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International capital mobility: Which structural policies reduce financial fragility?

A GOING FOR GROWTH REPORT

International capital mobility: Which structural policies reduce financial fragility?

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- Part 3. How do Structural Policies affect Financial Crisis Risk? Evidence from Past Crises across OECD and Emerging Economies, No. 966
- Part 4. Which Structural Policies Stabilise Capital Flows when Investors Suddenly Change their Mind? Evidence from Bilateral Bank Data, No. 967
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Abstract / Résumé

**International capital mobility:
Which structural policies reduce financial fragility?**

The structure of a country's external liabilities, as well as the extent and nature of its international financial integration are key determinants of its vulnerability to financial crises. This is confirmed by new empirical analysis covering OECD and emerging economies over the past four decades. For example, a bias in gross external liabilities towards debt has raised crisis risk. The same holds for "currency mismatch" which refers to a situation where a country's foreign-currency denominated liabilities are large compared to its foreign-currency denominated assets. In addition, international banking integration has been a major vector of contagion, and even more so when cross-border bank lending was primarily short-term. Vulnerability to contagion has been lower when global liquidity has been abundant, underlining the importance of major central banks ensuring ample international liquidity at times of financial turmoil.

Structural policies can increase financial stability, typically through their effects on the composition of the external financial account or on the vulnerability to contagion-induced financial shocks. Lower barriers on foreign direct investment and lower product market regulations have increased financial stability by shifting external liabilities from debt towards FDI. In contrast, tax systems that favour debt finance over equity finance have undermined stability by increasing the share of debt, including external debt, in corporate financing. Targeted capital controls on inflows from credit operations have reduced the impact of financial contagion, not least by shifting the structure of external liabilities. Stricter information disclosure rules or capital requirements, and strong supervisory authorities have also reduced countries' financial crisis risk.

JEL classification codes: E44; F34; F36; G01; G18; G32

Keywords: structural policies; financial stability; banking crises; bank balance sheet; contagion; financial account; debt; capital controls; banking regulations; asset mismatch; financial integration.

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**Flux de capitaux internationaux :
quelles politiques structurelles réduisent la fragilité financière ?**

La structure des engagements externes des pays, ainsi que l'ampleur et les différentes formes de leur intégration financière internationale, sont d'importants facteurs de vulnérabilité aux crises financières. Ceci est confirmé par une nouvelle analyse empirique couvrant les pays membres de l'OCDE et les pays émergents pendant les quatre dernières décennies. Par exemple, un biais des engagements externes vers la dette a augmenté les risques de crises. De même, un excès d'engagements libellés en monnaie étrangère par rapport aux créances libellées en monnaie étrangère a accru les risques de crises. En outre, l'intégration bancaire internationale a été un important vecteur de contagion, d'autant plus que la part de la dette bancaire de court-terme était importante. La vulnérabilité des pays à la contagion a aussi été moindre lorsque la liquidité globale était abondante, ce qui souligne l'importance d'une réaction des banques centrales assurant un niveau de liquidité internationale élevée lors des périodes d'instabilité financière.

Les politiques structurelles peuvent contribuer à accroître la stabilité financière, tant par leurs effets sur la structure des engagements externes que par leurs effets sur la vulnérabilité aux chocs financiers liés aux épisodes de contagion. De faibles barrières aux investissements directs étrangers ainsi qu'une réglementation des marchés de produits favorable à la compétition ont contribué à la stabilité financière en modifiant les engagements externes des pays vers les IDEs au contraire de la dette. En revanche, les systèmes de taxation qui favorisent le financement par la dette au détriment des investissements de capitaux ont contribué à réduire la stabilité financière en augmentant le financement des entreprises par la dette, y compris la dette externe. Des mesures ciblées de contrôle des flux de crédits ont contribué à réduire les effets de contagion financière, notamment en modifiant la composition des engagements internationaux. Des règles plus strictes quant à la divulgation des résultats financiers et quant aux fonds propres requis, ainsi qu'une plus forte supervision des autorités ont aussi réduit les risques de crises financières.

Codes JEL : E44; F34; F36; G01; G18; G32

Mots-clés : politiques structurelles ; stabilité financière ; crises bancaires ; compte financier ; dette externe ; contrôle des flux de capitaux ; réglementation bancaire ; excès de demande d'actifs sûrs ; intégration financière.

International capital mobility: Which structural policies reduce financial fragility?

Key policy messages

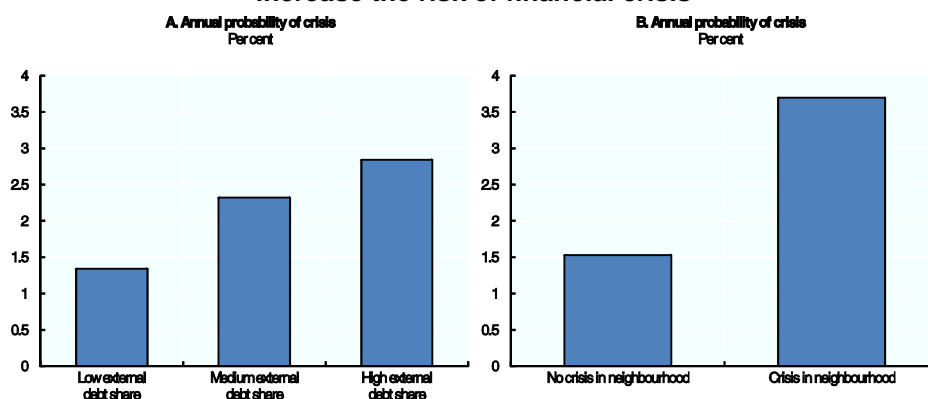
- The experience of recent years has underlined the need for reducing financial fragility and the risk of financial crises.
- As with earlier episodes of financial crises, countries that were severely hit *via* their external account during the global financial crisis had for the most part previously seen a substantial run-up in the share of debt in total external liabilities.
- New empirical analysis covering OECD and emerging economies over the past four decades finds that the structure of a country's external liabilities, more than the overall level, is a key determinant of the vulnerability to financial crises.
- The analysis shows more specifically that factors which increase crisis risk include a bias in gross external liabilities towards debt, in particular bank debt, currency mismatch and shorter banking debt maturities.
- The analysis also finds that the extent and nature of international financial integration, in particular of the banking sector, have contributed to the propagation of the crisis.
- On the one hand, integration through FDI is not found to raise financial risk, but on the other hand international banking integration has been a major vector of contagion, and even more so when cross-border bank lending was primarily short-term.
- Vulnerability to contagion has been lower in situations of abundant global liquidity, underlining the importance of major central banks ensuring that ample international liquidity is provided at times of financial turmoil.
- Structural policies can increase financial stability, typically through their effects on the external financial account structure or on the vulnerability to contagion-induced financial shocks.
 - The trends towards lower barriers on foreign direct investment, and the easing of product market regulations in the majority of advanced economies have increased financial stability by shifting external liabilities from debt, including bank debt, towards FDI.
 - In contrast, tax systems that continue to favour debt finance over equity finance have undermined stability by increasing the share of debt, including external debt, in corporate financing.
 - Targeted controls on capital inflows from credit operations, where they have been applied, appear to have reduced the impact of financial contagion, not least by shifting the structure of external liabilities.
- Adequate financial regulation, banking supervision and macroprudential regulation have also strengthened financial stability.
 - Stricter information disclosure rules and capital requirements, as well as strong supervisory authorities have been found to reduce countries' financial crisis risk. Nonetheless, action by individual countries in this area – while warranted – risks leading to regulatory arbitrage and greater harmonisation and international cooperation of supervision would therefore be desirable.
 - Macroprudential regulations that protect against excessive domestic credit growth reduce the risk of financial crises. Similarly, the removal of policy-induced distortions favouring mortgage debt and the build-up of housing price bubbles would help raising stability.

1. Financial fragility needs to be reined in


The recent financial crisis has underlined the need for reducing financial fragility, both by reducing the risk of financial crises occurring, and by limiting their spreading and destructive impact when they occur. This paper examines in particular what role *structural* policies can play in reducing financial fragility *via* their influence on international capital flows. Such an impact comes over and above the effect of macroeconomic imbalances such as misaligned exchange rates or fiscally unsustainable positions that have been extensively explored in the literature and are therefore reviewed only briefly. The paper focuses on structural policies whose link with financial stability can be assessed empirically. Additional structural policies that do not lend themselves to quantification, and which could also be beneficial for financial stability (*e.g.* improved regulation of the shadow banking sector) have been explored in other OECD work.

Simple stylised facts suggest that both financial account structure and the vulnerability to contagion influence the risk of suffering a financial crisis. For example, systemic banking crises have been more frequent in countries where external liabilities (*i.e.* external debt, equity and FDI) include a higher share of debt (Figure 1, Panel A). This suggests a need to examine policies that shape the financial account structure. In principle, both the composition and the size of countries' gross external positions may matter for financial stability. Though the size of some financial account components, such as bank debt, is found to play an important role in the context of financial contagion, new OECD analysis indicates that in practice the overall size of countries' external liabilities plays a more limited role in explaining financial fragility. The occurrence of a systemic banking crisis seems also to have been more frequent when a neighbouring country was also experiencing one (Figure 1, Panel B), pointing to the need to specifically explore policy options to mitigate exposure to financial contagion.

Figure 1. External liabilities in the form of debt and crises in neighbouring countries increase the risk of financial crisis



Note: Simple descriptive statistics based on data covering 184 countries from 1970 to 2007 for gross external debt as a percentage of total external liabilities and episodes of systemic banking crisis taken from Laeven and Valencia (2010). Low, medium and high external debt is defined based on the 33rd and 66th percentiles of the external debt to external liabilities ratio for each year. Systemic banking crises are defined based on both significant signs of financial distress in the banking system and policy interventions in response to such distress. Crisis in neighbourhood refers to the geographically closest 5 neighbouring countries, and indicates whether any of them experienced a crisis in the previous period.

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An overview of the different empirical approaches used in the analysis underlying this paper is provided in Box 1. Section 2 looks beyond the simple chart above and explores how the financial account structure – the shares of portfolio, FDI and banking positions in total foreign assets and liabilities – affects financial stability. Section 3 examines the role of contagion in transmitting shocks internationally and also whether specific forms of international financial integration are more prone to such transmission. Thereafter, Section 4 turns to the question of which structural policies can reduce financial fragility, either *via* their impact on the structure of the financial account, or *via* other channels that affect the likelihood of suffering from financial crisis or financial contagion. Based on this analysis, Section 5 concludes by identifying specific reform options to reduce financial fragility and their complementarities and trade-offs with other policy goals.

Box 1. Empirical approaches

The econometric analysis focuses on models exploring either the probability of suffering a banking crisis or fluctuations in capital flows. A distinction is made between the following main components of the financial account: Portfolio equity (shares), portfolio debt (bonds), foreign direct investment (controlling equity stakes, FDI), as well as bank transactions (mainly loans and deposits).¹ Even though there is a clear-cut distinction in official data, it should be noted that in reality these categories may be somewhat blurred. For instance, the threshold for classifying equity transactions as FDI is set arbitrarily at 10% of a firm's equity, possibly resulting in some equity transactions conducted for pure portfolio motives, *i.e.* not targeting controlling equity stakes, being misclassified as FDI and *vice versa*. Similarly, bank transactions may partly include portfolio and FDI transactions of banks rather than exclusively loans and deposits. These caveats notwithstanding, considerable improvements in the measurement of disaggregate financial account positions over recent years allow drawing robust policy conclusions from these data. Unless otherwise stated, the analysis is conducted on *gross* external positions or flows, *i.e.* considering the asset or liability side of a country's external balance sheet rather than netting assets and liabilities. Banking crises are taken from Laeven and Valencia (2010), who classify as systemic banking crises, episodes displaying both significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and bank liquidations), and significant banking policy intervention measures in response to significant losses in the banking system. In 114 countries, 129 systemic banking crises were observed over the 1984-2009 period.

More specifically, the individual econometric analyses underlying the recommendations can be summed up as follows (see Ahrend and Goujard 2011; 2012a; 2012b; Ahrend and Schwellnus 2012a; 2012b for more details):

- The **role of financial account structure for the risk of suffering a banking crisis** is explored using a fixed effects panel data model. The dependent variable is a dummy indicating the start of a banking crisis taken from Laeven and Valencia (2010), while the explanatory variables of interest are the shares of portfolio, FDI or bank liabilities in total external liabilities. Control variables include the level of total external liabilities and a large number of other possible determinants of banking crises. In a second step, the analysis explores the impact of structural policies on those financial account categories that were found to influence the risk of suffering a banking crisis in the first step. To this end, based on a fixed effects panel data model, measures of financial account structure are regressed on a set of variables measuring structural policies and institutions. This analysis makes the implicit assumption that the impact of a given increase in *e.g.* external debt (as a share of external liabilities) on banking crisis risk is independent of what caused the increase in the external debt share.
- A second econometric approach examines **financial contagion driven by bank balance-sheet shocks**, as well as the mitigating effect of structural policies. Gauges of bank balance-sheet shocks are constructed using either direct measures of stress for banks in creditor countries or indirect measures reflecting these banks' exposure to adverse shocks in third countries. A dummy indicating the start of a banking crisis is regressed on different measures of foreign creditor bank balance-sheet shocks and a wide range of other possible determinants of banking crises in a fixed effects panel data model. The mitigating effect of structural policies is analysed by interacting the bank balance-sheet shocks with indicators of structural policies in the countries hit by these shocks.
- A further econometric approach assesses **capital flow reversals during the recent global financial crisis**, using the latter as a "natural experiment". Bilateral foreign asset positions before and after the global financial crisis of 2008-09 are regressed on geographical distance and a wide range of control variables in a fixed effects gravity equation. The effect of geographical distance is allowed to vary over time to test whether asset withdrawals followed a distinct geographical pattern during the crisis. Interacting this time-varying distance effect with host-country structural policy indicators allows examining the role of structural policies in shaping distant investors' behaviour during the crisis.
- Also focusing on contagion-type effects, **capital flow reversals driven by investor sentiment shocks** are analysed by regressing bilateral capital flows on a measure of change in investor perceptions unrelated to the fundamentals of the country under consideration. Investor perceptions are based on the results of a quarterly survey of institutional investors asked for

their opinion about the creditworthiness of a large sample of countries. The measure of investor perceptions unrelated to domestic fundamentals is obtained by using investor sentiment at the global level and towards neighbours as instrumental variables for investor sentiment towards a given country. The analysis focuses on changes in bilateral capital flows over time controlling for other determinants of capital flows through investor- and recipient-country year fixed effects, as well as country-pair fixed effects. The role of structural policies in mitigating investor sentiment shocks is assessed by interacting the measure of investor sentiment shocks with recipient-country structural policy indicators.

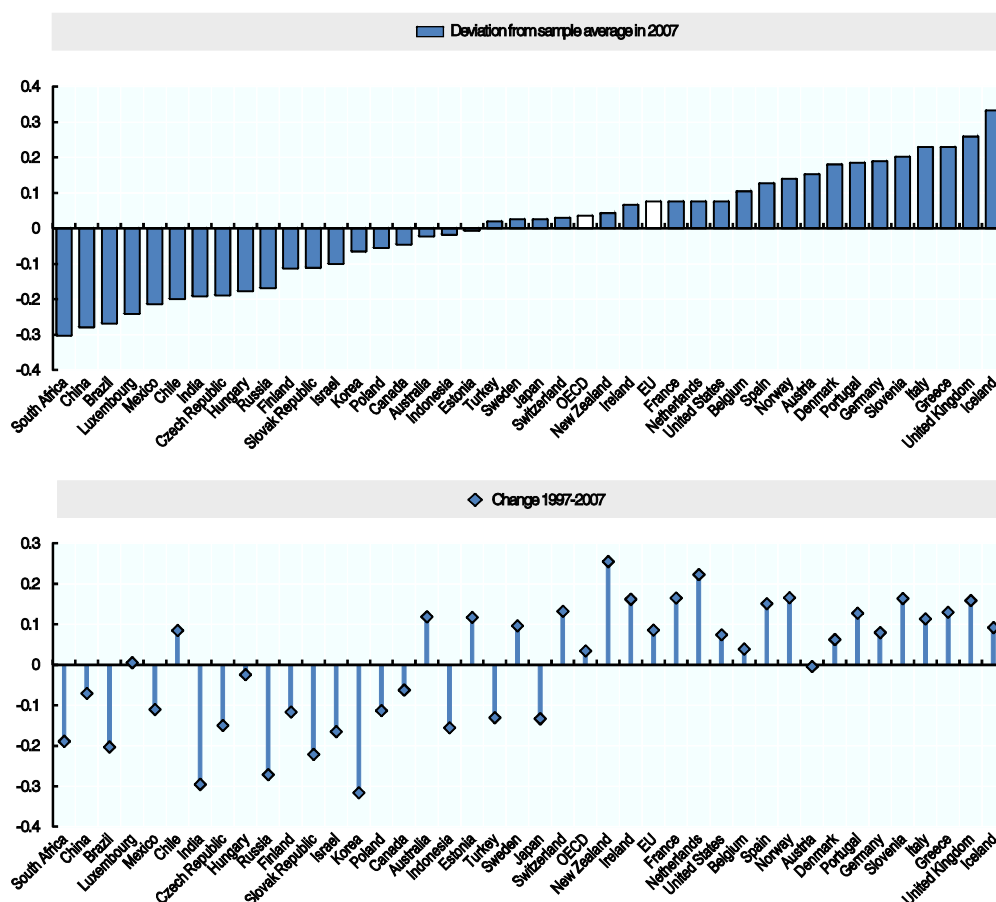
1. In financial account statistics, loans and deposits are included in the residual category “other investment”.

2. Financial account structure influences financial vulnerability


Descriptive evidence suggests financial account structure affects financial fragility...

The causal factors and propagation mechanisms of financial crises remain controversial. Nonetheless, one channel that has received increasing interest in recent years is the structure of a country's external financial account (that is, the overall claims and liabilities of the combined private and public sector *vis-à-vis* foreigners). Excessive non-contingent liabilities (such as debt), too-high *short*-term debt, as well as currency mismatch – a measure of sensitivity to exchange rate shocks – are seen to increase the riskiness of countries' external balance sheets, and thereby their risk of suffering financial turmoil, as suggested from simple statistics shown in Figure 1. In addition, Figure 2 shows the share of (gross) external debt in total external liabilities for OECD countries and the BRIICS. Abstracting from the most creditworthy countries for which this may be less of an issue, the debt share can be interpreted as a measure of potential risk arising from non-contingent external liabilities. Two stylised facts emerge: first, most of the countries that suffered from violent financial turmoil in recent years had a relatively high share of external debt prior to the 2007-09 financial crisis (top panel). Second, over the decade that preceded this crisis, many advanced economies had increased their share of external debt, whereas emerging economies had generally reduced it to comparatively low levels (lower panel). This may be one factor in explaining why emerging markets fared not only much better during the recent crisis than during the financial crises of the 1990s, but also why they were generally less affected than developed countries.

Figure 2. Share of external debt in total external liabilities



Source: Ahrend and Goujard, 2011.

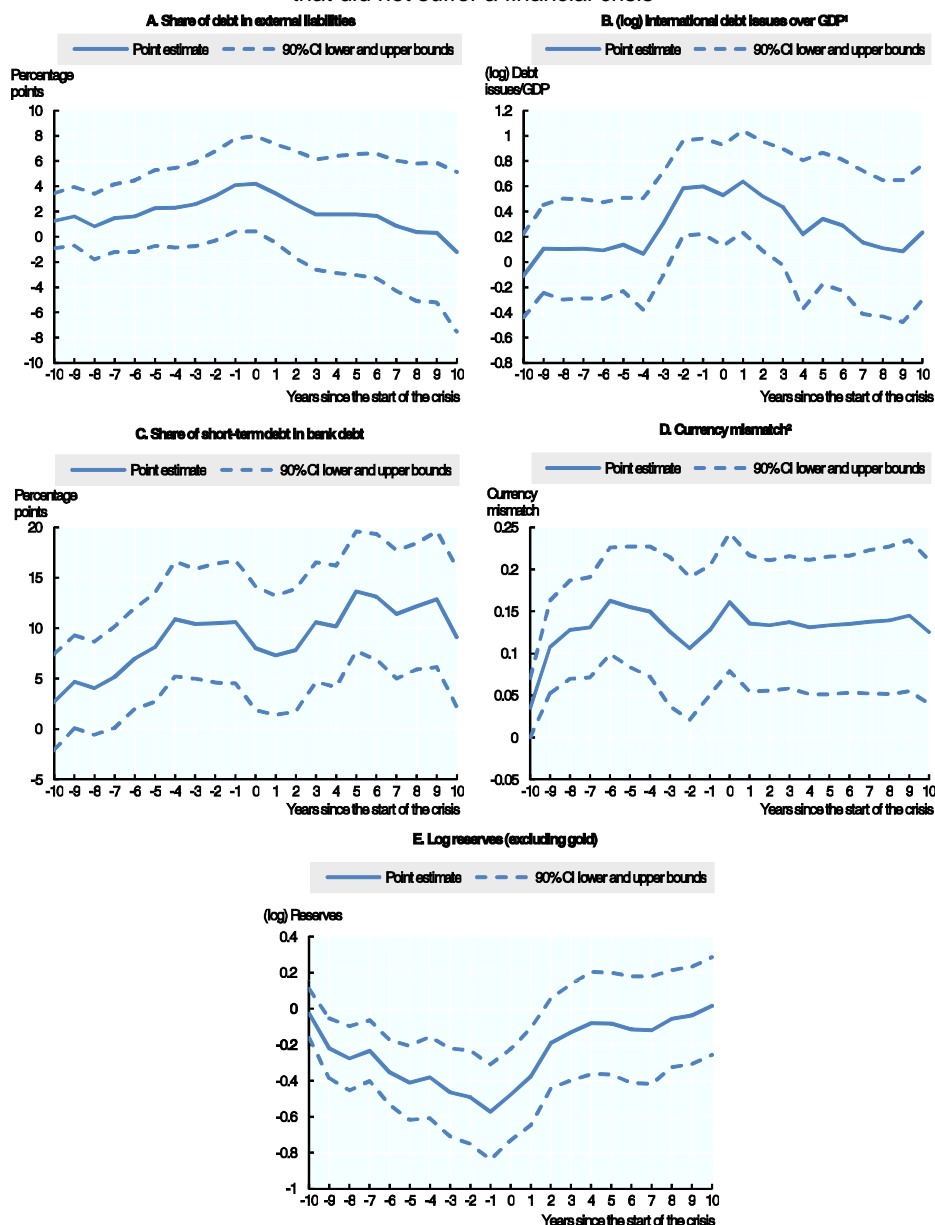
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Other more sophisticated descriptive evidence further underlines the role that financial account structure seems to play for financial stability. Figure 3 draws on data since 1970 for a wide group of countries to report the development of selected financial variables and characteristics of external liabilities before and after systemic banking crises, compared with similar statistics for countries that did not experience a crisis. It shows that:

- The share of debt in external liabilities typically increases in the run-up to the crisis (Panel A).
- This coincides with a large increase in newly issued international debt (Panel B) at increasingly short maturities (Panel C): cross-border bank debt with residual maturity of less than one year as a share of total cross-border bank debt increases on average by nearly 10 percentage points in the pre-crisis period.
- Similarly, currency mismatch increases significantly before banking crises (Panel D), coinciding with a large drop in foreign currency reserves (Panel E).

Figure 3. Financial variables including financial account structure display specific patterns around systemic banking crises


Development of selected variables around financial crises, relative to those countries that did not suffer a financial crisis



Note: The solid lines show the average path of the variable of interest around banking crises, which is computed by regressing the respective variable of interest on dummy variables corresponding to ten years before a banking crisis and up to ten years in the aftermath of a crisis, controlling for country and year fixed effects. The dashed lines represent the 90% confidence interval adjusted for heteroskedasticity and within-country autocorrelation. Countries with no banking crisis are included in the control group.

1. International debt issues comprise all foreign currency issues by residents and non-residents and all domestic currency issues launched in the domestic market by non-residents. Domestic currency issues launched in the domestic market by residents and targeted at non-resident investors are also considered as international issues.
2. The currency mismatch takes values between -1 and 1. 0 indicates a financial account insensitive to domestic currency devaluations and 1 indicates a financial account over-exposed to domestic currency devaluations (Lane and Shambaugh, 2010).

Source: Ahrend and Goujard, 2011.

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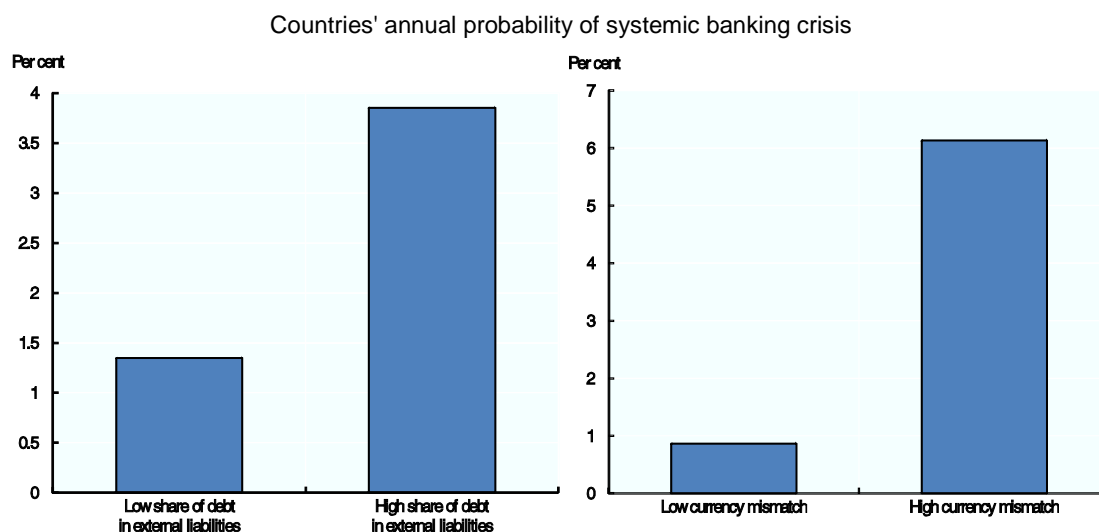
... and more rigorous empirical analysis confirms this link

This section examines more rigorously whether financial account *structure* – *i.e.* the structure of countries' external balance sheets – indeed affects financial stability. While both the composition and the size of countries' gross external positions may matter for financial stability, the overall size of countries' external positions appears to play a more limited role in explaining financial fragility. While the size of reserve holdings appears to reduce the probability of crises,¹ the size of external assets (excluding reserves) or liabilities as a share of GDP is not found to have statistically significant influence on the likelihood of financial crisis. The exception is when this size becomes very large.² In this case – which concerns only few countries – large external liabilities raise, and large external assets reduce the probability of a systemic banking crisis. Since for most OECD or BRIICS countries it is the composition rather than the size of the external balance sheet that matters for financial stability, the analysis here focuses on the structure of the financial account.

A greater share of debt, and in particular bank debt, increases crisis risk


Excessive reliance on debt instruments instead of state-contingent liabilities (as *e.g.* equity) – be they domestic or, in the context of this paper, international – is often seen as a fundamental factor behind financial crises in general and the propagation of the 2007-09 financial crisis in particular (Rogoff, 1999, 2011). Debt contracts require regular payments regardless of the borrowers' situation and are therefore more prone to cause financial distress (Henry, 2007). Debt inflows are also less stable than FDI inflows (Kose *et al.*, 2006; IMF, 2011). However, in many emerging economies most of the bank lending to the non-tradable sector finances relatively small projects and can hence not be replaced by FDI or equity inflows: insofar as the domestic financial capacity is insufficient to match domestic borrowing needs, international debt is necessary for realising the growth potential of these economies (Tornell and Westermann, 2005). This notwithstanding, there is compelling theoretical and anecdotal evidence on the risks to macroeconomic financial stability arising from external debt finance, even though solid empirical evidence on the issue has been lacking (Faria *et al.*, 2007).

OECD empirical analysis shows that the share of debt in external liabilities is indeed a strong predictor of systemic banking crises (Ahrend and Goujard, 2011). It explores the impact of a country's structure of foreign liabilities on the likelihood of banking crises, based on a panel of 184 developed and emerging economies from 1970 to 2009. Taken at face value, the estimates suggest that an increase in the share of debt in external liabilities by 24 percentage points, corresponding to a move from the average debt share of relatively low-debt OECD countries to the average debt share of relatively high-debt OECD countries, would on average increase the likelihood of banking crises by 2½ percentage points (Figure 4, left panel).³ This effect is large considering that on average a country's annual crisis risk is about 2½-3%. Furthermore, bank debt affects financial-stability risk indirectly by increasing exposure to contagion, as shown in Section 3.⁴

Figure 4. A high debt share and large currency mismatch increase crisis risk

Note: Bars represent, for two possible levels of the share of debt in external liabilities (the currency mismatch), the annual probability of suffering a systemic banking crisis. OECD countries are split into two equally-sized groups based on the size of their share of debt in external liabilities (currency mismatch). The low share of debt in external liabilities (low currency mismatch) is defined as the average across the low debt-share (low currency mismatch) group, with the high share of debt in external liabilities (high currency mismatch) being defined correspondingly.

Source: OECD calculations based on Ahrend and Goujard (2012a).

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Currency mismatch also increases financial fragility

Mismatches in the currency composition of a country's external position are an important determinant of capital gains and losses that result from exchange rate movements, and can thereby increase financial fragility related to expected or actual exchange rate shocks (Lane and Shambaugh, 2010, Eichengreen *et al.*, 2007).⁵ At the same time, the share of debt in external liabilities and currency mismatch measures are often strongly correlated as FDI and equity inflows are mostly denominated in domestic currency whereas debt instruments may carry exposure to foreign currency. As a result, it is difficult to disentangle empirically effects of an increase in external debt from an increase in the currency mismatch. Bearing this caveat in mind, the empirical analysis shows a consistent positive relationship between the currency mismatch and the likelihood of banking crises. Similar results are obtained when replacing the currency mismatch with a *debt* currency mismatch which has no strong mechanical correlation with the debt share. This suggests that the potential net wealth effect of foreign currency exposure, as reflected in the currency mismatch, has an impact on the likelihood of banking crises. To give an order of magnitude, the estimates suggest that an increase in the net foreign-currency exposure from the average position observed in OECD countries with relatively low currency mismatch to that found in countries with relatively high mismatch would increase the annual likelihood of banking crisis by somewhat over 5 percentage points, *ceteris paribus* (Figure 4, right panel). These results corroborate the empirical finding that while a depreciation of the local currency ultimately reduces the risk of a protracted financial crisis by improving international competitiveness over time, valuation losses often increase this risk in the short run (Prat, 2007).

A shorter maturity of banking debt increases crisis risk

The maturity of debt is often thought of as another important determinant of financial crises (see Jeanne and Zettelmeyer, 2002, for a review). One reason is that a shorter maturity structure of debt increases refinancing risk. A larger share of short-term debt may also be associated with a bank funding structure that increases vulnerability to "Northern-Rock type" wholesale funding runs.⁶ At the macroeconomic level, higher short-term debt is found to be correlated with a higher probability of large capital-account reversals (Rodrik and Velasco, 1999, and Radelet and Sachs, 1998). Such

correlation, however, could also reflect that a deteriorating financial situation may force countries to borrow increasingly short-term, implying that short-term debt could be as much a consequence as a cause of pending financial instability.

In the OECD analysis, higher short-term cross-border *bank* debt (as a share of total liabilities) is found to increase the likelihood of banking crises. An increase of the share of short-term bank debt in total liabilities by 3½ percentage points (corresponding to a move from the median to the third quartile of the distribution across OECD countries in 2007) would increase the likelihood of a banking crisis by 0.8 percentage points, compared with an increase of 0.6 percentage points for a similar rise in the share of overall external debt (*i.e.* not specific to bank creditors and covering all maturities). Moreover, short-term bank debt increases the risk of crisis contagion, as indicated in the following section. In contrast, OECD work finds no evidence that the share of *overall* short-term debt (maturity < 1 year) in total external liabilities directly influences the risk of banking crises. While this lack of evidence could mirror the low quality of the available data, it could also reflect that the maturity structure of external debt has different effects depending on the creditor. For example, official lending of any maturity may be relatively stable, while bank lending may particularly increase crisis risk when it is short-term – as conjectured by Kaminsky and Reinhart (2001) – as it can generally be withdrawn more quickly than most other loans.

3. Some types of financial integration increase financial contagion risk

Aside from the structure of the financial account, one factor that has contributed to the spreading of the financial crisis is the extent and nature of financial integration, especially of the banking sector. Even though international financial integration is commonly seen as increasing economic efficiency and growth (see *e.g.* Henry, 2007), it may also expose countries to increased contagion risks (Bolton and Jeanne, 2011), as well as to boom-bust cycles through asset-price bubbles and surges and sudden stops in capital flows (OECD, 2011; Furceri *et al.*, 2011). Similarly, some financial crises in emerging economies have been linked to premature financial liberalisation and a connected increase in international financial integration (see *e.g.* Diaz-Alejandro, 1985, or Kaminsky and Reinhart, 1999). This section therefore examines how financial integration may increase the probability of suffering a banking crisis by transmitting international shocks *via* bank balance sheets. It also looks at how international financial integration has shaped the impact of the recent global financial crisis on capital flows and the co-movement of asset prices. In doing so, the analysis assesses whether certain forms of international financial integration are more prone to such transmission than others (see Box 1 for details on the different empirical frameworks).⁷

Financial shocks are principally transmitted through international integration among banks

New analysis suggests that financial shocks have for the most part been transmitted internationally through debt integration, with equity integration playing some and FDI integration little role. For example, an analysis of shifts in bilateral positions during the recent financial crisis (see Box 1, 3rd bullet) indicates that investors have reduced their exposure to far-away countries about which they have less information, and this effect has been more pronounced for bank loans and debt securities than for portfolio equity and FDI (Ahrend and Schwellnus, 2012a). Similarly, stronger banking and debt-market integration⁸ has increased the co-movement of, respectively, bank-share-prices and equity prices during the recent financial crisis (Box 2). In contrast, there is no robust evidence that FDI integration has increased the co-movement of asset prices (Ahrend and Goujard, 2012b), indicating that contagion risk increases with debt and banking integration, but not with FDI integration.

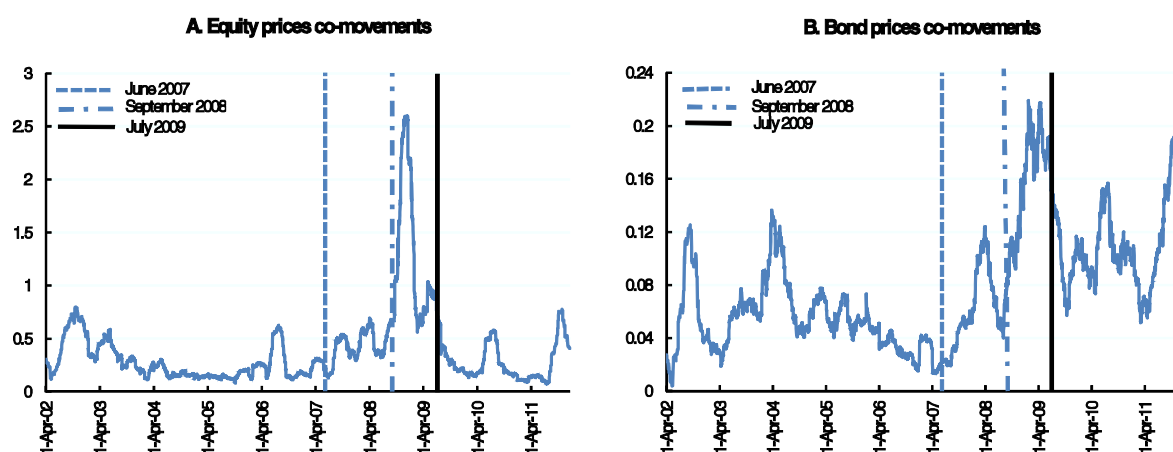
Box 2. Financial integration, co-movements during the crisis, and financial contagion

The 2007-09 global financial crisis can be used as a quasi-experiment to assess to what degree different types of financial integration led to contagion. Relying on high frequency data for multiple financial market variables in different countries, the bilateral co-movement of a given financial variable in two countries can be examined. The variables considered include stock and bond market valuations. Descriptive evidence shows that co-movement is generally larger for equity than for bond prices, probably reflecting that equity prices are to a larger degree driven by international factors, and that the co-

movement increases in times of crisis (Figure A). Econometric analysis can then be used to assess whether the co-movement of a financial variable for a given country-pair depends on the corresponding degree of bilateral financial integration. This allows assessing whether increases in co-movement in crisis times differ with the type of financial integration (*i.e.* through debt, equity, FDI, or bank debt), with significantly larger increases in the co-movement being interpreted as stronger contagion (Ahrend and Goujard, 2012b). Stronger banking and debt-market integration has increased the co-movement of, respectively, bond prices and equity prices during the recent financial crisis. In contrast, there is no robust evidence that FDI integration has increased the co-movement of asset prices. This indicates that asset price contagion through debt and banking integration is stronger than through FDI integration.

Figure A. Financial integration and financial crisis risk

Average co-movements across country pairs during the global financial crisis



Note: Co-movements are measured using the product of the daily return in country i with the daily return in country j . The solid blue line represents the 90 day lagged moving average over all country pairs. Lines in June 2007, September 2008 and July 2009 represent key crisis dates (Didier *et al.*, 2011; Cetorelli and Goldberg, 2011).

Source: Ahrend and Goujard (2012b).

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The importance of banking integration as a major vector of financial contagion is further confirmed when exploring contagion through international banking (see Box 3 for a detailed discussion). Bank balance-sheet contagion arises when a country's foreign creditor banks experience deteriorations in their balance sheets that – even if unrelated to the debtor country in question – push them to reduce their exposure to this country, *e.g.* by recalling external loans. Bank balance-sheet driven financial contagion would be expected to increase the likelihood of banking crises in the borrowing country, all the more so when its banking system is more internationally integrated – as reflected for example in high indebtedness to foreign banks. OECD analysis indeed confirms that bank-driven financial contagion is an important driver of financial crises, especially when *ex-ante* reliance on cross-border funding from foreign banks is high (Ahrend and Goujard, 2011).⁹ These results suggest that in an OECD country with a median level of banking integration (external bank debt of somewhat above 50% of GDP), a median-sized negative bank balance-sheet contagion shock would increase the annual likelihood of a banking crisis by 2.3 percentage points, thereby almost doubling it. This effect is even stronger for countries that rely more on funding *via* the international banking system. Given that Ahrend and Goujard (2011) find the *direct* effect on the probability of banking crises (explored in Section 2) to be only marginally higher for external bank debt than for non-bank external debt, this suggests that the increased risk from bank debt (in comparison to other forms of debt) arises overwhelmingly through increased contagion risk.

Box 3. Bank balance-sheet contagion

Beyond the possibility that simultaneous banking crises in different countries may be caused by a common shock to economic fundamentals, the literature proposes three main channels of contagion:

- Financial market perceptions: Negative shocks in one country can worsen the perception of financial market investors about countries with similar characteristics. Especially under high uncertainty among creditors about the cause of the negative shock or the creditworthiness of borrowers, foreign banks may reduce their cross-border lending and institutional investors may reduce asset holdings more generally. This, in turn, could cause self-fulfilling financial crises outside the country that was originally affected.
- Trade: Trade linkages can transmit a banking crisis, as a negative shock in one country – decreasing domestic demand and possibly resulting in devaluation and a gain in competitiveness – can reduce the export prospects of other countries.
- Balance sheets of financial intermediaries: Deteriorations in the balance sheet of banks or other leveraged financial institutions can push them to sell external assets or to recall external loans to comply with internal rules or with prudential regulations such as capital requirements or maximum leverage ratios. Krugman (2008) refers to such international financial contagion as the “International Finance Multiplier”.

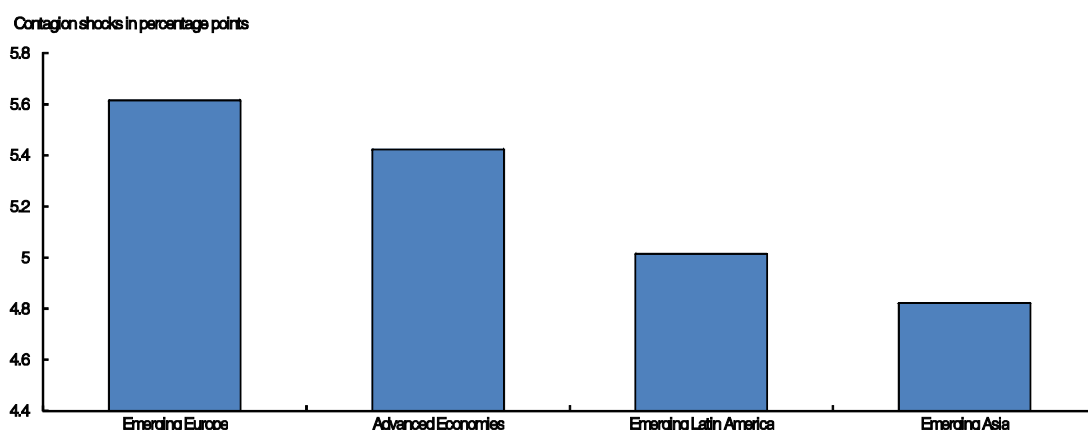
Bank balance-sheet (BBS) driven contagion can be direct or indirect. *Direct* financial contagion results, for example, from being indebted to a creditor country with a deteriorating risk profile, and will be referred to as “lending-country spillovers” in the following. In addition, *indirect* contagion through the international banking system can arise, for example, as banks cut back on loans to a country in response to suffering losses on loans to another country (referred to as “common-creditor contagion” in what follows). Consequently, borrowers may find their access to credit restricted even in a situation where their country’s (and their own) credit risk has remained unchanged. This indirect financial multiplier was first suggested by Calvo (1998) to introduce a causal link between the 1998 Russian crisis and the following crisis in Brazil. Similarly, Kaminsky and Reinhart (2001) attribute part of the contagion of the 1997-98 Asian crisis to a “common creditor” effect, with Japanese and European banks the common creditors in this case.

Quantitative measures of different types of bank balance-sheet contagion shocks have been constructed by combining information on countries' credit ratings and on bank's cross-border lending from BIS locational statistics (for details see Ahrend and Goujard, 2011). Starting in 1977, bilateral data show the total amount that banks from each BIS reporting country have lent to the financial and non-financial institutions of each other country (including to countries that are not reporting to the BIS). Consider country r that reports the international lending of its banking system. The quality of the loan portfolios of country r 's banks can be affected either by a domestic shock or a foreign shock – *i.e.* a shock to countries to which country r 's banks have lent money. For each period, the degree to which country r 's banks are affected by domestic shocks is measured by the change in country r 's own sovereign rating that is not driven directly by foreign developments. The degree to which country r 's banks are affected by foreign shocks is computed as the change in the sovereign rating of the countries to which its banks have been lending to, weighted by the share of lending to the respective country. The calculation of the strength with which creditor banks' are affected by domestic and foreign shocks for all BIS reporting countries allows to compute, in a second step, measures of contagion for a given country referred to as country d (debtor). Lending-country spillovers (LCS) are calculated as the (aggregate) degree to which country d 's creditor banks have been affected by domestic shocks, weighted by their lending to country d . Similarly, common-creditor contagion (CCC) shocks are calculated as the (aggregate) degree to which country d 's creditor banks have been affected by foreign shocks (excluding shocks to country d), weighted by their lending to country d . Common-creditor contagion and lending-country spillovers identify different shocks. The common-creditor contagion channel portrays banks as a conduit for transmitting shocks from third-party countries, with banks being unable or unwilling to cushion borrowing countries against such shocks. The lending-country spillover channel represents (at least in part) direct shocks to the main international lending banks. Empirically, increases in financial crisis risk are generally found to be much larger for CCC shocks than for LCS shocks.

Bank balance-sheet driven contagion shocks during the recent global financial crisis have dwarfed observed levels of contagion in previous crises. The estimates obtained would imply that, holding everything else constant, being exposed to both the median CCC and LCS shocks observed in 2009 increased the likelihood of banking crisis more than six-fold (18 percentage points) for an OECD country at 2009 median levels of short-term debt.


Important episodes of global bank balance-sheet contagion over the last two decades have been mainly related to developments in the large advanced economies (Ahrend and Goujard, 2011). The 1997-98 Asian crisis or the 1995 Mexican crisis did not lead to visible contagion at the global level, even though at the regional level and for certain emerging economies outside the region strong contagion effects were clearly visible at the time. Combining common-creditor contagion and lending-country spillovers, Figure A shows that the regional patterns of contagion during the recent global financial crisis were different from the earlier crises of the 1990s. This time, Latin American and Asian economies were among the least affected, whereas advanced and European emerging economies were those exposed to the strongest contagion shocks. In particular, Eastern European countries suffered from the strongest common-creditor contagion shocks (Ahrend and Goujard, 2011). This reflected large exposure to Western European banks and investors which cut their exposure to Eastern Europe as a result of the losses they incurred on their international asset portfolios (see de Haas *et al.*, 2011, and de Haas and van Horen, 2011). The low degree of banking integration within the region may also have played a role. A comparatively high degree of intra-regional banking integration probably amplified the Asian and Mexican crises in the respective regions they originated in, but was this time an advantage in a crisis that originated and mainly affected the most advanced economies.

Figure A. Contagion affected emerging European and advanced countries relatively more during the recent crisis



Note: Each bar represents the contagion shock a region has been subjected to, calculated as the aggregated sovereign rating downgrade of its creditors. The percentage point increases in the size of the contagion shocks shown on the y-axis correspond to equivalent percentage point downgrades in sovereign ratings. See Ahrend and Goujard (2011) for further details.

Source: OECD calculations based on Ahrend and Goujard, 2011.

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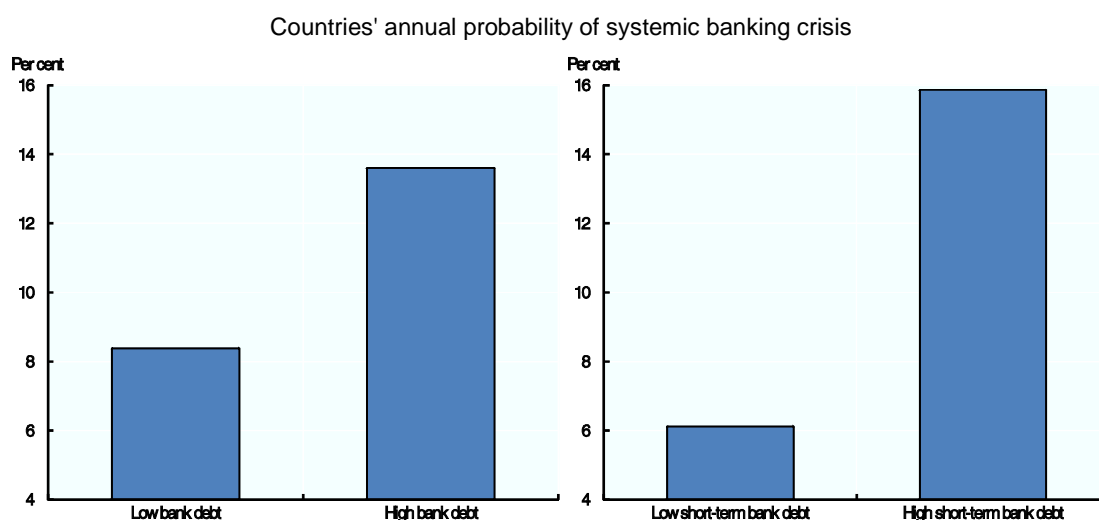
The evidence from OECD analysis that bank balance-sheet contagion is operating through exposure to borrowing from external banks is consistent with more descriptive earlier results for the Asian (1997-98) and the Mexican (1994-95) crises (Kaminsky and Reinhart, 2001) or for the 2007-09 global financial crisis (Cetorelli and Goldberg, 2011). Strong contagion effects through the bank balance-sheet channel are also in line with results from bank-level micro-econometric analyses. Liquidity shocks to banks have been shown to be transmitted to their borrowing firms, resulting in strong financial distress for small unconnected firms (Khwaja and Mian, 2008). Also, banks at the periphery of the banking network – in the sense of being the ultimate debtors among banks and not intermediaries – are most strongly affected by banking crises as their access to bank lending gets curtailed and they often cannot roll-over their maturing debt (Hale, 2011).

Financial contagion is even stronger when the maturity of external bank debt is short

Financial contagion risk does not only depend on the size of external – in particular bank – debt, but also on its maturity structure. A sudden inability to refinance external funding positions may force borrowers to liquidate assets not only earlier than planned, but typically in distressed market conditions, and resulting losses may render them insolvent. For a given level of external debt, refinancing needs rise with a shorter maturity structure of the outstanding debt. Consequently, *short-term* borrowing from external banks (in the empirical analysis, debt with remaining maturity below one year) may pose external funding risk beyond the size of total external bank debt.


The empirical analysis finds that countries with higher external funding needs, due to a debt structure that is biased towards short-term bank debt,¹⁰ have indeed been comparatively more affected by bank balance-sheet driven contagion shocks (Ahrend and Goujard, 2011). More specifically, the impact of *short-term* bank debt on annual financial crisis risk *via* international contagion is found to be almost twice as large as the impact of overall bank debt over the same channel.¹¹ For example, when hit by a median sized bank balance-sheet shock during the global financial crisis a country with bank debt at the average of the high bank-debt group would face a crisis probability roughly 5 percentage points higher than a country at the low bank-debt group average. A similar calculation shows that for short-term bank debt this difference rises to 8 percentage points (Figure 5). These large increases in crisis probability underline the important role of bank debt, and in particular short-term bank debt, in spreading financial turmoil.

Figure 5. Bank debt, especially when short-term, increases financial fragility



Note: Bars represent, for two possible levels of (short-term) bank debt, the annual probability of suffering a systemic banking crisis when hit by the median-sized bank balance sheet shock observed in 2008-09 during the global financial crisis. OECD countries are split into two equally-sized groups based on the size of their (short-term) bank debt. Low (short-term) bank debt is defined as the average across the low (short-term) bank debt group, with high (short-term) bank debt being defined correspondingly.

Source: OECD calculations based on Ahrend and Goujard (2012a).

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Debt from banks without a local presence further increases risk

Financial integration through banking debt can be more or less conducive to contagion depending on the structure of the banking sector in the borrowing country. In particular, borrowing directly from international banks appears to be riskier than international lending channelled through branches or subsidiaries of international banks. The former type of lending is more strongly affected than the latter in times of financial turmoil (Ahrend and Goujard, 2012a), possibly reflecting international banks' superior information about countries, or the greater value of continued business-relations in countries in which they have branches or subsidiaries, given the important sunk costs

associated with such structures. Moreover, they are in line with the other new finding that countries which are more open to foreign bank entry (and therefore presumably have a larger presence of foreign banking operations) have been less affected by capital outflows in response to sudden reversals in investor sentiment (see Ahrend and Schwellnus, 2012b). The new empirical results also complement existing literature showing that a larger share of foreign-owned banks has ambiguous effects on financial stability – while enhancing stability during local or regional financial crises, it has increased fragility during the recent global financial crisis (see *e.g.* de Haas and van Lelyveld, 2010 and 2011).¹² From a financial-stability point of view a mix of domestically-owned and foreign-owned banks may therefore be a reasonable compromise, with the latter mainly taking care of indispensable international borrowing by drawing funds from their owners.

4. Policies can reduce financial vulnerability

Policies can affect financial stability through different channels

Structural and macroeconomic policies can affect financial stability in at least three different ways, which are explored in new OECD analysis:

- *Indirectly by shaping the financial account structure*, which in turn affects financial crisis risk (see Ahrend and Goujard, 2012a). As mentioned earlier, a bias in external liabilities towards debt, and in particular bank or short-term debt, increases financial crisis risk, as does a currency mismatch in the external balance sheet. Consequently, policies that encourage such features of the financial account contribute to financial fragility. For example, regulatory restrictions on FDI increase financial risk to the extent they reduce FDI and equity inflows, leading to a larger debt bias. Another example is implicit government guarantees which, by increasing the size of the banking sector both in lending and borrowing countries, may favour cross-border bank lending (Rogoff, 1999). Also, a country's capacity to issue domestic-currency liabilities may be limited by a poor institutional environment, potentially leading to currency mismatch.
- *By reducing the risk of international financial contagion*. Over and above their impact on financial account structure, structural and macroeconomic policies may reduce the volatility of capital flows (see Ahrend and Schwellnus, 2012a,b) or the risk of domestic banking crisis (see Ahrend and Goujard, 2012a) in the event of an external financial shock.
- *By reducing the risk of financial crises through channels other than financial account structure or financial contagion risk* (see Ahrend and Goujard, 2011).

The following sub-sections draw the main conclusions from available analysis of these three channels, including new empirical work.¹³ They start with a brief discussion of the effects of macroeconomic policy factors before turning to the impact of structural policies, which is the main focus of this paper. Throughout this discussion, the emphasis is on the external drivers of financial crises. Internal factors, such as domestic credit and its determinants are largely ignored unless they have a direct bearing on financial account developments or contagion risk.

The impact of selected macroeconomic policies on financial stability

Fiscal and monetary policies

In general, fiscal and monetary policy that mitigate economic fluctuations and ensure long-term sustainability should also reduce financial risk. In some instances, however, nationally optimal monetary policy may contribute to international financial instability. For example, recent IMF work finds that low US interest rates have contributed to strong capital inflows (in particular from banks) in emerging economies (IMF, 2011), with the risk that a future sudden stop or reversal of such large flows could trigger a financial crisis (see *e.g.* OECD 2011). There is evidence in new OECD analysis to support the concern that financial risk materialises in periods of tight(ening) liquidity conditions. Bank balance-sheet driven contagion is found to particularly raise the likelihood of a domestic banking crisis when US or global interest rates are high, or global liquidity is low (see Ahrend and Goujard, 2012a).

A large and unsustainable budget deficit has on several occasions – especially during the 1980s, but also *e.g.* during the 1998 Russian crisis – been a factor that contributed to financial instability, but, even so, no systematic evidence is found here for a causal link from the fiscal position to financial risk. This non-finding could be related to imprecise data, particularly as actual deficits may not be a good measure of fiscal sustainability, but it could also reflect that in many financial crises since the mid-1990s fiscal deficits were not a decisive factor. This said, a measure of public debt sustainability is indeed found to be correlated with crisis risk, but this effect is not robust to controlling *e.g.* for the size of external bank debt. This could point to public debt becoming an issue for financial stability primarily when it is held abroad.

The impact of the exchange rate regime is ambiguous

The impact of the exchange rate regime on financial stability is *a priori* ambiguous. On the one hand, the increased scope for monetary policy stabilisation under flexible exchange rate regimes should deliver greater macroeconomic stability, which in turn should benefit the stability of the financial system. Moreover, the currency appreciation pressure during periods of strong capital inflows is often thought to moderate capital flow volatility compared with a fixed exchange rate regime (Eichengreen and Hausmann, 1999). On the other hand, monetary policy has in practice often been pro-cyclical in emerging economies, and hence not conducive to stabilisation (Calvo and Reinhart, 2002). Also, when high shares of private sector liabilities are denominated in foreign currencies, floating exchange rate regimes can have drawbacks insofar as large depreciation can lead to widespread bankruptcies that in turn result in banking crises (Velasco and Cespedes, 1999). Finally, monetary unions like the Euro area are in numerous dimensions fundamentally different from simple fixed exchange rate systems, and empirical results for fixed exchange rate systems may not apply to them.

New empirical analysis points to an ambiguous role of the exchange rate regime for financial stability. No evidence is found that flexible exchange rate regimes mitigate booms in capital flows driven by swings in investor sentiment.¹⁴ However, investor-sentiment driven capital flow reversals have been larger in countries with fixed exchange rates – probably as investors hedge against the risk of a large devaluation should the peg not hold. This notwithstanding, fixed exchange rate systems are found to reduce the probability of financial crisis. These results are in line with empirical evidence that adopting a fixed exchange rate diminishes the likelihood of banking crises among developing countries; however, once crises occur the real cost appears to be larger in countries with fixed exchange rates (Domac and Peria, 2003).

Global imbalances may increase crisis risk, but the role of policies in causing them remains disputed

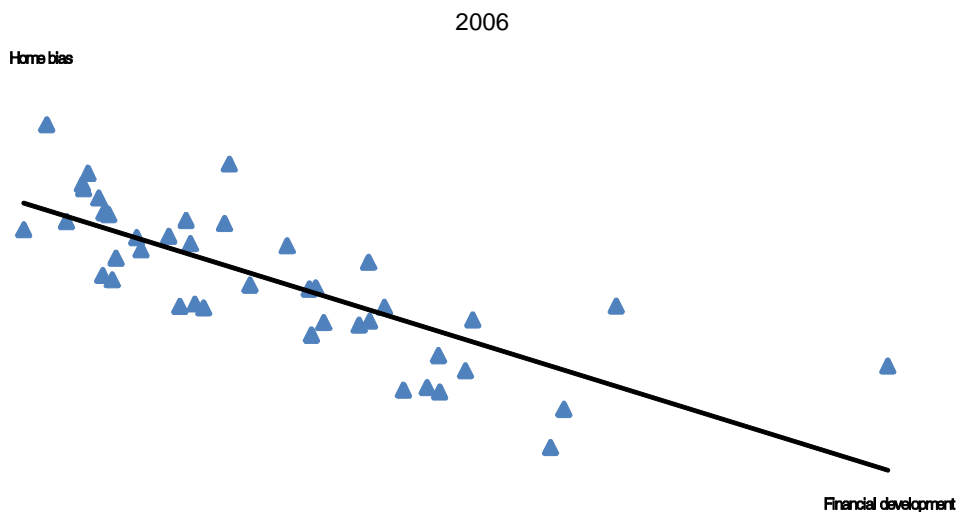
Global imbalances are often seen as a factor behind the recent financial crisis (see *e.g.* Bernanke, 2011), and more generally could lead to systemic problems, *e.g.* “disruptive adjustments” (Blanchard and Milesi-Feretti, 2009). A well-known hypothesis claims that insufficiently rapid financial development in fast-growing emerging economies has led to a shortage of safe domestic assets – a phenomenon referred to as “asset mismatches”. Following this hypothesis, asset mismatches resulted in purchases of safe assets in financially developed countries, which in turn gave rise to low interest rates in the latter as well as global imbalances (Caballero, 2006; Caballero *et al.*, 2008).¹⁵ Yet, OECD analysis finds that “asset mismatches” do not determine the asset allocation of emerging economies, as these invest primarily in financial assets of their own country (Box 4 and Ahrend and Schweltnus, 2011). And when they invest abroad, while overinvesting in US bonds, they under-invest in bonds of other financially highly-developed countries such as Australia, Germany, Switzerland and the United Kingdom, which are also widely seen as safe. Hence it is doubtful that – as often claimed – greater financial development in emerging countries would shrink global imbalances by increasing emerging economies’ supply of domestic safe assets.¹⁶ This said, insurance sector development as well as financial development conducive to a relaxation of credit constraints may reduce private savings in emerging economies with a current account surplus. Also, even though financial-development-driven asset mismatches do not seem to be a significant contributor to global imbalances, policy-induced distortions and other push factors could still play a major role. Possible examples include the demand for highly-liquid assets denominated in the world’s primary reserve currency (the US dollar), exchange rate policies that keep exchange rates undervalued through rapid currency reserve accumulation, as well as financial recycling of windfalls from (mainly oil-price driven) terms-of-trade changes, particularly in periods during which countries adjust to new prices.

Box 4. The safe-assets shortage hypothesis

The emergence of large global current account imbalances over the past decade has sparked concerns, particularly as regards their implications for financial stability. While the causes of global imbalances remain a subject of debate, one influential view sees them as driven by a mismatch between the supply and the demand of safe financial assets. According to this view, fast-growing emerging and commodity-producing countries have seen fast increases in disposable income without corresponding increases in financial development and the supply of safe financial assets. The resulting excess demand would have been re-directed to financially highly-developed countries capable of producing vast amounts of financial assets perceived as safe (Caballero, 2006; Caballero *et al.*, 2008; Mendoza *et al.*, 2009). This would have put downward pressure on long-term interest rates in safe-asset producing countries, thereby contributing to increased financial leverage, high consumption and current account deficits. As financial development in emerging countries changes only gradually over time, the asset mismatch hypothesis would imply limited short-term scope for reducing global imbalances. Instead, policy would predominantly need to deal with their consequences, *e.g.* by strengthening prudential regulation. Over the medium term, global imbalances would narrow as financial markets in fast-growing emerging economies develop.


The asset mismatch hypothesis has two empirically-testable implications. First, financially less-developed countries should hold a higher share of their total portfolio in foreign securities than financially more-developed countries. Second, they should hold a higher share of their foreign portfolio in the assets of financially highly-developed countries which are perceived as safer. Based on data covering the countries with the largest debt- and equity portfolios, new OECD analysis finds little empirical support for the asset mismatch view. Indeed, financially less-developed countries tend to hold a larger share of domestic securities in their total portfolios than financially highly-developed countries, *i.e.* they have greater home bias (Figure A).

Figure A. Across countries the home bias decreases with the level of financial development



Note: Sample includes OECD and emerging countries reporting to the IMF CPIS; financial development is defined as the ratio of bond market capitalisation to GDP; home bias is defined as the logarithmic deviation of foreign bond holdings from those predicted by a simple Capital Asset Pricing Model.

Source: OECD calculations based on Ahrend and Schwellnus, 2011.

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Furthermore, even when abstracting from such bias and focusing only on the geographical allocation of their foreign portfolio, financially less-developed countries do not display a general preference for the assets of financially highly-developed countries. One notable exception is debt securities holdings in the United States, to which financially less-developed countries allocate disproportionately high shares of their foreign bond portfolios. However, it is difficult to interpret this as supporting the asset mismatch

hypothesis, as financially less-developed countries' home bias dominates their US bias in foreign portfolio allocation: overall, financially less-developed countries hold lower shares of their total portfolios in the United States than financially highly-developed countries. Moreover, they also hold lower total and foreign portfolio shares in other safe-asset-producing countries such as those English-speaking countries explicitly considered by Caballero *et al.* (2008) (Australia and the United Kingdom), or Germany and Switzerland which may also be seen as producing relatively safe assets (Table A).

Table A. Financially less-developed countries hold a lower share of their total portfolio in assets from the US or other "safe-asset producing" countries

Portfolio debt securities in 2005, %		
	USA	Other "safe-asset producing" countries ²
Total portfolio shares (in %)		
Financially less developed ¹	2.2	1.2
Financially more developed	5.7	4.5
Foreign portfolio shares (in %)		
Financially less developed	34.9	15.0
Financially more developed	18.1	20.6

1. Sample split based on the ratio of bond market capitalisation to GDP.

2. Australia, Germany, Switzerland and the United Kingdom.

Source: OECD calculations based on Ahrend and Schweltnus (2011).

The results of the OECD analysis suggest that an increased supply of safe assets in emerging markets may not *per se* contribute to the unwinding of global current account imbalances and the resulting financial fragilities. By contrast, the analysis suggests that continued financial development in emerging economies might even amplify global current account imbalances, as their share of total savings invested in foreign assets is likely to increase with higher levels of financial development. However, the overall level of savings in emerging economies may decrease as banking and insurance sector development may, respectively, reduce credit constraints and precautionary savings. The overall effect of financial development on global imbalances is therefore ambiguous.

Well designed tax systems are conducive to financial stability

Debt bias increases vulnerability

Tax systems that favour debt finance over equity finance would be expected to bias corporate financing towards debt. Many countries afford corporations larger tax deductibility of interest payments than of dividends or capital gains. There is no single measure of the degree to which the tax treatment of interest differs from that of dividends and capital gains across countries, but empirical testing can instead rely on the presumption that differences in tax treatment should have a larger impact on corporate financing when corporate tax rates are higher.¹⁷ De Mooij (2011a,b) documents that corporate financing is indeed more biased towards debt in countries with higher corporate tax rates. Such a bias could conceivably result in an aggregate bias in a country's external liability structure towards debt.¹⁸ While there is no literature on the aggregate impact of corporate income tax (CIT) rates on the structure of the financial account, firm-level estimates of the CIT elasticity of enterprises' debt share reviewed by de Mooij (2011a) are relatively large, in the order of 0.4-0.6.¹⁹

New OECD analysis finds that tax systems which favour debt over equity finance have indeed biased external financing towards debt, thereby increasing crisis risk (Ahrend and Goujard, 2012a). More precisely, an increase in the CIT rate is found to have raised international debt liabilities, and reduced reliance on external equity finance (leaving FDI roughly unaffected).²⁰ The estimate for the elasticity of the external debt bias (0.6) is roughly in line with the firm level evidence.

Tax treaties appear to increase FDI, thereby reducing crisis risk

Firms may also invest more in countries with which their home countries have tax treaties, as they then no longer face the cost of double taxation. If this effect is particularly large for FDI investment, tax treaties should reduce any bias of a country's external liabilities in favour of volatile portfolio and bank liabilities, thereby increasing financial stability. Previous studies, mainly based on US FDI data, have found little evidence for the FDI-enhancing effects of tax treaties (Blonigen and Davies, 2004; Louie and Rousssang, 2008).²¹ New OECD analysis on the drivers of financial account structure uses a comprehensive database of bilateral tax treaties and suggests instead that countries that rely more on tax treaties (in the sense of covering a larger share of the world economy through them) have a larger share of their external liabilities in the form of FDI (Ahrend and Goujard, 2012a). This is also consistent with countries having more FDI – with no effects found for other types of investment – in countries with which they have tax treaties (Ahrend and Goujard, 2012a).²²

Financial sector policies can boost financial stability

Tighter banking supervision and sound prudential regulation increase financial stability

Overall, stricter financial oversight is found to reduce financial fragility: countries with stronger banking supervision are less affected by investor-sentiment driven capital flow reversals, and have a lower risk of suffering from financial crises (the latter likely reflecting factors related both to the financial account and the behaviour of domestic banks).²³ For example, an improvement in banking supervision corresponding to an increase in the indicator by one standard deviation (in 2005) would reduce a country's annual probability of a banking crises (around 2.5-3%) by roughly 1.6 percentage points, *ceteris paribus*. However, stricter domestic banking supervision has also increased (short-term) borrowing from foreign banks. This points to a need for greater harmonisation and international cooperation of supervision to prevent regulatory arbitrage.

Prudential banking regulation, in particular relatively stringent capital adequacy rules and information disclosure requirements, are found to have limited capital flow reversals during the 2008-09 crisis. Further underlining the importance of strict financial regulation, countries where the banking sector is less leveraged and has a lower credit-over-deposits ratio have had a lower risk of bank balance-sheet driven contagion leading to a banking crisis. Moreover, countries with more transparent financial markets or which are more open to foreign bank entry have been less affected by capital outflows in response to reversals in investor sentiment (the latter possibly an indication that foreign investors have better information about the country). Overall, the analysis of the impact of banking regulation and supervision on the risk of capital flow reversals and systemic banking crises corroborates findings by Ahrend *et al.* (2011b) that indicators of regulatory and supervisory strength are well correlated with the extent to which countries escaped banking damages during the 2007-09 financial crisis.

Policies can increase financial stability by curbing housing and credit booms

OECD analysis finds strong (lagged) credit growth to the non-financial sector to be correlated with increases in the external debt share, and to be significantly and positively correlated with the probability of a systemic banking crisis.²⁴ For example, an increase of 10 percentage points in annual credit growth would imply an increase in the annual likelihood of banking crisis of 0.8 percentage points. These findings corroborate the conjecture of Kaminsky and Reinhart (1999) and Schularick and Taylor (2011) that financial crises can be partly seen as “credit booms gone wrong”.²⁵

Housing-related policies can also affect financial stability. For example, owner-occupied housing is commonly subject to special tax treatment such as mortgage-interest relief without parallel taxation of imputed rents, which has been found to increase both household leverage and house price volatility (Andrews *et al.*, 2011, Keen *et al.*, 2010, and Johnson, 2011).²⁶ Aside from the impact of stronger volatility, new analysis has found fast-rising housing prices to have increased the bias towards external debt,²⁷ suggesting that special tax treatments for owner-occupied housing may contribute to financial fragility. To give some order of magnitude, the estimated coefficients suggest that an increase in housing prices by 10 percentage points raises the debt bias by 6 percentage points,

implying an increase in crisis risk by close to 0.6 percentage points. While such an increase in itself is not massive, it is cumulative and should be seen in the context of house price increases of well above 100% in many countries in the run-up to the global financial crisis.

More developed financial sectors have allowed for a greater reliance on external bank debt

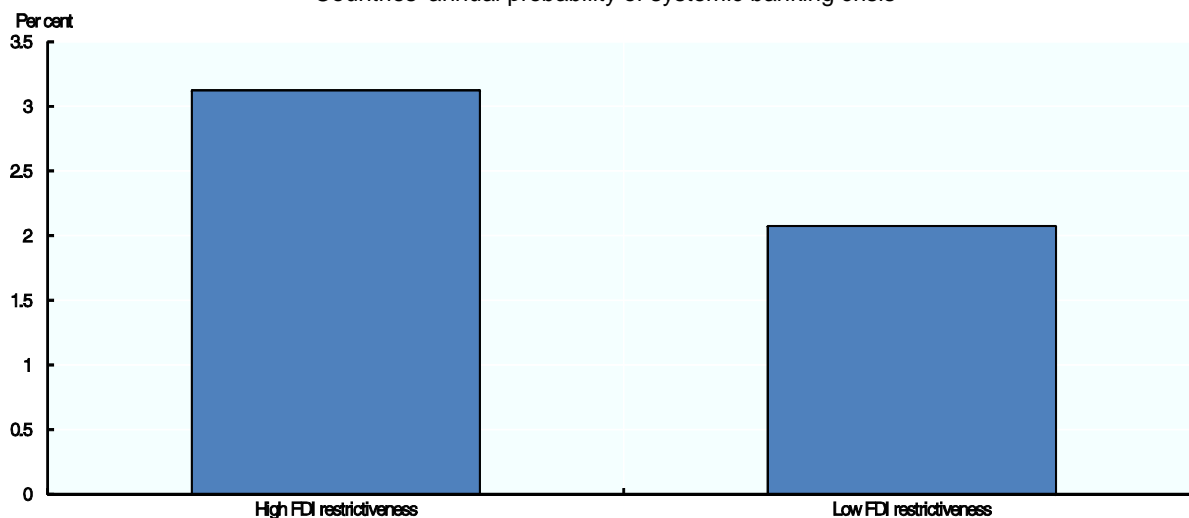
Despite forces acting in opposite directions, the institutional development of the banking sector appears on balance to be beneficial for financial stability. On the one hand, less financially repressed banking sectors are found to have resulted in countries rely more on (short-term) external bank debt, possibly reflecting greater willingness of foreign investors to lend under such institutional set-ups.²⁸ This has increased countries' financial fragility. For example, lower state-ownership of the banking sector and the absence of directed credit are found to increase both bank lending and short-term bank lending from abroad, thereby increasing the risk of financial crisis.²⁹ However, lower-state ownership of the banking sector is also found to directly mitigate the impact of bank balance-sheet contagion, and this effect outweighs the indirect negative effect.³⁰

The institutional development of domestic securities markets is also found to have conflicting impacts on financial stability. On the one hand it may increase external short-term bank debt. A move from the average position of OECD countries with low securities market development to the ones with high development would increase the share of short-term external liabilities in GDP by close to 1 percentage point. Since most developed countries have had fully-developed securities markets for some time, the room for further changes in this area lies in emerging economies. One possible interpretation for this finding would be that the development of a domestic securities market facilitates carry-trade activities by making it easier for domestic banks or other financial investors to borrow short-term abroad in order to invest in higher-yielding domestic debt securities (Galati *et al.*, 2007). While institutional development of securities markets seems to increase financial vulnerability through its impact on financial account structure, it also on the other hand appears to contribute directly to financial stability by reducing vulnerability to investor-sentiment driven reversals in capital flows.

Restrictive regulations on FDI and in product markets contribute to financial risk


Higher regulatory barriers to FDI and equity investment, as measured by the OECD FDI Restrictiveness Index, have resulted in an increased bias of external liabilities towards debt, driven both by increases in external debt liabilities and decreases in equity and FDI liabilities. In particular, more stringent screening approvals for foreign investments, restrictions on employment of foreigners for key management and board positions, as well as operation restrictions on foreign investments (such as on branching or capital repatriation) are found to strongly increase the debt bias. The results from the analysis suggest that an increase of the overall restrictiveness index from the average 2010 positions of low-restrictiveness to high-restrictiveness OECD countries would imply an increase in the share of debt in external liabilities by nearly 10 percentage points.³¹ This would translate into an increase in financial crisis risk by roughly 1 percentage point (Figure 6). Even though effects are less pronounced, stricter product market regulation, as measured by the OECD PMR indicator, also increases the bias towards external debt liabilities by orienting external financing away from equity and FDI.

Figure 6. Restrictive regulations on FDI have increased crisis risk
Countries' annual probability of systemic banking crisis



Note: Bars represent, for two possible levels of FDI restrictiveness, the annual probability of suffering a systemic banking crisis. OECD countries are split into two equally-sized groups based on their levels of FDI restrictiveness. High FDI restrictiveness is defined as the average across the high FDI restrictiveness group, with low FDI restrictiveness being defined correspondingly.

Source: OECD calculations based on Ahrend and Goujard (2012a).

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Differentiated capital controls affect crisis risk via the financial account

Only weak evidence is found that capital controls have affected overall capital flows...

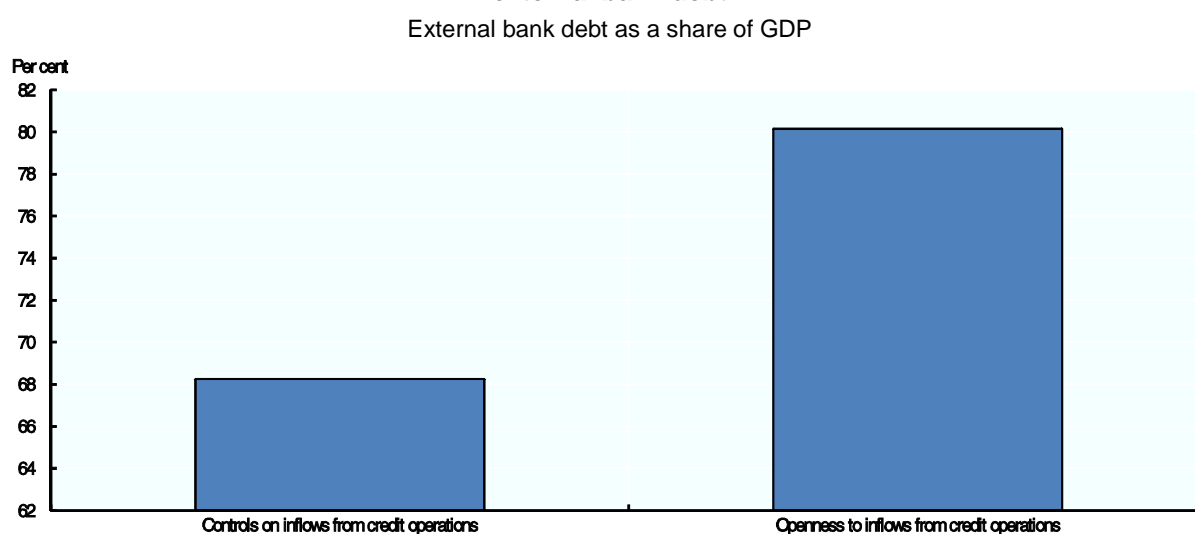
Controls on capital inflows are sometimes advocated as a tool for limiting the amount of short-term inflows, and thereby for reducing fragilities in a country's financial account structure. Similarly, inflow controls may partly prevent foreign-currency denominated liabilities, thus reducing currency mismatch. By contrast, outflow controls may increase currency mismatch by constraining the ability to acquire foreign-currency denominated assets. In addition, capital controls that target specific forms of capital flows may be able to skew the composition of external liabilities towards safer forms of finance and thereby make economies more robust to external shocks (Henry, 2007; Jeanne and Korinek, 2010; Korinek, 2011). Capital inflow controls have taken a variety of forms including taxes, quantitative restrictions, and reserve requirements that discriminate against (short-term) foreign-currency denominated deposits. However, in spite of a recent increase in the use of such restrictions, their effectiveness is still controversial, especially as regards their impact on the level (as opposed to the composition) of capital flows.

Fairly weak econometric evidence is found here that capital controls affect overall capital flows, or have a direct impact on financial crisis or contagion risk. There is some evidence that in countries with inflow restrictions on credit operations, bank balance-sheet driven contagion shocks have led to smaller increases in financial crisis risk, but no evidence that any other type of capital account restrictions had an effect. Similarly, no evidence is found that countries with stricter capital controls have been less affected by investor-sentiment driven reversals in capital flows. These results are roughly in line with studies that take similar approaches and find usually only weak (or no) evidence for an aggregate impact of capital controls (see *e.g.* Reinhard and Smith, 1998; Montiel and Reinhard, 1999; Edison and Reinhart, 2001; Binici, Hutchinson and Schindler, 2009). Nonetheless, these results do not necessarily imply that capital controls have no aggregate effects. Such effects may be hard to identify as changes in capital controls may themselves be driven by periods of strong inflows or outflows. Moreover, existing measures for the strength of capital controls remain approximative. Also, several case studies find effects on overall levels of capital flows – though mostly temporary (see *e.g.* Baba and Kokenyne, 2011, or the studies surveyed in Ostry *et al.*, 2010). On balance, the available evidence can be interpreted at a minimum as pointing to capital controls not having strong, lasting effects on *aggregate* capital flows.

... but targeted capital controls influence the structure of external liabilities, and thereby crisis risk


In contrast, empirical OECD analysis finds strong evidence that targeted capital controls can influence the structure of external liabilities, and thereby financial stability.³² Lower inflow restrictions on credit operations have led to sizeable increases in external debt and (short-term) bank debt, and as a result the share of debt in total external liabilities. In contrast, capital account openness to FDI and equity investments has considerably decreased the share of debt in external liabilities by reducing inflows of debt and bank debt. Moreover, capital account openness to FDI and equity inflows appears to significantly reduce currency mismatch, presumably by removing a bias in capital inflows towards forms that are denominated in foreign currency. For example, having inflow restrictions on credit operations over a two-years horizon results in bank debt as a share of GDP being 13 percentage points lower compared to a situation of not having them (Figure 7).

Figure 7. Lower inflow restrictions on credit operations have led to sizeable increases in external bank debt



Note: Bars represent, for two possible levels of openness to inflows from credit operations, the different levels of bank debt (as a share of GDP) that arise from a two-year period of having different regimes for credit operation inflows. OECD countries are split into groups based on their openness to inflows from credit operations.

Source: OECD calculations based on Ahrend and Goujard (2012a).

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Some capital controls – such as restrictions on credit operations – that appear to be beneficial for financial stability may come at a price to economic efficiency, *e.g.* by distorting competition among banks based on their country of origin. It has therefore been suggested that macroprudential policies would be generally preferable to capital controls (see *e.g.* Filiz Unsal, 2011). This may especially apply to domestic factors (pull): it would for instance probably be preferable to address domestically-driven bubbles by macroprudential regulations rather than by capital controls as the former can be applied more precisely to the problem area. However, it seems more doubtful that macroprudential tools are generally superior to capital inflow controls in mitigating capital flows driven by external factors (push). Well-designed differentiated capital controls could potentially influence the composition of such flows, and thereby enhance financial stability. Moreover, in countries with limited administrative capacity or with low levels of bank lending to households, certain types of macroprudential policies may be difficult to implement or likely to have relatively little impact. At the same time, countries where corruption is pervasive may find it hard to enforce capital controls. And, the introduction of capital controls by some countries may have spillover effects for other countries that may be faced with stronger inflows.

Summing up: the channels through which structural policies can reduce financial fragility

Based on the empirical analysis, Table 1 summarises the effects of structural policies aimed at reducing financial fragility by channel of impact.

- Most structural policies affect financial stability either *via* the financial account structure or through vulnerability to financial contagion. Aside from the nature of the exchange rate regime, only macro-prudential regulation and bank supervision have an effect independent from the two main channels
- Different groups of policies also seem to work through different channels: Structural policies not directly related to the financial sector have mainly affected financial stability through their impact on financial account structure, whereas financial-sector related policies also seem to have played a role through their impact on contagion risk.
- Several policies have an impact through both the financial structure and the contagion channels. In the case of capital controls and macroprudential regulation, the impact through these channels reinforces each other and hence the overall effect on financial fragility is unambiguous. In the cases of institutional banking sector and securities market development, as well as banking supervision, the overall effect on financial fragility is more ambiguous, as the reduction in crisis risk through some channels is partly offset by an increase in risk arising from financial account structure. Even so, the evidence suggests that at least for banking supervision and institutional banking development the financial account structure channel is dominated by the others, resulting in an overall reduction in financial fragility.
- Finally, the table shows that the impact of structural policies on financial stability is far from limited to externally-oriented policies. A large number of domestically-oriented structural policies affect financial stability *via* their impact on financial account structure or contagion risk.

Table 1. Effects of structural policies on financial fragility by channel of impact

	Overall effect	Source of financial crisis risk		
		Financial account structure conducive to crisis risk	Other non-contagion influences on crisis risk	Contagion risk
Externally-oriented policies:				
Lower FDI restrictions	↓	↓		
Targeted capital controls	↓	↓		(↓ ³)
More flexible exchange-rate regime	?		↑	(↓ ²)
Domestically-oriented policies:				
Lower product market regulation	↓	↓		
Lower tax system distortions towards debt financing; greater use of tax treaties	↓	↓		
Stricter macroprudential regulation	↓	↓	↓	↓ ³
Lower budget deficit / public debt				
Higher institutional banking sector development	↓	↑		↓ ³
Higher institutional securities markets development	?	↑		↓ ²
Stricter banking supervision	↓	↑	↓	↓ ²
Sound banking regulation	↓			↓ ¹
Lower financial sector leverage	↓			↓ ³

Note: Empty cases signify that no robustly significant effects were found. This does not necessarily mean that there are no effects, but could *e.g.* also reflect low quality of available data. For grey-coloured cells no analysis could be undertaken due to lack of sufficient historical data. An arrow in brackets indicates rather weak evidence.

1. Have reduced risk of capital flow reversals during global financial crisis.
2. Have reduced risk of capital flow reversals under investor sentiment shocks.
3. Have reduced risk of banking crisis under bank balance-sheet driven contagion shocks.

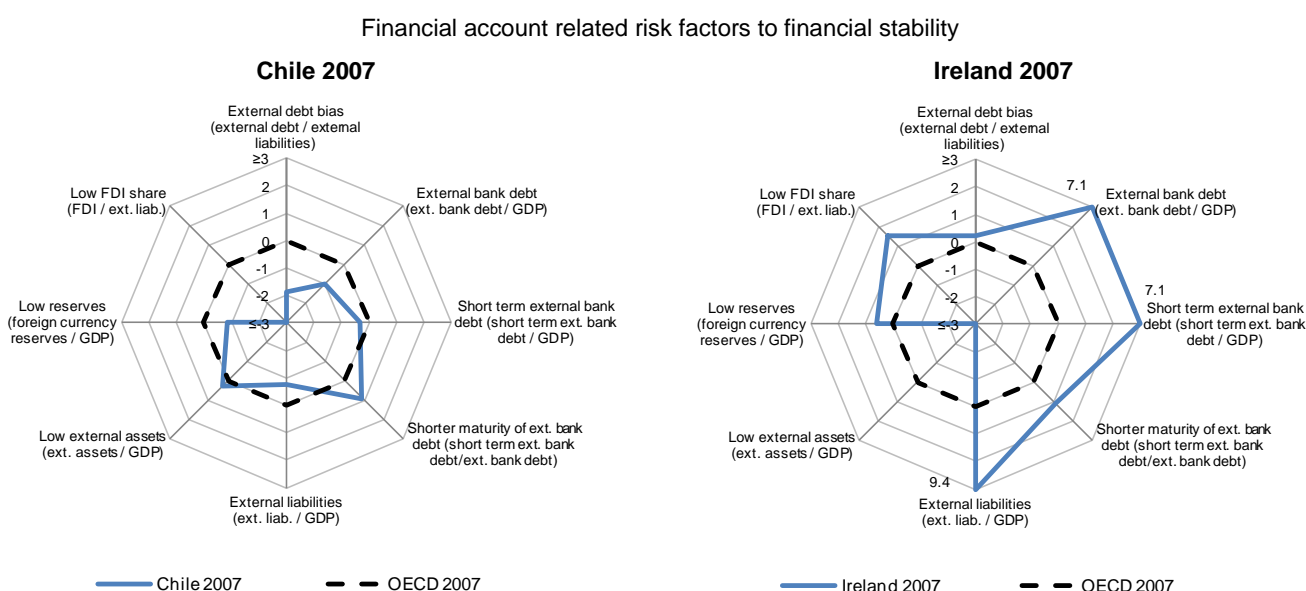
5. Reform options to reduce financial fragility and their trade-offs with other policy goals

Bringing together the results from the empirical analysis, this section first examines the financial account structure of selected countries, as well as of the OECD and the BRIICS as a group, in order to identify areas of relative fragility. It then looks at the extent to which structural policy settings in these countries may be conducive to financial stability, and explores whether financial-stability enhancing reforms would imply trade-offs or complementarities with economic efficiency objectives. Country-specific information for all OECD countries and the BRIICS can be found in Ahrend and Valdivia (2012).

Figure 8 shows the position of selected countries along various dimensions of their financial account structure (relative to the 2007 OECD median value on each dimension, for simplicity and without any normative implications).³³ Larger values indicate a financial account structure that is riskier compared with the OECD median. The diamonds show for instance that Chile had a safer financial account structure than most other OECD countries prior to the global financial crisis – a typical feature for commodity exporting countries (Panel A). In contrast, Ireland had a riskier financial account structure – a typical feature for countries with a large financial sector (Panel A). Higher fragility resulted from increased leverage of the external balance sheet, which occurred through increased external bank debt, often of short maturity. China had a pre-crisis financial account structure that appeared fairly safe – a typical feature for countries that were running large current account surpluses prior to the crisis (Panel B). On the contrary, the 2007 financial account structure of Greece appeared relatively risky – a typical feature for countries with sizeable current account deficits in the years preceding the global financial crisis (Panel B).

Figure 8. Financial account structure of selected countries in 2007

Panel A. In 2007, commodity-exporting countries generally had a safer, and countries with a large financial sector, a riskier financial account structure than the typical OECD country




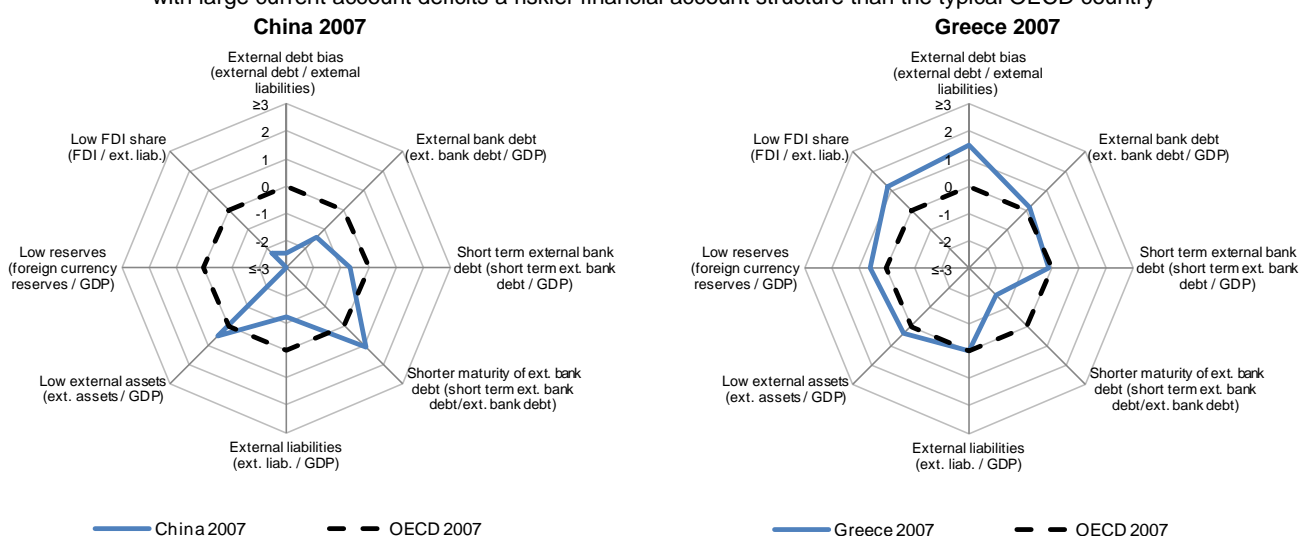
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Figure 8. Financial account structure of selected countries in 2007 (cont.)

Panel B. Countries with large current account surpluses prior to 2007 generally had a safer, and countries with large current account deficits a riskier financial account structure than the typical OECD country



Note: For each variable, a larger value indicates a riskier financial account position. Indicators are measured in multiples of the standard deviation across countries for the variable in question. Each variable is presented for the country in question, compared to the OECD median (which is normalised to zero).

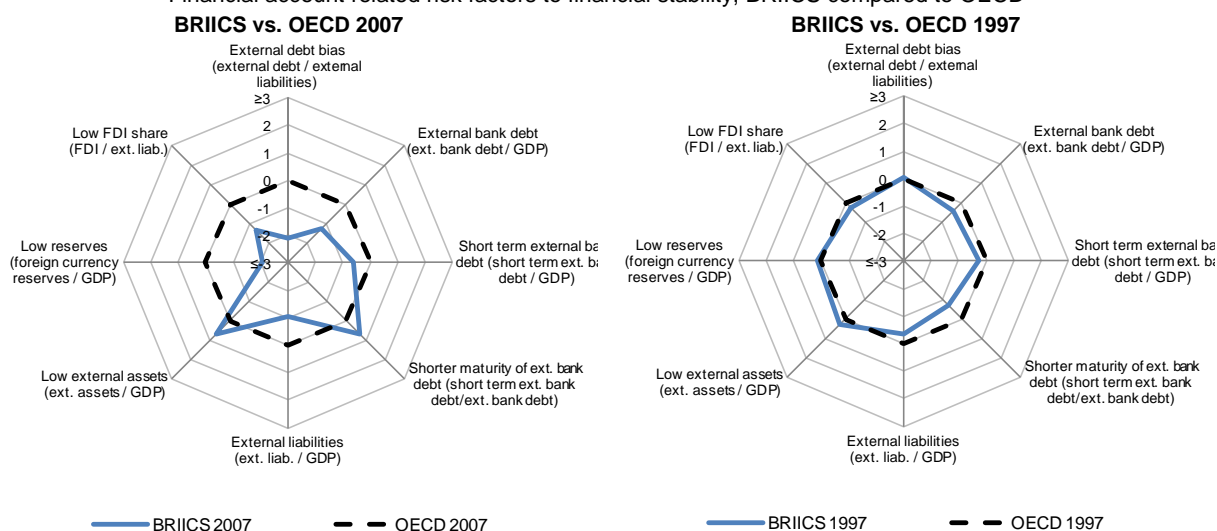
Source: Ahrend and Valdivia (2012).

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More generally, prior to the recent global financial crisis, the BRIICS had a much safer financial account structure than OECD countries along most dimensions, the main exception being that OECD countries held larger external assets (as a share of GDP) than the BRIICS (Figure 9). This is in sharp contrast with the situation a decade earlier, as in 1997 OECD countries still had a similar financial account structure to that of the BRIICS.

Figure 9. In 2007, the financial account structure of the BRIICS was more conducive to financial stability than that of the OECD

Financial account related risk factors to financial stability, BRIICS compared to OECD



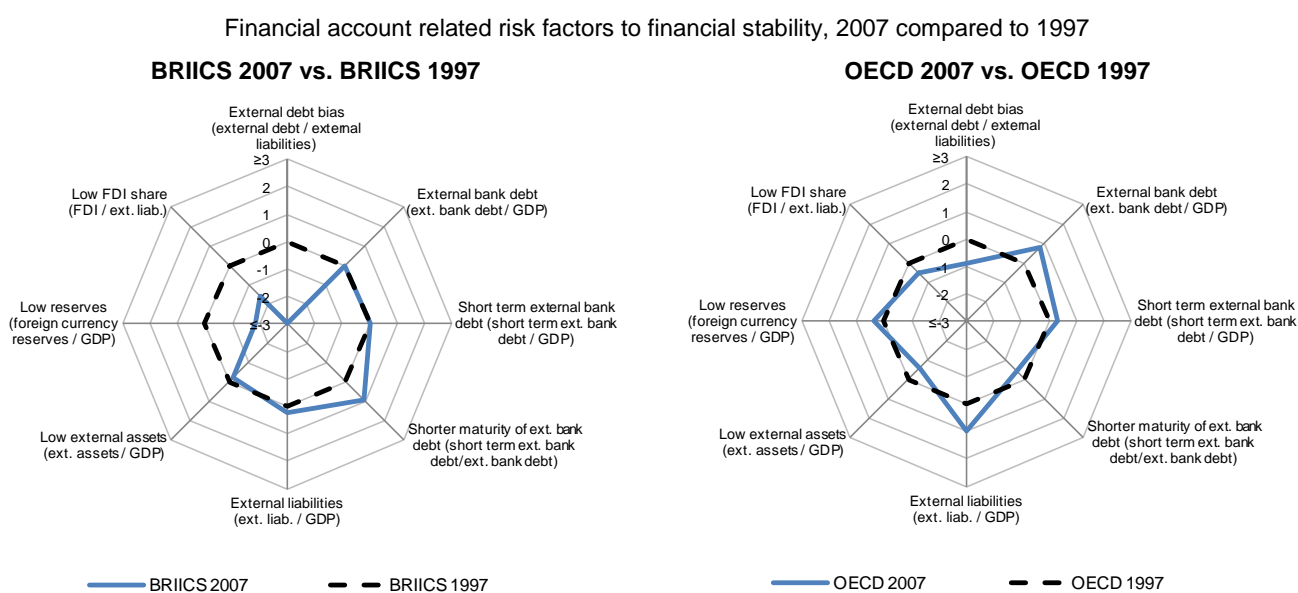
Note: Each variable is presented for the BRIICS median country, compared to the OECD median country (which is normalised to zero). For each variable, a larger value indicates a riskier financial account position. Indicators are measured in multiples of the standard deviation across countries for the variable in question.

Source: Ahrend and Valdivia (2012).

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The change came in part from major efforts on the side of the BRIICS in the decade prior to the recent crisis to reduce their financial fragility, likely driven in part by the experience of the Asian and other ensuing emerging market crises. Most notable changes were a shift in external liabilities from debt towards FDI and an increase in external assets, especially foreign currency reserves (Figure 10). Over the same period, OECD countries increased their financial fragility along several dimensions, leveraging up their external balance sheet and building up bank debt which, moreover, was often of short maturity.

Figure 10. In the decade prior to the recent financial crisis, financial account structure became more conducive to financial stability in the BRIICS while it became riskier in the OECD



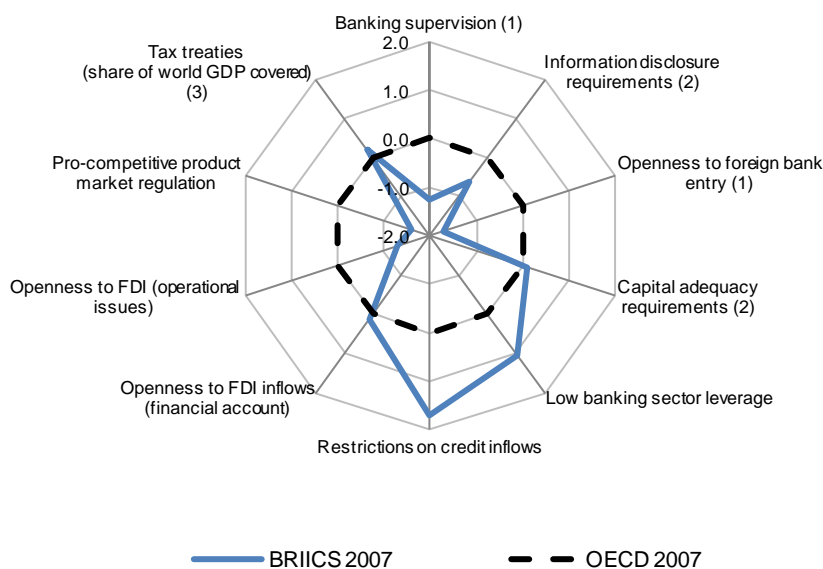
Note: Each variable is presented for the BRIICS (respectively OECD) median country in 2007, compared to the situation in 1997 (which is normalised to zero). For each variable, a larger value indicates a riskier financial account position. Indicators are measured in multiples of the standard deviation across countries for the variable in question.

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Turning to structural policies identified by the empirical analysis as increasing financial stability, Figure 11 compares average policy settings in the BRIICS to those in the OECD. There are marked differences between the policy stances, but no group has a set of policies that looks *a priori* more conducive to financial stability across all dimensions. Whereas greater FDI openness and stricter banking supervision and regulation should further financial stability in the OECD, BRIICS relied more on capital controls on credit inflows to prevent financial instability, and more generally had less leveraged banking sectors (mirroring a higher share of bank assets covered by capital). However, even on those dimensions where policies in the BRIICS were less conducive to financial stability than in the OECD – such as FDI and financial regulation and supervision – the resulting financial account structure was more conducive to financial stability relative to the OECD (see previous figures). This may point to voluntary policies on the part of the BRIICS, e.g. prudential policies not captured in available indicators or macroeconomic policies that may have played an important role for achieving a relatively safe financial account structure. However, it could also reflect that more advanced economies usually have more developed and leveraged financial sectors.

Figure 11. In 2007, neither the BRIICS nor the OECD had a set of structural policies that looked *a priori* more conducive to financial stability

Various structural policies conducive to financial stability, BRIICS compared to OECD




(1) Last available data, 2005.

(2) Last available data, 2006.

(3) Partner countries' share in world GDP. Last available data 2002.

Note: Each variable is presented for the average BRIICS, compared to the average OECD country (which is normalised to zero). The variable is measured in standard deviations of the sample. Values above zero indicate a policy stance that is more conducive to financial stability. Corporate tax rates are not included as they have been a tool to determine the financial-stability impact of tax treatment that favours debt over equity finance (for which data are not available).

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Financial-stability-enhancing reforms could in principle imply trade-offs with economic efficiency, but there are clearly a number of win-win options. Structural policies that are good for both financial stability and growth include easing FDI restrictions, both on inflows and with respect to operational issues, liberalising product markets, reducing distortions in the tax system towards debt financing, and making greater use of tax treaties. Some stability enhancing reforms may entail possible short-term costs but may nonetheless be beneficial for growth in the long term. Thus it seems plausible that positive GDP effects from avoiding financial crises – which appear to have sizeable, long-lasting negative effects on the level of GDP (see *e.g.* Cerra and Saxena, 2009 or Furceri and Mourougane, 2009) – outweigh the potential small negative impact from higher costs of capital that may result from stricter financial regulation and supervision (see *e.g.* Slovik and Cournède, 2011).³⁴ More tentatively given limited available evidence, the same might be expected to hold for well-designed macro-prudential regulation. Non-repressed banking sectors should also contribute to growth when coupled with sound prudential regulation, and overall appear to have a beneficial impact on financial stability. The bottom-line is less clear when it comes to targeted capital controls on credit inflows which appear to have positive effects on stability seen in isolation, but which may also entail cross-border spillovers and political economy dangers. Summing up, this paper has identified a wide range of structural policies that are conducive to financial stability, a number of which would also be beneficial (or at least neutral) for long-term living standards and are therefore strong candidates for future reform.

NOTES

1. However, this effect is non-linear in the sense that the marginal effectiveness of reserve accumulation decreases with increasing levels of reserve holdings. Taking estimates from Ahrend and Goujard (2011) at face value would suggest that if, for example, Sweden (the median OECD country in 2007 with reserves around 6% of GDP) increased its reserves by 10% of GDP, the likelihood of banking crisis would decrease by 1.2 percentage points. However, if Korea (around the 90 percentile of the sample in 2007 with reserves of 35% of GDP) would increase its reserves by 10% of GDP, the likelihood of banking crisis would decrease by only 0.5 percentage points. For recent OECD work on the determinants of foreign reserve accumulation see also Vujanovic (2011).
2. For external liabilities up to roughly 400% of GDP no increase on the likelihood of crisis is found.
3. This estimate is also broadly in line with recent estimates of Joyce (2010) based on a sample of 20 emerging countries.
4. There may also be some additional direct risk to financial stability from financing external debt liabilities through foreign banks, although this effect is not very robust and quantitatively small.
5. Currency mismatch between external assets and liabilities is measured such that it provides the overall valuation effect of a given exchange rate movement in percentage points of GDP: for example, a currency mismatch of 48% in Iceland in 2004 indicates that a uniform devaluation of the domestic currency by 10% would imply a valuation loss of 4.8% of GDP.
6. During such a wholesale funding run, providers of short-term financing stop rolling over their credits because they expect the bank to fail. Similar to classical bank runs (Diamond and Dybvig, 1983), such sudden refusals of financing can result, in the absence of a lender of last resort, in expectations of failure becoming self-fulfilling.
7. In the context of contagion, different forms of financial integration (*i.e.* in equity, debt, FDI and banking) are measured as a country's external liabilities of the corresponding financial instruments (as a share of GDP).
8. Both direct, as proxied by cross-border loans, as well as indirect, as proxied by integration through common creditors.
9. This analysis controls explicitly for level effects from financial account structure.
10. Both if measured as a share of bank debt or as a share of GDP.
11. These results partly contradict earlier micro-econometric results (Benmelech and Dvir, 2011) suggesting that banks' exposure to short-term debt did not predict bank failures during the 1997-98 Asian financial crisis. However, estimated effects are in line with findings of Cetorelli and Goldberg (2011) who, using the latest financial crisis as a case study, show that emerging markets that were exposed to creditors with higher short-term US dollar funding needs suffered larger contractions in cross-border lending by foreign banks.

12. These effects appear to be driven by the larger share of deposit finance of domestically owned banks.
13. This new OECD work aims to systematically separate effects of these three channels although they can sometimes be difficult to disentangle in practice.
14. The measure of investor sentiment is based on regular surveys of institutional investors.
15. Viewed differently, emerging countries import portfolio securities from financially highly-developed countries because the latter have a comparative advantage in the production of safe assets.
16. This leaves the question of how global imbalances can be reduced. Recent OECD work on the effect of structural policies on the current account points to some role of fiscal policy and structural reforms in this regard (Kerdrain *et al.*, 2011).
17. For an in-depth discussion of the desirability of capital income taxation see *e.g.* Mintz (1992).
18. In addition to the corporate finance effect, the corporate income tax can also affect the bias towards external debt by discouraging or encouraging foreign investment.
19. This CIT elasticity measures the percentage change in the debt-asset ratio in response to a 1 percentage-point change in the tax rate.
20. The significance of a higher statutory CIT rate for financial stability will also depend on a range of other factors, such as the inflation rate and its variability, or what implicit guarantees there are for banks regarded as strategically important in the country.
21. Tax treaties frequently include rules for information exchange between tax authorities, which may counteract the investment-enhancing effects of double-taxation relief by making tax evasion more difficult.
22. This result is robust to controlling for initial financial integration, indicating that part of the causality runs indeed from concluding tax treaties to increased FDI investment.
23. Banking supervision data are taken from Abiad *et al.* (2010).
24. For example, credit can induce financial fragility in the presence of collateral constraints, as increased leverage raises the risk that declining asset prices trigger increases in default rates of private households and firms which, in turn, directly affect the banking and insurance sectors. For the distributional consequences of financial crises in the presence of collateral constraints see also Ahrend *et al.* (2011a).
25. This is also in line with the microeconomic evidence: looking at changes in bank balance-sheet characteristics, Mendoza and Terrones (2008) find a loosening of lending standards towards more risky clients during credit booms. This lowering of the quality of banks' assets is later associated with a sharp increase in the share of non-performing loans and a drop in profitability.
26. In contrast, stricter banking supervision has been found to decrease house price volatility (Andrews *et al.*, 2011), highlighting yet another channel through which strict banking supervision can increase financial stability.
27. This result is robust to instrumenting domestic housing prices by the average of other countries' housing prices (multiplied by the standard-deviation of domestic housing prices over time), indicating that the result is not driven by reverse causation.

28. Data on state-ownership of the banking sector, the pervasiveness of directed credit, or institutional development of securities markets are all taken from Abiad *et al.* (2010).
29. A larger share of external debt in countries with lower state-ownership of the banking sector may partly result from the fact that privatised banks were often acquired by foreign banks who provide group financing from abroad.
30. While the economic effect from the absence of directed credit is relatively minor, a move from the average position of OECD countries with high state-ownership in banking to the ones with low state ownership (again splitting OECD countries equally between groups) would imply an increase in the external debt to GDP ratio by roughly 7 percentage points, which for a country hit by the median sized bank balance-sheet shock observed during the global financial crisis would have translated into a roughly 1 percentage point higher increase in crisis probability.
31. This overall impact is driven by an increase in external debt liabilities by 6%, and a decrease in equity liabilities by 16%.
32. As flows are based on reporting, the analysis cannot distinguish to which degree changes may reflect fictitious changes in declarations or genuine substitutions effects. However, as similar results are obtained for different types of debt it is implausible that effects are purely driven by fictitious changes in reporting.
33. By comparing the various indicator values to those in the median country instead of the average country, Figures 4 to 7 are robust to outliers, such as Iceland or Ireland where the increase in financial-account-structure related fragility was far larger than in the median OECD country (for country-specific evidence, see Ahrend and Valdivia, 2012).
34. Moreover, no evidence has been found that strict banking supervision and well designed and sound banking regulations affect competition in the financial sector (Ahrend *et al.*, 2009).

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