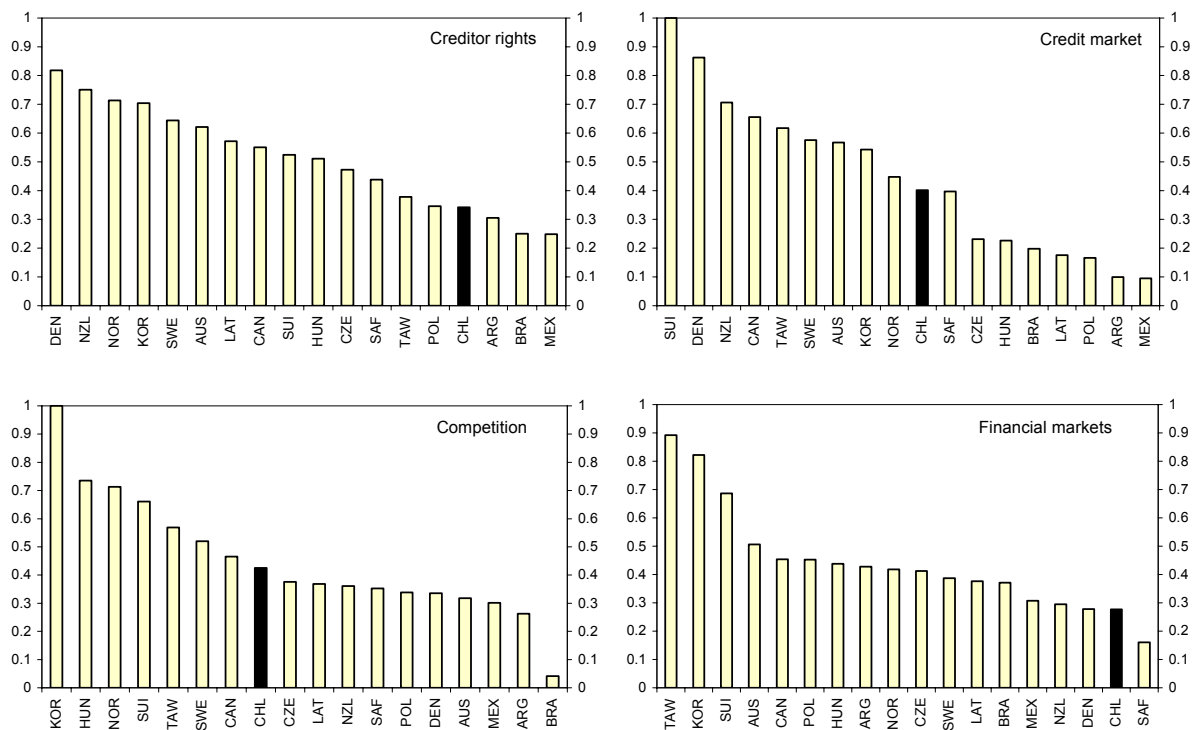
While the financial accelerator framework is perhaps the most standard way of relating business cycle fluctuations to financial frictions, other transmission mechanisms are entirely possible. Aghion and others (2005) find evidence that credit constraints—a corollary of underdeveloped financial systems—lead to more procyclical long-term (productivity-enhancing) investment, higher volatility, and a higher negative correlation between volatility and growth. In their model, it is the demand for credit that is at the center, rather than the supply, as in the financial accelerator framework. Credit constraints increase uncertainty about liquidity, limiting entrepreneurs' *willingness* to borrow for long-term projects during economic downturns. The point remains, however, that reducing financial frictions could help reduce economic volatility.

### III. MEASURING FINANCIAL FRICTION

Measuring financial friction is far from straightforward. Data are scarce, sometimes of questionable quality, and often represent highly imperfect proxies for relatively abstract concepts. The approach taken here is to construct a financial development index, similar (but less extensive, due to data limitations for emerging markets) to the index in IMF (2006). A total of eight variables are used to construct four sub-indexes, each intended to capture different aspects of financial development: creditor rights, size of the credit market, competition, and capital market development (see the appendix for details). It would have been desirable to include indicators for the quality of credit information accessible to lenders in the financial index, but none was found that was both suitable and available for all sample countries.



Figure 4: Financial development index



Index (0-1), where a higher score is better. 'Arm's length' index = average of last three sub-indexes. For data sources, see appendix.

Each variable is normalized on the “best” performer within the sample, hence all variables range between 0 and 1. Some variables are inverted so as to consistently ensure that a higher value of a variable is always “better.” Each of the four sub-indexes is calculated as the simple average of the underlying normalized variables (note that credit market size and competition are only based on one variable). The overall index is the simple average of the sub-indexes, giving equal weight to all measured aspects of financial development regardless of the number of variables available (Figure 4).<sup>3</sup>

The sub-indexes were divided into two groups: the creditor rights index and the average of the remaining three (referred to here as the “arm’s length lending” index). This was done mainly for two reasons: as mentioned above, the theoretical relation between creditor rights and credit cyclicity is more straightforward than for arm’s length lending. Moreover, the creditor rights index is likely more reliable, since it is built on survey-based indicators measuring concrete factors relating to cost and time to enforce debt contracts, as well as indicators of the legal power of creditors with regards to collateral and in bankruptcy. By

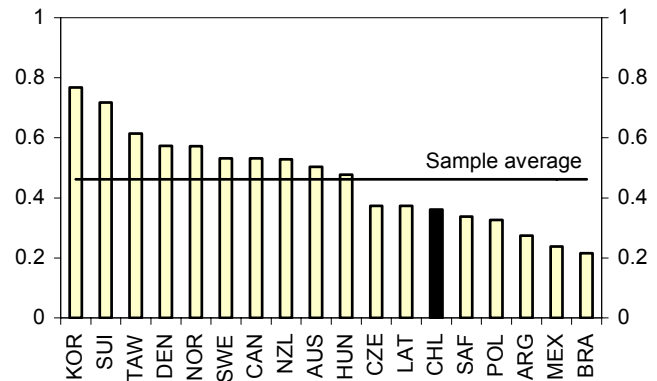
<sup>3</sup> For example, a simple average of the 8 variables would put 50 percent weight on creditor rights, for which four variables are available.

contrast, the arm's length indicator is built on various proxies, liable to capture reality less precisely.

Although Chile's creditor right index is the highest among the Latin American countries in the sample, it is low compared to the rest of the sample. According to the World Bank's Doing Business database, legal enforcement of debt contracts is relatively slow and costly, and creditors' power to seize collateral and exercise their legal rights in cases of bankruptcy is considered weaker than in many other countries. Fuentes and Maquieira (2001) argue that Chile's relatively poor creditor protection indicators are to some extent compensated by effective information sharing among lenders. Djankov, McLiesh, and Shleifer (2005) note that information is particularly important in less-advanced countries, especially those with a French legal origin (such as Chile). However, the role of information as a substitute to creditor rights appears to fade as countries develop.

Chile scores near the top of emerging markets in terms of credit liquidity and even ahead of some industrialized countries with regard to competition. This is consistent with the rapid development of Chile's credit markets in recent years and the intensified competition in consumer lending. By contrast, the country ranks near the bottom in terms of financial market development (Figure 5). Although this ranking may be somewhat inaccurate, given data limitations, a case can be made that Chile's derivatives markets, securitization, and non-traditional banking need further development. Hence, there remains scope to improve effective risk sharing and advance alternative forms of financing.

Figure 5: Overall financial development index



Overall index: simple average of sub-indexes

In terms of the overall index, Chile ranks higher than the other Latin American countries in the sample; on par with South Africa and the Eastern European countries, except Hungary; but still behind industrialized countries.

#### IV. CROSS-COUNTRY ANALYSIS OF IMPULSE RESPONSES

In this section, we analyze a cross-country sample of impulse responses to a set of shocks, to investigate whether these correlate with the countries' score on the financial index. At this point, we focus on household credit only. The preferred specification is a 6 equation VAR of (i) total M1 in U.S. dollars, euro, and yen (a proxy for global liquidity, expressed in dollars); (ii) the VIX (capturing global risk appetite); (iii) terms of trade; (iv) industrial production index (IPI); (v) real lending rate, and; (vi) real credit (in that Cholesky order). Data are monthly.

All variables are seasonally adjusted, using the standard census X11 method, and expressed as deviations from a Hodrick-Prescott (HP) trend, except the VIX and the lending rate, which are unadjusted and in levels. The main reason why HP deviations are preferred over levels or first differences is that the relationship between credit and GDP (proxied here by the IPI) is bound to be unstable over time, due to financial development. The HP trend is one way of controlling for financial development, in the absence of precise high-frequency measures. Using HP deviations also makes sense from the point of view that output gaps are more important than output growth for monetary policy. The Schwarz information criterion prescribes one or two lags, depending on the country. For simplicity, two lags were used for all countries.

Results appear robust with respect to specification. A core VAR containing only the terms of trade, the IPI, an interest rate (policy or lending rate), and credit produced very similar responses to output and terms of trade shocks. The exchange rate added little to the analysis and was hence excluded for reasons of parsimony. In addition, the Cholesky ordering turned out relatively unimportant, since the correlations of the VAR residuals were generally low. Different sample periods were also tested, notably excluding the crisis years of the late 1990s, with only moderate changes to the results.<sup>4</sup> Hence, we use data for all periods available, i.e. mid-to-late 1990s (depending on the country) through 2006. Furthermore, using different lag structures did not materially alter the results. Finally, basing the analysis on impulse responses 6 or 12 months out yielded very similar results.

### **A. Comparing impulse response functions**

We begin by estimating 6-month impulse responses of household credit to shocks to output, terms of trade, global liquidity (M1), and global risk appetite (VIX) for all countries in the sample. To get a first impression of the potential relationship between financial development and credit cyclicity, we plot each country's impulse response against its score on the financial index, or sub-index. To preserve cross-country comparability, the impulse responses are normalized to a one percent shock, rather than the usual one standard deviation.

If our basic premise is correct—namely that greater financial frictions lead to stronger procyclicality in credit—one would expect impulse responses to positive shocks to be large and positive for countries with low financial index scores, and vice versa. This would imply a negative correlation between the index and impulse responses to output, terms of trade, and global liquidity. The correlation would be positive for the VIX shock, since a higher score on the VIX represents lower risk appetite.

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<sup>4</sup> Perhaps surprisingly, the only country that turned out to be highly sensitive to the choice of the period was Australia.

Figure 6 shows impulse responses to output shocks plotted against the overall financial index. As predicted, the trend line between the impulse response and the index is downward sloping, lending some support to the hypothesis that financial development could reduce credit procyclicality. The picture is to some extent driven by the Latin American countries of Argentina, Brazil, and Mexico, which rank at the bottom of the financial development index and also show the most pronounced procyclicality in credit.

In Figure 7, we take a closer look at impulse responses to output shocks for a subsample excluding the “outliers” in the sample (Argentina, Australia, Brazil, Hungary, and Mexico), while also examining the creditor rights and the arm’s length sub-indexes separately. The downward slope remains in the case of the creditor rights sub-index, while the relationship with the arm’s length indicator disappears completely. While the weaker results with regard to arm’s length lending are consistent with a more ambiguous theoretical relationship, it could also be a data issue, as argued above.

Figure 8 shows the 6-month household credit impulse responses to terms of trade, VIX, and global liquidity shocks. The predicted relationship appears to exist between financial development and the sensitivity of household credit to shocks to terms trade and the VIX. Regarding the latter, however, the relation appears weak; indeed, the apparent link with the financial index also cannot be confirmed by econometric tests presented below: no evidence is found that financial development has any influence on the response of credit to shocks to global liquidity.

## **B. Cross-country regressions**

To test the statistical significance of the relationships emerging from the impulse response plots in Figures 6-8, we apply cross-country regressions of the impulse responses on the financial index and other variables. While controlling for other factors, this permits testing the impact of some of the financial development indicators discussed above on credit cyclicity. Only the impulse responses to output shocks will be analyzed here (results using impulse responses to terms of trade shocks are listed in the appendix). No significant relationships were found using the impulse responses to global liquidity or the VIX; these results are not reported.

Since the country-specific VARs were estimated with varying precision, their impulse responses all have different standard errors attached to them. We therefore apply a bootstrapping method to calculate standard errors for the regression. We first generate 500 samples of impulse responses, using the estimated standard errors for each country. We subsequently use these samples to repeat the cross-country regression 500 times.

Figure 6: Household credit impulse responses to output shocks, full sample

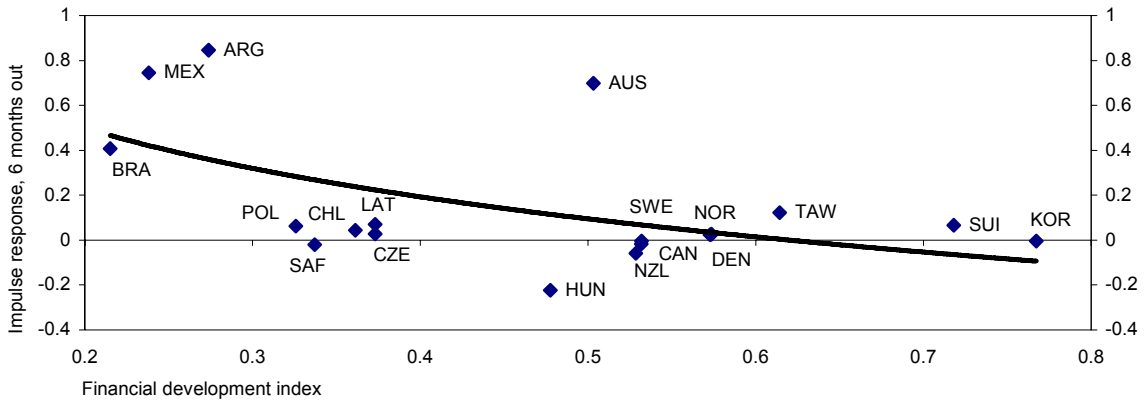


Figure 7: Household credit impulse responses to output shocks, subsample

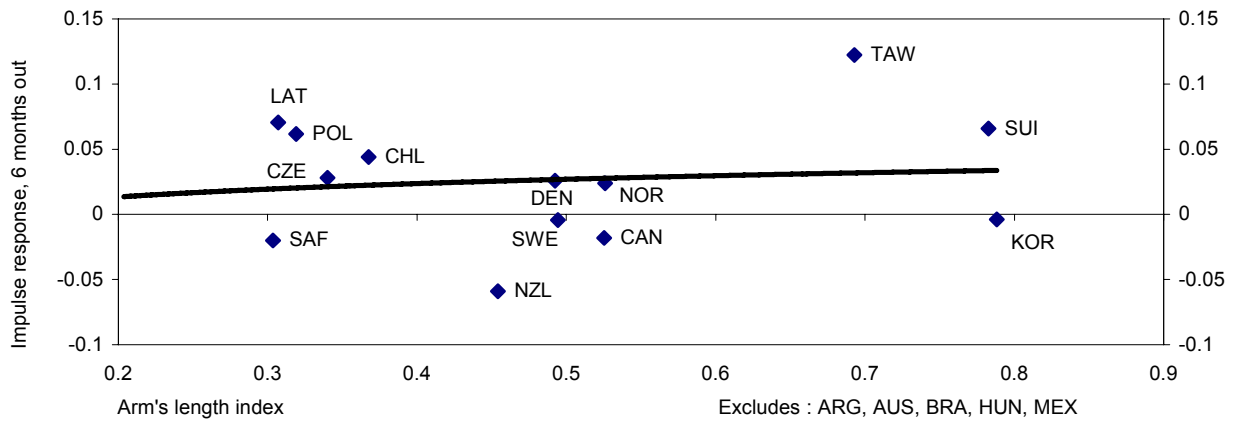
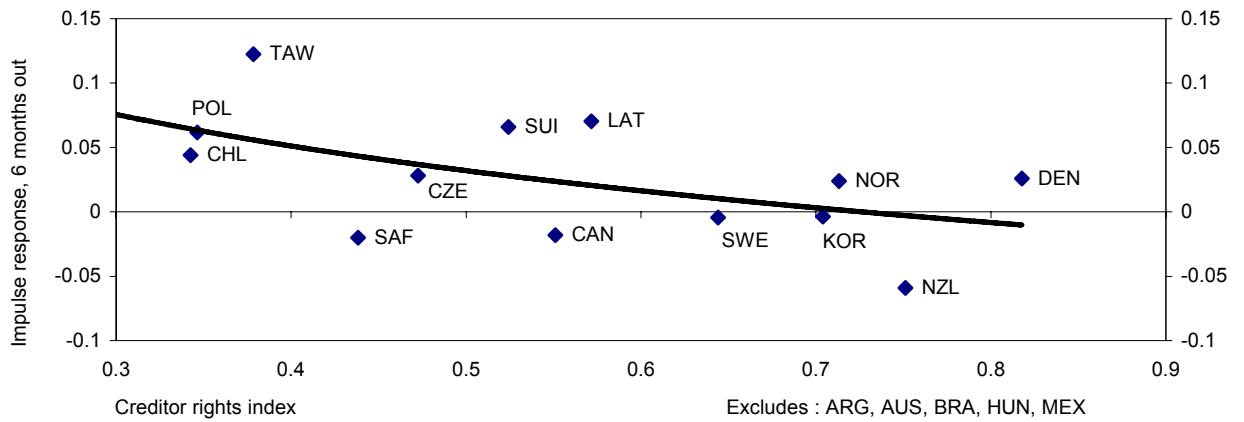


Figure 8: Household credit impulse responses, full sample

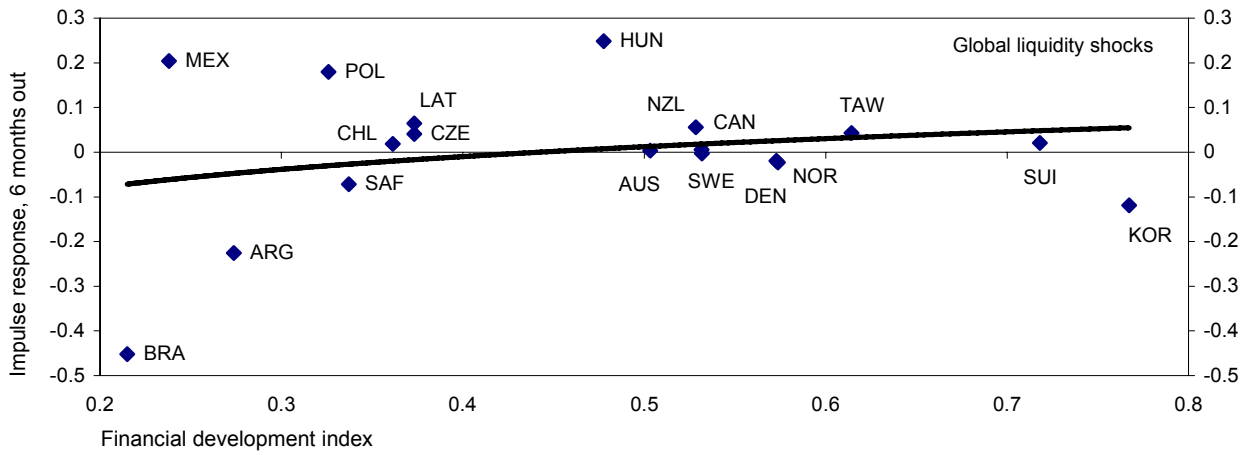
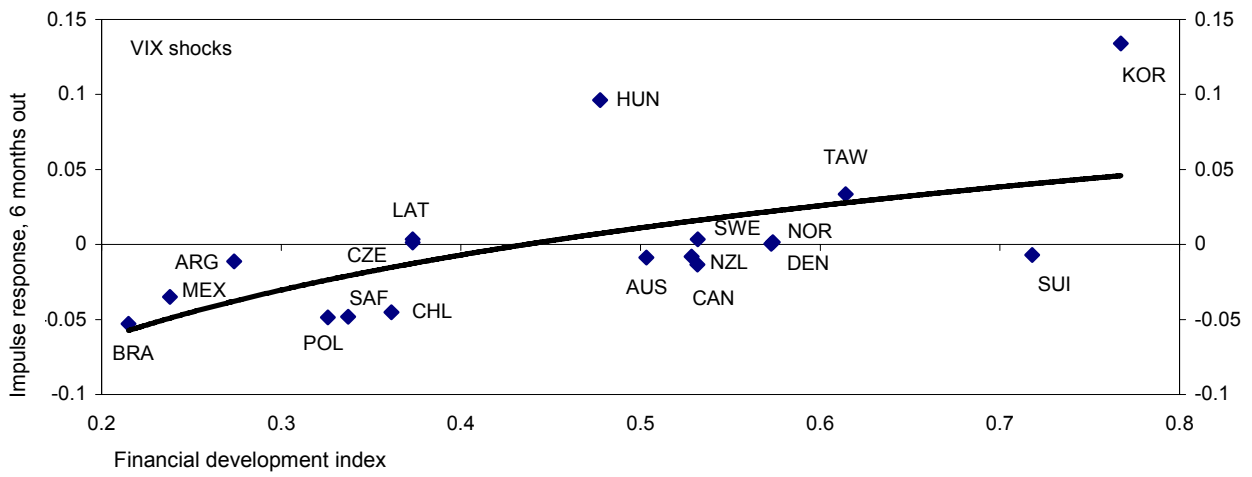
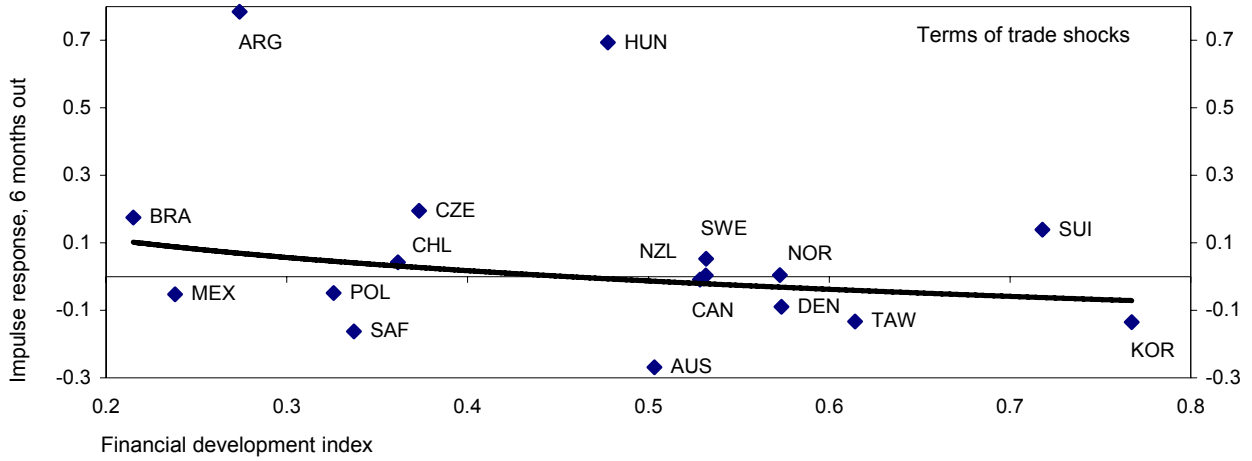


Table 1 reports the mean and two standard deviation confidence intervals of the estimated coefficients from these regressions. Numbers in bold indicate statistical significance within a two standard deviation margin. The financial index is statistically significant, with the expected sign, even after controlling for GDP per capita (columns 1 and 2). The same applies to the two sub-indexes on creditor rights and arm's length lending (with all countries included in the regression, columns 3 and 4). Since financial development tends to be positively correlated with the level of income, failing to control for GDP per capita is important—otherwise we would only say that credit is more pro-cyclical in emerging markets than in developed countries.

The point estimate of the impact of the level of household debt indicates that higher debt is associated with greater procyclicality in credit (column 5). However, this result is not statistically significant – not surprising since the regression includes only 12 countries, due to data limitations. Nevertheless, the number of items on financial statements—a proxy for creditor information used in De Nicoló, Laeven, and Ueda (2006)—does turn out significant and with the expected sign, despite the limited sample (column 6).

**Table 1. Cross-country regressions**  
**Dependent variable: 6 months response of household credit gap to output gap**

Regressor:		(1)	(2)	(3)	(4)	(5)	(6)
Log(Financial Index)	Mean	<b>-0.42</b>	<b>-0.69</b>			-0.63	
	+2 stdv	<b>-0.03</b>	<b>-0.01</b>			0.04	
	-2 stdv	<b>-0.81</b>	<b>-1.37</b>			-1.30	
Log(GDP/Capita)	Mean		0.15	0.11	0.10		-0.11
	+2 stdv		0.31	0.24	0.19		0.00
	-2 stdv		-0.02	-0.02	0.00		-0.21
Log(Creditor protection)	Mean			<b>-0.64</b>			
	+2 stdv			<b>-0.04</b>			
	-2 stdv			<b>-1.25</b>			
Log(Armlength Index)	Mean				<b>-0.53</b>		
	+2 stdv				<b>-0.08</b>		
	-2 stdv				<b>-0.98</b>		
Log(Household debt/GDP) 1/	Mean					0.10	
	+2 stdv					0.26	
	-2 stdv					-0.06	
Log(Nbr. items on statement) 2/	Mean						<b>-1.31</b>
	+2 stdv						<b>-0.28</b>
	-2 stdv						<b>-2.34</b>

1/ Household debt data available only for 12 countries in the sample

2/ Nbr of items on financial statement available only for 14 countries in the sample

Confidence intervals are estimated using Monte Carlo simulations

Constant used in all regressions (not reported)

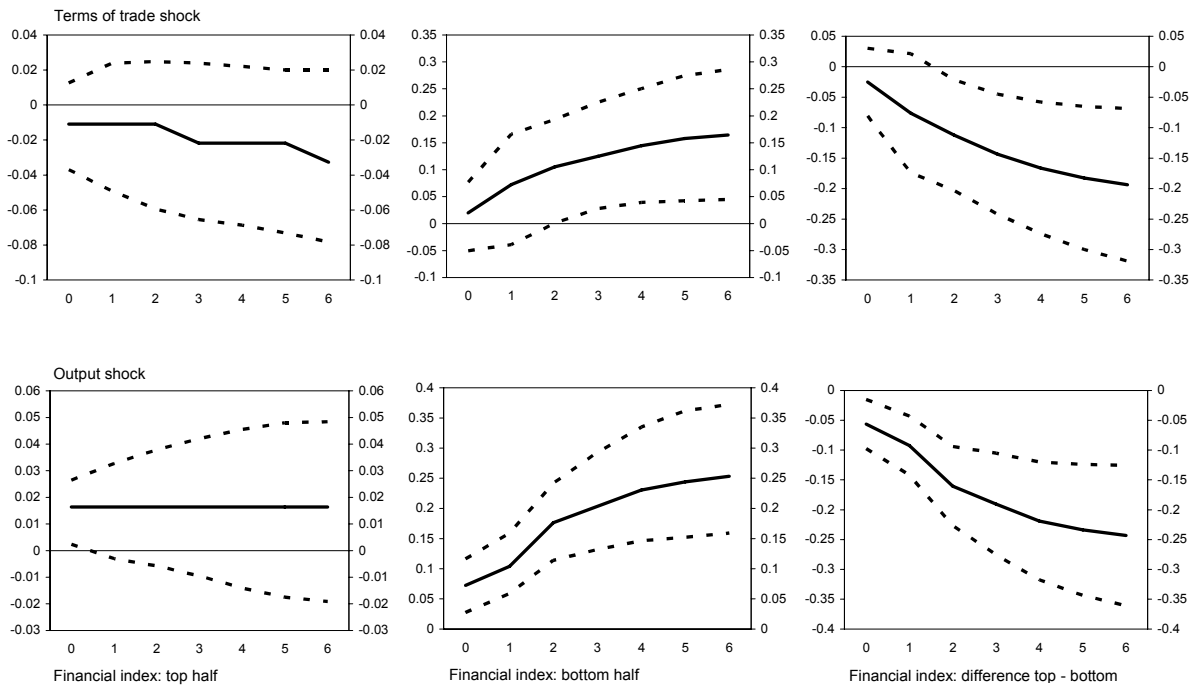
Note: numbers in bold indicate statistical significance within two standard deviations

## V. ESTIMATING PANEL VARs

In this section, we estimate panel VARs to compare impulse responses for countries that score at the top half of the financial index with those at the bottom half. The same VAR specification is used as in the country-specific cases. The purpose of this approach is to gain degrees of freedom relative to the cross country regressions, given that we only have 18 observations. One disadvantage is that it is not straightforward (although an attempt is made) to control for factors other than the criteria underlying the grouping of countries.

Figure 9 shows household credit impulse responses to output and terms of trade shocks. The leftmost charts show the response of the countries in the top half of the financial index, the middle chart shows the bottom half, and the rightmost chart the difference between the two. All charts are shown with a 2 standard deviation confidence interval. For comparability, the impulse responses are normalized to a one percent shock, rather than one standard deviation.

Figure 9: Household credit impulse responses, panel VAR



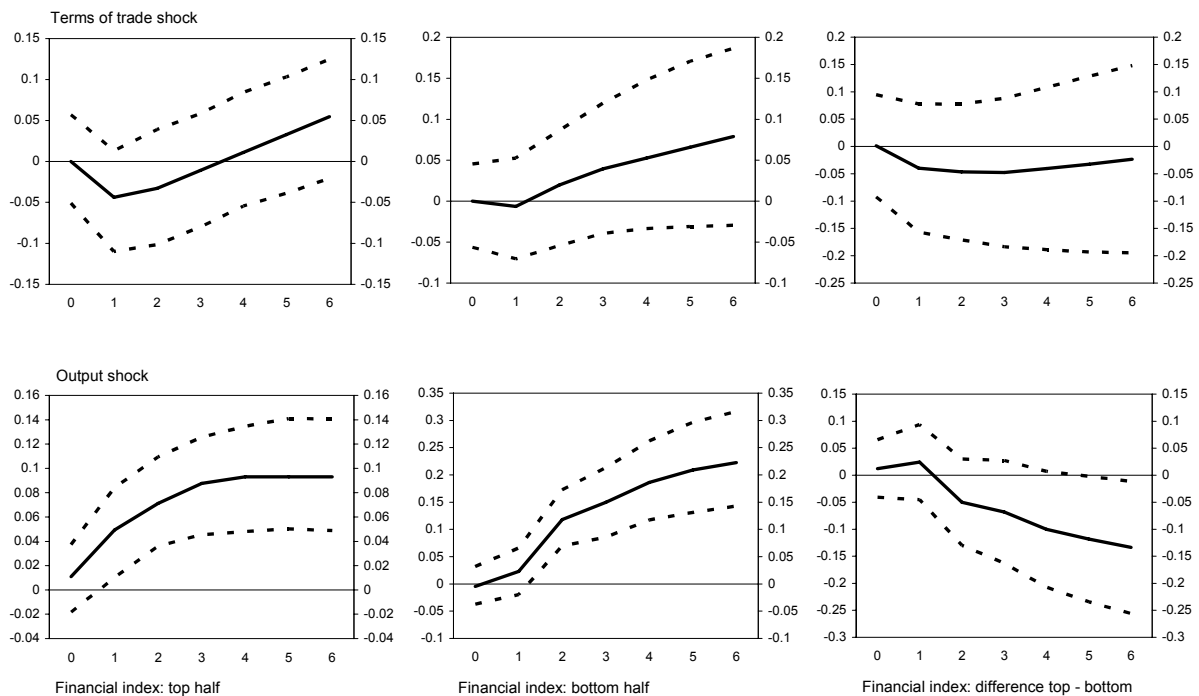
The results confirm the earlier findings: financial development reduces the degree of procyclicality of household credit relative to output and terms of trade shocks, and the difference is statistically significant. We also found no evidence that financial development has any significant impact on the responses to shocks to the VIX or global liquidity. As mentioned above, the degree of financial development and income per capita are positively correlated. This is particularly troublesome for the panel VAR analysis; indeed the sample split according to the financial development index is very similar to the one according to GDP per capita, making it hard to distinguish what is actually measured. To address this



problem, we first run a cross-country regression of the financial development index on GDP per capita (and a constant), then divide the sample between the countries that ‘over-perform’ or ‘under-perform’ in terms of financial development relative to their income level. This produces very different groupings, but the key results remain unchanged.

So far, all results presented have been for household credit only, since the results on corporate credit are less clear and, by consequence, less interesting. However, using the panel VAR provides greater statistical power, allowing for additional analysis on corporate credit. It turns out that a higher ranking on the financial development index implies a less procyclical response to output shocks, although not to terms of trade shocks (Figure 10).

Figure 10: Corporate credit impulse responses, panel VAR

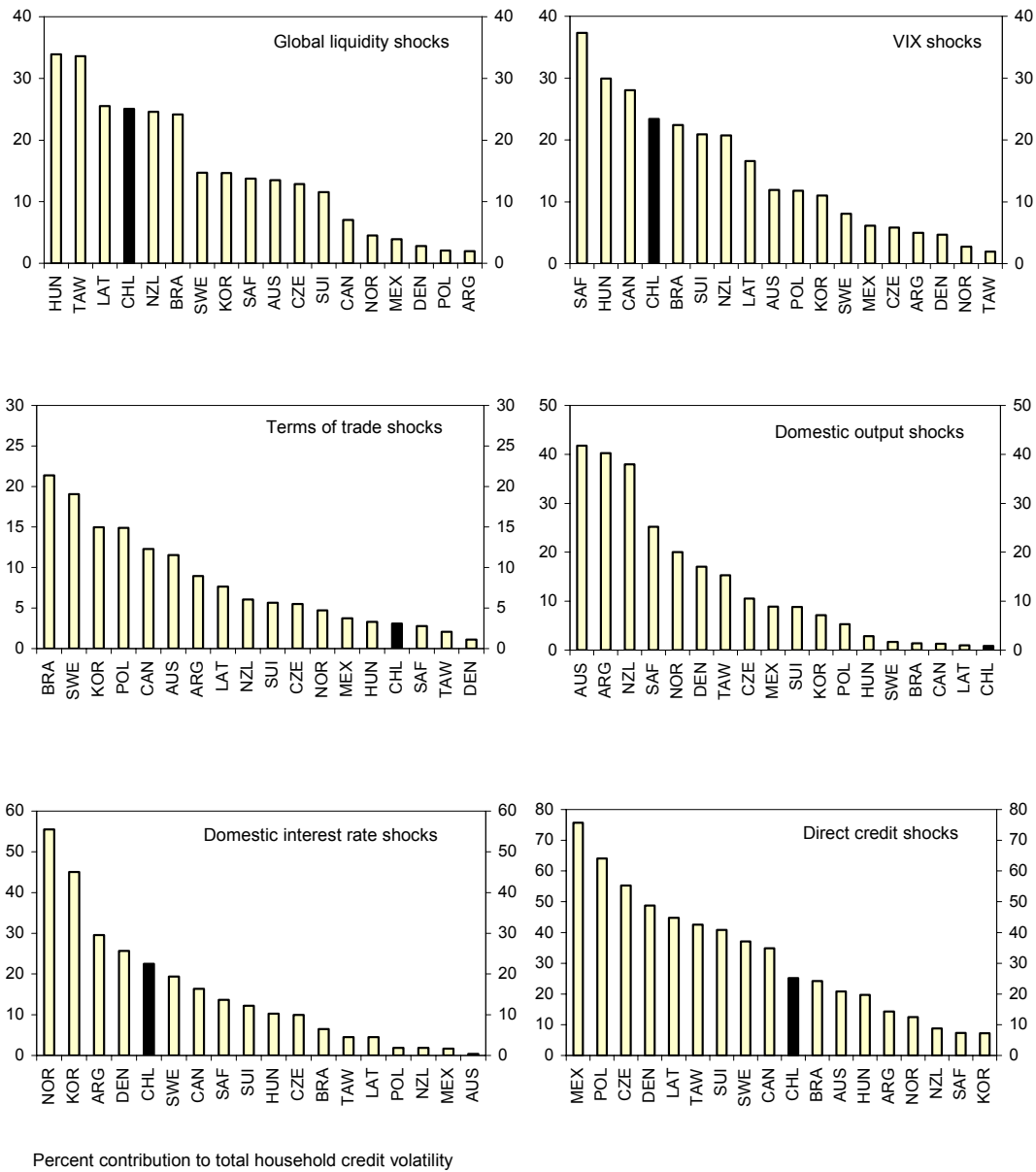


Finally, in order to study the drivers of household credit volatility in the current cycle, we use the country-specific VARs to carry out a variance decomposition of credit developments between 2002 and the present. This analysis provides us with the relative contribution of the variables in the VAR system to variations in credit during that period. Figure 11 shows these results in percent of total variation in credit. The VAR system performs fairly well in the sense that own (direct) shocks to credit account for a reasonably small part for most countries, leaving a large part explained by the variables of interest. By this standard, the quality of the country-specific VAR results is less impressive for Mexico, Poland, and the Czech Republic.

The results indicate that credit in Chile appears little affected by the domestic economic cycle (contributing only a couple of percent to total credit variations). Terms of trade shocks also

have contributed little to credit volatility, despite the dominant share of copper in the Chilean economy. This is not entirely surprising, given the fact that the mining sector is often regarded as an enclave with relatively few links to the rest of the economy. In addition, and perhaps more importantly, countercyclical fiscal policies have increasingly isolated Chile from swings in copper prices. By contrast, credit in Chile is much more sensitive to external financial conditions; global liquidity and the VIX account for about half of the volatility in household credit in the current cycle. Domestic interest rate shocks have contributed about one-quarter of total household credit variability.

Figure 11: Variance decomposition - explaining credit volatility since 2002



As another tentative finding, the credit cycle in Eastern European countries appear strongly influenced by global liquidity. Casual observation seems to indicate that the countries most affected by changes in the VIX have high current account deficits or are at either end of carry trades.

## VI. CONCLUSIONS, POLICY IMPLICATIONS, AND CAVEATS

The results presented in this paper indicate that financial development matters for credit cyclicity. Hence, strengthening creditor rights and increasing arm's length lending could reduce credit volatility, which in turn could contribute to lessen macroeconomic volatility more broadly. These results are particularly robust with regards to the beneficial impact of creditor rights, while the evidence is weaker for arm's length lending. Moreover, there are indications that credit information could help reduce procyclicality, although the analysis is hampered by poor data availability.

The evidence is stronger for household credit than for corporate credit, consistent with the results from IMF (2006). A plausible interpretation is that companies have more relationship-based interaction with lenders, which helps them access financing during temporary downturns. Moreover, corporations generally have better access to external financing and are hence less impacted by the domestic cycle.

The point estimates of the credit responses to output or terms of trade shocks indicate moderate procyclicality in Chile, ranking in the middle of the sample and significantly better than other Latin American countries. The question then arises whether credit-induced economic volatility could be further contained. In a financial accelerator setting (where only credit supply factors are taken into account), one would always expect credit to be procyclical, leaving little room for improvement in Chile. However, in the context of, e.g., a permanent income model, credit would optimally be countercyclical. Hence, there might be scope for Chile to further reduce vulnerabilities by implementing policies that would promote countercyclical credit behavior.

In this regard, Chile scores relatively low in terms of credit protection. To some extent, these weaknesses are compensated by effective information sharing on defaulting borrowers. However, as mentioned earlier, analysis by Djankov, McLiesh, and Shleifer (2005) suggests that good information-sharing will eventually have to be complemented by stronger creditor rights as Chile aspires to close the gap with advanced countries. Finally, deeper markets in securitized products and the creation of a credit derivatives market could also contribute to lower credit-induced volatility.

To conclude, a few caveats deserve mention. Financial frictions are clearly not all that matters for credit cyclicity. Micco and Panizza (2004) find that public ownership of banks tends to limit credit cyclicity, as these are more likely to internalize the benefits of macroeconomic stability and enjoy a more stable depositor base. Their results on foreign versus domestic ownership are less clear-cut. The exchange rate regime and degree of

dollarization also likely play a role, given different behavior of interest rates in response to shocks. The dependence on commodity exports, and a country's access to global financial markets are other relevant factors. Moreover, confidence effects could also amplify credit cyclicity from the demand side, as could unanticipated changes in 'permanent income'. The latter is especially relevant in times of crises. Combining these factors with the findings of this paper is a subject for further study.

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**APPENDIX 1. DETAILS ON THE FINANCIAL DEVELOPMENT SUB-INDEXES****1. Creditor rights**

- Legal rights index (World Bank, Doing Business Database)
- Number of days to enforce debt contract in court (Djankov, McLiesh, and Shleifer, 2005).
- Number of procedures for lawsuit (World Bank, Doing Business Database)
- Cost of legal procedure/debt value (World Bank, Doing Business Database)

**2. Credit market liquidity**

- Private credit/GDP (IFS, average 2000-06)

**3. Competition**

- Spread between borrowing and lending interest rates (IFS, average 2000-06)

**4. Financial markets development**

- Banks' non-interest income/total income (Bankscope, 2003)
- Stock market turnover/stock market capitalization (World Bank, A new database on financial development and structure, 2003)

**Raw data**

Country	Leg_rights	Days	Procedures	Cost	Cred_GDP	Spread	Fee_inc	Stock mkt turn.
ARGENTINA	3	520	33	15.0	0.16	6.4	34.6	0.07
AUSTRALIA	9	157	19	12.8	0.91	5.3	28.8	0.76
BRAZIL	2	566	42	15.5	0.32	40.3	25.1	0.34
CANADA	7	346	17	12.0	1.05	3.6	26.7	0.63
CHILE	4	305	33	16.3	0.64	3.9	21.4	0.10
CZECH REP.	6	300	21	14.1	0.37	4.5	25.3	0.52
DENMARK	8	83	15	6.5	1.38	5.0	11.3	0.67
HUNGARY	6	365	21	9.6	0.36	2.3	26.8	0.55
KOREA	6	75	29	5.5	0.87	1.7	27.0	2.34
LATVIA	8	189	21	11.8	0.28	4.5	28.7	0.16
MEXICO	2	421	37	20.0	0.15	5.5	22.0	0.21
NORWAY	6	87	14	9.0	0.71	2.3	19.7	0.86
NEW ZEALAND	9	50	28	10.9	1.13	4.6	17.9	0.38
POLAND	4	1000	41	10.0	0.27	4.9	33.3	0.26
SOUTH AFRICA	5	277	26	11.5	0.63	4.7	5.4	0.45
SWITZERLAND	6	170	22	11.0	1.60	2.5	41.5	0.89
SWEDEN	6	208	19	5.9	0.92	3.2	12.5	1.12
TAIWAN	4	210	28	16.6	0.98	2.9	41.9	1.84
Mean	5.6	296.1	25.9	11.9	0.7	6.0	25.0	0.7
Stdv	2.1	230.4	8.6	3.9	0.4	8.7	9.7	0.6

**Cross correlations**

	LEG_RIGHTS	DAYS	PROCEDURES	COST	CRED_GDP	SPREAD	FEE_INC	STOCK_MKT_TURN
LEG_RIGHTS	1.00	-0.62	-0.75	-0.57	0.55	-0.43	-0.20	0.15
DAYS	-0.62	1.00	0.69	0.31	-0.62	0.34	0.27	-0.45
PROCEDURES	-0.75	0.69	1.00	0.51	-0.53	0.51	0.23	-0.24
COST	-0.57	0.31	0.51	1.00	-0.44	0.29	0.32	-0.42
CRED_GDP	0.55	-0.62	-0.53	-0.44	1.00	-0.28	-0.03	0.47
SPREAD	-0.43	0.34	0.51	0.29	-0.28	1.00	-0.02	-0.24
FEE_INC	-0.20	0.27	0.23	0.32	-0.03	-0.02	1.00	0.19
STOCK_MKT_TURN	0.15	-0.45	-0.24	-0.42	0.47	-0.24	0.19	1.00

**Other data sources**

- Credit data from national authorities and IMF desks
- Global liquidity (US/Japan/Euro area M1): Haver
- Terms of trade: Haver and IFS
- CPI (deflator for real interest rates, real credit): Haver, IFS
- Industrial production index: Haver
- Lending interest rate: IFS