Managing Capital Inflows: The Role of Controls and Prudential Policies

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Abstract

This paper analyzes the effects of prudential policies and capital controls in reducing financial fragilities related to capital inflows. We construct new indices for prudential policies and for financial sector-specific capital controls for 50 emerging market economies over the period 1995–2008. Our results indicate that both prudential regulations related to the currency of denomination and capital controls tend to reduce the proportion of foreign currency-denominated loans by the domestic banking sector, and shift the country's external liability structure away from portfolio debt. Other prudential policies, however, appear to be more effective in restraining overall banking system credit booms. Experience from the global financial crisis suggests that countries that had such prudential policies and capital controls in place prior to the crisis fared better in terms of the output decline during the crisis.

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I. INTRODUCTION

With the world economy recovering from the global financial crisis, capital is flowing back to emerging market economies (EMEs). Although capital flows to developing and emerging market countries are generally welcome—providing lower-cost financing and indicating market confidence in the fundamentals of the economy—sudden surges can complicate macroeconomic management and create financial-stability risks. Such flows put upward pressures on currencies, which, if not sustained, can create costly dislocations when exchange rates come down, given the erosion in competitiveness and possible exposure to foreign-currency denominated borrowing on domestic balance sheets. From a financial-stability perspective, there are concerns that some of the flows may not be channeled towards productive uses, and end up fueling credit and asset price booms that may not be sustainable, amplifying financial fragilities down the road. Such concerns have led to renewed interest in the effectiveness and design of the macro prudential framework, including the potential role of capital controls. This paper examines the nexus between various macro prudential measures, capital controls, and economic and financial stability.

Beyond purely macroeconomic policies, policy makers have at their disposal a number of tools to help mitigate the risks associated with surges of capital inflows. For example, domestic prudential measures, such as stricter loan-to-value ratios, can discourage credit growth "downstream," in turn reducing the demand for foreign flows. Regulations related to the currency denomination of the transaction ("FX-related" measures) can reduce foreign currency risk on domestic balance sheets by forcing foreign lenders to bear that risk and/or reducing foreigners' willingness to lend. Capital controls targeted to the financial sector can have an impact on the external liability structure of banks and thereby reduce foreign flows, while economy-wide capital controls can target direct borrowing from abroad by the non-financial sector as well as borrowing that is intermediated by unregulated institutions within the domestic financial system. In our analysis, we group the available tools into the four broad categories: (i) domestic prudential regulations, (ii) FX-related prudential measures, (iii) financial-sector specific capital controls, and (iv) economy-wide capital controls. We then assess the impact of these various measures on the structure of external liabilities; the growth of domestic banking system credit and its currency composition; and the economy's resilience in the event of financial crisis.

While several indices of economy-wide capital controls have been put forward in the recent literature, composite measures of financial sector-specific capital controls, and prudential regulations for a wide range of emerging market economies, have hitherto been unavailable. Using information from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), we construct new indices for the regulation of FX transactions in the domestic financial sector, and for financial-sector specific capital controls. We also construct an index of domestic prudential regulations based on a survey of IMF desk

economists. These three indices, together with the index for economy-wide controls on inflows constructed by Schindler (2009), are then used in our empirical analysis.

Our results may be summarized briefly. First, we find a strong association between FX-related prudential measures—especially limits on banks' open foreign currency positions and regulations regarding domestic lending in foreign currency—and the proportion of foreign currency loans in domestic bank lending, but not with the extent of credit booms (i.e., including domestic currency loans) generally. Second, controls on capital inflows (either economy-wide or targeted at the financial sector) are associated with a smaller proportion of foreign currency loans in domestic bank lending, but not with the extent of credit booms generally. Third, other prudential regulations (i.e., measures that do not discriminate either on the basis of currency denomination or the residency of the parties to the transaction) are associated with smaller credit booms by the domestic banking system. Fourth, capital controls and FX-related prudential measures are associated with a shift away from portfolio debt flows towards portfolio equity and FDI flows. Therefore, controls on capital inflows and FX-related prudential measures appear to be substitutes in terms of their effects on the country's external liability structure and on foreign currency lending by the domestic banking system, and both complement other prudential measures, which have traction against credit booms in general.

To the extent that portfolio debt is the riskiest type of external liability, and credit booms, especially in foreign currency, can exacerbate financial fragilities, measures that reduce these should be associated with greater resilience of the economy to financial crises. To test this hypothesis, we exploit the "natural experiment" afforded by the recent (2008-09) global financial crisis, which triggered downturns of varying intensities across emerging market economies, to see whether countries that had prudential measures and capital controls in place before the crisis also fared better during the crisis. We find statistically significant associations between greater crisis resilience (measured as a smaller GDP growth decline) and FX-related, other prudential, and capital control measures when each type of measure is considered separately. When considered jointly, only the effect of capital controls retains its statistical significance. This is probably because (economy-wide) capital controls can have an effect on all flows to the economy, regardless of whether or not these are intermediated through the regulated financial system, whereas prudential measures by definition only operate on domestic banks.

Our results dovetail nicely with the existing literature, which has mostly focused on possible macroeconomic effects of capital controls—on the aggregate volume of flows, the exchange rate, and monetary policy autonomy. By and large, evidence on this is mixed. The survey and meta-analysis of Magud, Reinhart and Rogoff (2007) points to capital controls having only limited effectiveness in altering the overall volume of capital inflows (and hence the level of

the exchange rate).[2] Consistent with our findings, evidence that capital controls may affect the composition of capital flows is stronger, with at least some studies finding that capital controls have managed to lengthen the maturity of inflows.[3] Since most studies have focused on the use of controls to reduce capital inflows (and hence to affect the exchange rate), the mixed evidence of their effectiveness in altering the aggregate volume of flows has been taken to be a severe limitation on their use in practice. It is worth pointing out, however, that from a financial-stability perspective, altering the composition towards safer flows without affecting overall flows would be the ideal outcome. One of the contributions of our paper is to highlight this distinction, and show that while capital controls may be of limited (or only temporary) use in affecting the aggregate volume of flows, inflow controls (together with FX-related and other prudential measures) can form an important part of the policy toolkit to reduce the financial-stability risks associated with inflow surges.

The remainder of the paper is organized as follows. Section 2 presents an overview of the instruments in the prudential toolkit to manage the macroeconomic and financial stability risks posed by excessive capital inflows. Section 3 describes the construction of indices of FX-prudential measures, capital controls and domestic prudential policies. Section IV presents some empirical evidence on the association between the policy indices with financial fragilities and crisis resilience. Section 5 concludes.

II. THE PRUDENTIAL TOOLKIT

A. Defining the Toolkit

Beyond purely macroeconomic policies, policy makers have at their disposal a number of tools to help mitigate financial-stability risks associated with capital inflows. It is convenient to group these according to whether they discriminate in terms of the residency of the parties to the capital transaction (capital controls), or the denomination of the currency of the transaction (FX-related prudential measures), or neither (other prudential measures). By definition, prudential measures apply only to the regulated domestic financial system

[2] Evidence on effectiveness is generally stronger in cross-country studies than in individual country studies (see, Ostry et al., 2010), perhaps because endogeneity (whereby countries facing inflows are more likely to impose or strengthen controls) is more likely to be a problem in a time-series context.

[3] On altering the composition (lengthening the maturity) of capital inflows, see De Gregorio and others (2002) on Chile, and Cardenas and Barrera (1997) on Colombia. On monetary policy autonomy, De Gregorio and others (2002) find that capital controls allowed Chile's central bank to target a higher domestic interest rate over a period of 6 to12 months; Ma and McCauley (2008) and Hutchison and others (2009) find that interest differentials are significant and persistent in China and India, which maintain more extensive capital controls. However, Ghosh, Ostry and Tsangarides (2010) find significantly lower monetary autonomy in countries with fixed exchange rates compared with more flexible regimes, even in countries with relatively closed capital accounts.

("banks"), whereas capital controls can apply to all residents (though they can also be applied selectively to specific sectors).

Capital controls are measures that restrict capital transactions (or transfers and payments necessary to effect them) by virtue of the residency of the parties to the transaction.[4] Controls may be economy-wide, sector- specific (usually the financial sector), or industry specific (for example, "strategic" industries in the case of controls on FDI). Measures may apply to all flows, or may differentiate by type or duration of the flow (debt, equity, direct investment; short-term vs. medium- and long-term). Since much of our analysis focuses on the financial-sector, we distinguish between financial-sector specific and economy-wide capital controls separately.

FX-related prudential measures discriminate by virtue of the currency denomination of the capital transaction, not the residency of the parties to the transaction. These measures are applied to domestic financial institutions, primarily to banks. Limits on banks' open FX position (as a proportion of their capital) are common, as are limits on banks' investments in FX assets.[5] Other measures may serve to limit FX lending by domestic banks, especially to borrowers that lack a natural hedge, including for example, differential reserve requirements on liabilities in local currency and FX. These types of measures will affect the composition of liabilities, and will also affect the volume to the extent that forcing the foreigners to bear the currency risk affects their willingness to lend.

Other prudential measures are all other prudential regulations that do not discriminate on the basis of either the currency denomination of the transaction or the residency of the parties to the capital transaction. Typical measures include maximum loan-to-value (LTV) ratios, limits on domestic credit growth, asset classification and provisioning rules, sectoral limits on loan concentration, dynamic loan-loss provisions, and counter-cyclical capital requirements.

While this grouping is analytically convenient, it is not always clear cut. First, capital controls may have the *effect* of reducing foreign currency denominated capital transactions (and, likewise, FX-related measures may have the *effect* of reducing resident/non-resident transactions), even though that is not their primary intent. Second, there may be minor variations according to residency or currency in the application of "other prudential

[4] There is no unique generally accepted legal definition of capital controls. In the broadest sense they are measures meant to affect the cross-border movement of capital. In its *Code of Liberalization of Capital Movements*, the Organization for Economic Cooperation and Development (2009) considers measures to be capital controls subject to liberalization obligations if they discriminate between residents and nonresidents.

[5] In some currency-board or fixed-exchange-rate countries, exposures in the peg currency are excluded in the calculation of the open position—in our empirical analysis, asymmetric open position limits, which introduce different limits on short and long positions, are categorized as FX-related measures—even though these could be considered a form of capital control inasmuch as they act to discourage inflows (e.g., a lower short position limit could limit capital inflows).

measures" (for example, a lower maximum loan-to-value ratio for foreign currency denominated loans).

B. Measuring Capital Controls and Prudential Regulations

Like most discrete policy variables, capital controls and prudential measures are difficult to quantify. De jure measures (which are based on the IMF's AREAR) include Chinn and Ito (2008), who provide an index of overall capital account restrictiveness (combining both inflow and outflow controls), and Schindler (2009), who differentiates between (economy-wide) inflow and outflow controls. Some studies have restored to de facto measures or outcome variables to proxy for the de jure regulation, but clearly that cannot be done here as we are interested in the effect of policy measures on outcomes.

We therefore develop three new indices of de jure measures of (i) capital controls specific to the financial sector; (ii) FX-regulations, and (iii) other prudential measures. For financial sector specific controls and FX regulations, we obtain information from the IMF's AREAR for 50 EMEs over the period 1995–2008. For other prudential measures, we conduct a survey of IMF country teams and compile information for 42 EMEs for the years 2005 and 2007.[6] For economy-wide capital controls, we rely on the index provided by Schindler (2009).

Financial sector capital controls

Our measure of financial sector-specific capital controls (*Fincont*) is based on whether the AREAER documents provisions that apply only to the financial sector and that discriminate based on the residency of the parties to the transaction. Specifically, whether measures exist that (i) impose limits on the financial sector's borrowing from abroad; (ii) restrict their maintenance of accounts abroad; or (iii) impose differential treatment of accounts held by nonresidents (for example, different reserve and liquid asset requirements, interest rate, or credit controls for nonresidents).

Each type of restriction, if it exists, is assigned a value of one (and zero otherwise), and this information is used to create two composite measures—a simple average of restrictions on (i) the financial sector's borrowing from abroad, and (ii) differential treatment of accounts held by nonresidents (labeled *Fincont1*), and an average of all the three components: (i) differential treatment of accounts held by nonresidents; (ii) limits on borrowing from abroad; and (iii) restrictions on maintenance of accounts abroad (denoted as *Fincont2*).

Figure 1(a) plots the composite *Fincont2* index over 1995–2008 across different regions, and gives an indication of how financial sector-specific controls have evolved over time. On average, both Europe and Latin America appear to be the least restrictive in terms of capital

[6] The EMEs covered in our analysis are those included in the IMF's Early Warning Exercise (IMF, 2010). See Table A1 for the list of countries in the sample.

controls on the financial sector, while Asia is the most restrictive. This pattern mimics that of economy-wide capital controls on inflows, as measured by Schindler's (2009) index (labeled here as *Kcont*). Figure 1(b) shows that Asia is more intensive in economy-wide capital account restrictions on inflows than either Europe or Latin America. Interestingly, while the average intensity of economy-wide capital controls has been falling somewhat in EMEs over the years as countries have moved towards capital account liberalization, the prevalence of financial sector-specific capital controls increased in the second half of 2000s, presumably in response to perceived risks associated with inflow surges.

Foreign currency regulations

Our index of FX-related prudential regulations is based on whether measures exist to (i) limit lending locally in foreign currency; (ii) limit purchase of locally issued securities denominated in foreign currency; (iii) impose differential treatment of deposit accounts in foreign exchange; and (iv) limit open foreign exchange positions.[7] As before, a score of one is assigned when such restrictions exist (and zero otherwise). Based on this information, we create two indices: *FXreg1*, which is a simple average of restrictions on lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange; and *FXreg2*, which is an average of all four components.[8]

Figure 1(c) shows that while FX regulations are more common in Asia, their adoption has increased over the years in both Asia and Latin America. By contrast, FX regulations are the least prevalent in emerging Europe, and seem to have been relaxed gradually over the years.

Domestic prudential regulations

Our measures of domestic prudential regulations cover three aspects of macro prudential policy: maximum loan-to-value (LTV) ratios; existence of reserve requirements; and limits on credit concentration to specific sectors. While the existence of maximum LTV ratios and sector-specific credit concentration limits are coded by binary variables, the reserve requirement measure is coded as 0 if the reserve requirement ratio is below 10 percent; 0.5 if it is in the range of 10-20 percent; and 1 if it is greater than 20 percent. As above, we create two measures to capture domestic prudential regulations—*Domreg1*, which is an average of the reserve requirement variable, and limit on credit concentration to specific sectors; and *Domreg2*, which also includes the LTV limit.

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[7] If the limits on open FX positions differentiate between residents and nonresidents, they would constitute a capital control on the financial sector. However, disaggregated data on residents versus nonresidents open foreign exchange position limits is relatively limited, and where such information is available, there are only a handful of cases where limits existed on nonresidents' but not on the residents' assets and liabilities.

[8] Typically, countries with a currency board exclude the anchor currency from the computation of limits on FX positions; we code such cases as not having limits on open FX positions.

Figure 1(d) shows that, between 2005 and 2007, the prevalence of domestic prudential regulations increased across all regions. Nevertheless, Asian EMEs have the most domestic macro prudential measures, while European EMEs have the least.

Measures in the Run-up to the Global Financial Crisis

How prevalent were these measures in the years leading up to the 2008 global financial crisis? Figure 2 provides a detailed snapshot of the individual measures comprising the various indices that were in place in our sample of emerging market economies in 2007.

Around one half of the countries had controls on bond inflows, with slightly fewer having controls on portfolio equity and even fewer on FDI flows.[9] Somewhat surprisingly, capital controls specific to the financial sector were not more common than economy-wide controls. FX-related policies tend to be the most common type of measure, with over half of the countries imposing restrictions on lending locally in FX, and stricter requirements for deposit accounts in FX. Virtually all countries had limits on banks' open FX positions.

In general, the constructed measures tend to be positively correlated with each other as well as with the measure of economy-wide capital account controls on inflows (Figure 3).[10] The correlation is higher between capital controls (both economy-wide and financial sector) and FX-related prudential regulations than among these measures and the other prudential measures index. A detailed pre-crisis cross-sectional snapshot for the EMEs reveals that most countries had more than one set of measures in place, with about one-third having measures pertaining to all the categories considered here—capital controls, FX-related prudential regulations, and other prudential measures (Figure 4).[11] All countries barring Bulgaria (which has a currency board) and Ecuador (which is dollarized) had some form of FX-related prudential regulations in place, and several countries (for example, Chile, Costa Rica, Korea, and Israel) had imposed capital controls on the financial sector but not on the rest of the economy.

III. ESTIMATION RESULTS

Using these measures, we assess whether capital controls and prudential regulations are associated with fewer financial fragilities that are typically linked to capital inflow surges—namely the composition of external liabilities, foreign currency-denominated lending, and

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[9] It is very common for countries to have FDI restrictions on strategic industries, even in the U.S., but these are not coded as restrictions in Schindler's (2009) data.

[10] Another popular index for capital account restrictions is the one constructed by Chinn and Ito (2008). However, unlike Schindler (2009), their index does not distinguish between restrictions on inflows from restrictions on outflows. Nevertheless, the correlation between the Chinn-Ito index and our measures of financial sector specific capital controls and forex regulations is about 0.5.

[11] Only one country (Ecuador)—out of the 34 EMEs for which we had information on all policy measures—had no type of regulation in place in 2007.

credit booms, as well as overall economic resilience in the face of financial crises. Our estimations pertain to cross-sectional data, which covers the most recent financial crisis and provides a "natural experiment," as well as a panel data set for the period 1995–2008.[12]

A. Baseline Specification

Composition of external liabilities

To assess the association between capital controls and prudential measures, and the share of debt liabilities—considered as the riskiest form of liabilities—in total external liabilities, we estimate specifications including the *Kcont*, *Fincont*, *Fxreg*, and *Domreg* indices, while controlling for a composite measure of external vulnerability. This external vulnerability measure takes into account the country's foreign reserves position, current account balance, fiscal balance, and trade openness (but excludes external debt liabilities).[13] Columns (1) through (13) in Table 1 present the cross-sectional results for the pre-crisis liability structure of EMEs. The composite vulnerability index enters the regressions with a strongly positive coefficient, indicating that countries rated as more vulnerable also tend to rely more on debt financing, presumably because they are considered to unattractive destinations for equity investments by foreign investors.

Among the variables of interest—economy-wide capital controls, financial sector-specific capital controls, and FX-related prudential measures—appear to have a statistically strong effect on tilting the composition of external liabilities away from debt liabilities when included individually in the regressions. A one-standard deviation shock to these measures is estimated to reduce the share of debt liabilities in total liabilities by about 4 percent. It is noteworthy, moreover, that the association between economy-wide capital controls and a lower share of debt liabilities survives when all of the measures are included jointly in the regression (see Table 1, columns (6)-(13)).

The cross-sectional results are supported by the panel specification (columns 14-26) where the estimated coefficient of *Kcont* is statistically significant in almost all specifications, and the magnitude of the estimated effect is similar to that reported above.[14] Examining the individual components of *Kcont*, both in the cross-section and panel data the strong

[12] Inclusion of country fixed effects in the panel regressions makes it difficult to identify the effect of our policy measures as these tend to be slow moving variables. Instead, therefore, for all variables we estimate a pooled model controlling for region and income group specific effects to capture time invariant factors specific to countries, and annual dummies to control for shocks common across countries over time. Further, the sample size in the panel estimations drops drastically when indices for other prudential measures (Domreg1and Domreg2) are included since for these measures, the available data is for two years (2005 and 2007) only.

[13] See Table A2 for a description of variables and data sources.

[14] The control variable in the panel regressions is the same as in the cross-sectional regressions—a (lagged) index of external vulnerability (excluding debt liabilities) is included to capture the association between economic vulnerabilities in the economy, and the composition of the external liability structure.

association between *Kcont* and debt liabilities stems from the effect of capital controls on bond inflows, which strongly reduce the share of debt liabilities in total liabilities.[15] These results are in line with those obtained in earlier studies that show that capital controls are associated with a decline in short-term debt flows, and a lengthening of their maturity.[16]

Foreign Currency Lending and Domestic Credit booms

To examine whether capital controls and prudential measures are associated with lower foreign currency-denominated lending in the domestic economy, we estimate the effect of these measures on the share of foreign currency loans in total bank credit, while controlling for the effects of the exchange rate regime, and the overall level of financial development (proxied by the share of private credit to GDP).[17] The cross-sectional evidence from the recent crisis, presented in Table 2 (columns 1-13) indicates that countries with economy-wide capital controls and FX-related prudential regulations had lower pre-crisis domestic borrowing in foreign currency. Importantly, however, both measures retain their (strong) statistical significance when included jointly in the regression (column 11), providing some evidence of complementarity between the two sets of measures. The obtained estimates show that one-standard deviation shocks to *Kcont* or to *Fxreg2* are associated with about 8 to 10 percentage point reductions in the share of foreign currency-denominated lending in total bank lending in 2007.

The results obtained from the panel data (Table 2, columns 14-26) confirm these findings, but in addition show a statistically strong association between financial sector-specific capital controls and lower FX borrowing. Specifically, estimates from the panel specification show that an increase in the composite financial sector-specific controls index, *Fincont2*, by one standard deviation is associated with a 5 percentage point reduction in the proportion of FX-denominated lending. The strong association between either capital controls or prudential measures and lower FX lending seems to be driven by restrictions on equity inflows, restrictions on lending locally in foreign exchange, and limits on open FX positions.[18]

In addition to FX lending, we also examine whether regulatory measures have any effect on overall domestic lending. Table 3 reports the results of the effect on capital controls and (FX-related and other) prudential measures on domestic credit boom—defined as the change in

[15] The results for individual components of the indices are not reported here but are available upon request.

[16] See, for example, Cardoso and Goldfajn (1998), De Gregorio et al. (2002), Cardenas (2007), Clements and Kamil (2009), and Magud, Reinhart and Rogoff (2007).

[17] The exchange rate regime is included to capture the possibility that countries with fixed exchange rate regimes are likely to have higher foreign currency lending, while a proxy for the level of financial market development is included as more financially developed countries are likely to have less FX lending. The results, particularly, from the panel specification provide some evidence of fixed exchange rate regimes being associated with a higher share of FX lending (in total lending), while greater financial market development is associated with a lower share of FX lending.

[18] The obtained results remain qualitatively similar if FX credit-to-GDP ratio is used as the dependent variable.

private credit- to-GDP ratio, while controlling for other factors that may affect credit booms such as the level of financial development, overall regulatory/institutional quality, the availability of creditor information sharing institutions (à la Djankov, McLiesh, and Shleifer, 2007), and the exchange rate regime.[19]

Evidence from both the recent crisis (columns 1-13) and the panel specifications (columns 14-26) indicates that other prudential measures are significantly associated with smaller credit booms. Among the individual components, reserve requirements and limits on credit concentration in specific sectors, appear to be effective in restraining lending by the domestic financial system.

Notwithstanding the results above, we do not find any significant association between FX-related regulations (or capital controls) and smaller credit booms, perhaps because FX lending typically does not constitute a large share of total lending.

Crisis resilience

If, as Tables 1-3 suggest, capital controls and prudential measures are associated with lower financial fragilities, this should show up in greater resilience of the economy in the event of a crisis. It does. Columns (1) through (13) in Table 4 indicate that economy-wide capital controls are indeed associated with improved growth resilience in crises: countries that had capital controls in place in the years leading up to the global financial crisis also fared better during the crisis, as measured by the change in average real GDP growth in 2008-09 relative to the country's historical average (average real GDP growth over 2003–07).[20] Regressions for individual components (not reported here) show that this result is largely driven by controls on bond inflows, which are strongly associated with lower output decline, presumably by reducing the accumulation of debt liabilities (as indicated in Table 1).

While FX-related prudential regulations appear to have some effect on growth resilience during crises when included on their own, the effect of capital controls tends to dominate when both are included together in the regression (column 11). Other prudential measures, particularly, limits on sectoral lending and reserve requirements, seem to complement however the effect of capital account restrictions, with both measures retaining significance

[19] Specifically, we include (log) real GDP per capita, the political stability index, stock market capitalization, and dummy variables for fixed exchange rate regime, and the existence of public or private credit registries/bureaus in all specifications. The estimation results for the control variables show that greater political stability and fixed exchange rate regimes are associated with larger domestic credit booms, whereas countries with higher per capita income, and creditor-sharing information institutions experience smaller credit booms.

[20] The control variables in the baseline specification are: (i) change in terms of trade, and (ii) real GDP growth of trading partners. Both variables are constructed as the difference between the average of 2008-09 and 2003-07. Using the average growth in 2008-09 instead of the difference from average growth over 2003-07 has no effect on the results. Further, the finding of a negative association between restrictions on capital inflows and output decline in the crisis is robust to the inclusion of several other control variables. as reported below.

when included together. Evidence from past crises episodes (in columns 14-24) supports the association of capital controls with growth resilience—specifically, we find that among the EMEs that experienced crises in earlier years, those with higher economy-wide capital account restrictions in their pre-crisis years experienced smaller growth declines when the crises occurred.[21] These results support those of some earlier studies, for example, Gupta et al. (2007), who find that the fall in output during crisis episodes is significantly lower if capital controls were in place in the years running up to the crisis.[22]

B. Sensitivity Analysis

The results presented in Tables 1-4 suggest that both capital controls and prudential measures are strongly associated—in the cross-sectional and panel data—with reduced financial vulnerabilities. In what follows, we also examine the robustness of our results to model specification, alternate indices of policy measures, and estimation methods.

Model specification

While the regressions reported in Tables 1-4 include several relevant control variables, to ensure that the strong association between our policy measures and financial fragilities/crisis resilience is not driven by omitted variables, we also estimate alternate specifications with additional control variables particularly to capture country characteristics such as the level of financial development and the overall regulatory and institutional environment. For example, some existing studies suggest that institutional quality may be an important determinant of debt liabilities such that institutionally vulnerable countries would have a higher share of FDI in total external liabilities since FDI is relatively difficult to expropriate (Razin et al., 1998 and 2000). In contrast, Wei (2001) suggests that weak institutions may reduce the relative importance of FDI in total liabilities, but increase the importance of debt, because foreign banks are more likely to be bailed out than foreign direct investors in the event of a crisis, and will therefore be more willing to invest in institutionally weak countries.[23]

Table B1 reports the results with several additional variables (such as the political stability index, stock market capitalization as a proxy for financial development, and (log) of real

[21] Past crises are those identified by the IMF (2010) database over 1995–2008. Growth decline for these crises cases is computed as the difference between real GDP growth rate in the crisis year and the average past 5 year growth rate. Domreg1 and Domreg2 are not included in these regressions (columns 14-24) because of insufficient observations.

[22]The sample of Gupta et al. (2007) comprises about 200 crisis episodes in 90 countries over 1970–2007.

[23] FDI and portfolio equity investment could also be lower in institutionally weak environments if foreign investors are particularly concerned about the likely exposure to requests for bribes and the need to work through red tape.

GDP per capita) added to the panel specification of debt liabilities (Table 1).[24] While we find a statistically strong negative effect of political stability and financial development on the share of debt liabilities (supporting the hypothesis that institutionally vulnerable countries rely more on debt financing), the association between capital controls and a lower proportion of debt liabilities holds in both the panel and cross sectional regressions.[25]

Similarly, in Table B3, we report the results for FX lending after augmenting the specifications in Table 2 with measures of overall regulatory quality and financial development. While the estimation results for the additional control variables suggest lower foreign currency lending in more politically stable and financially developed economies, the effect of capital controls and FX regulations on dampening foreign currency lending remains robust.[26] The results for crisis resilience (reported in Tables B5 and B6) also survive the inclusion of relevant additional variables—including the pre-crisis foreign reserves to GDP ratio, exchange rate regime, fiscal balance to GDP—and countries with more restrictions on capital inflows, particularly bond inflows, are estimated to suffer less when the crisis occurs.[27]

Endogeneity

A typical concern in estimating the effect of capital controls on the stock or flow of external liabilities relates to reverse causality between the two variables—that is, countries may strengthen capital account restrictions in response to a surge in capital inflows, particularly debt flows. If however such causality exists, then the estimated effect of capital controls will be inconsistent and downward biased.[28]

While we use lagged values of the capital controls index in all estimations to mitigate the endogeneity concerns, we also apply the instrumental variable two-stage least squares (IV-

[24] Instead of the political stability index and stock market capitalization, we also use the polity score and bank return on equity as alternate proxies for institutional quality and financial market development/soundness and find the result to remain broadly similar.

[25] In Tables B2, B4, B5, and B6 we add the additional variables one by one due to the limited degrees of freedom because of the cross-sectional nature/small sample size of the data.

[26] We also include domestic interest rates as a potential determinant, but unlike some other studies, for example, Rosenberg and Tirpak (2007), find this variable to be statistically insignificant.

[27] In addition to model specification, we check the sensitivity of our results to the construction of policy indices. Specifically, we replace our financial sector-specific capital controls and prudential indices (which are simple averages of the individual components, as discussed in Section III) with the first principal components of the individual sub-indices. The results using these alternate regulatory measures are very similar to those obtained in Tables 1-4, both in terms of statistical significance as well as the estimated magnitude of the association between policy measures and financial/economic vulnerabilities. These results are not reported here but are available upon request.

[28] The lack of association (or at times even positive association) between capital controls and capital inflows reported in some studies is often attributed to econometric identification problems, and the lack of suitable instruments particularly in individual-country time-series regressions (see Ostry et al., 2010).

2SLS) approach to explicitly address reverse causality. The application of IV-2SLS in our case however requires at least one valid instrument that is correlated with the capital controls index but is not expected to affect the dependent variable directly. We consider a (binary) variable reflecting the existence of a bilateral investment treaty (BIT) between country *i* and the United States in year *t* as a potential instrument. This variable is expected to be an important determinant of capital controls because BITs with the United States prohibit capital account restrictions, but there is no a priori reason to believe that it would be directly related to, say, the composition of external liabilities or growth resilience during crises.

The validity of our instrument is supported by the results from the first stage of the IV-2SLS estimation: the estimated coefficient of BIT is negative and highly significant indicating that countries which have ratified a BIT with the United States have lower prevalence of capital controls on inflows.[29] The F-test of the hypothesis that the estimates in the first stage regression are jointly equal to zero is rejected, and the R-squared in all first stage specifications is about 0.50, offering some evidence on the appropriateness of our instrument. The results of the second stage of the estimation however still indicate that capital controls on inflows help in shifting the composition of external liabilities away from debt, and improve growth resilience during crises (Table B7). The magnitude of the effect is however somewhat larger, showing, for example, that a one standard deviation shock to the *Kcont* index is associated with a reduction in the share of debt liabilities by about 11 percentage points; this is consistent with the intuition above that not controlling for potential endogeneity would bias the coefficient downwards.

IV. CONCLUSION

This paper analyzes the effects of prudential policies and capital controls in reducing financial fragilities related to capital inflows. We construct new indices for prudential measures and for financial sector-specific capital controls for 50 emerging market economies over the period 1995–2008.

Our findings suggest that capital controls and various forms of macro prudential measures can help reduce risky external liability structures and domestic credit booms, with the empirical results being generally robust. Controls on capital inflows and FX-related prudential measures appear to be substitutes in terms of their effects on the country's external liability structure and on foreign currency lending by the domestic banking system, and both complement other prudential measures, which have traction against credit booms in general. Given this substitutability between capital controls and FX-related prudential measures, how to choose between them? Although a full cost-benefit analysis will depend on the particular circumstances, and is beyond the scope of this paper, several considerations should be borne in mind.

[29] In our sample, 20 EMEs have a BIT with the United States.

First, as a general principle of welfare economics, interventions should be targeted as close to the distortion as possible. Since prudential measures target the *risks* associated with capital flows rather than the capital flow itself, prudential measures should be preferable to capital controls (which target the flows) when the measures are being imposed for financial stability concerns.[30]

Second, micro-level studies have shown that capital controls can make access to financing relatively more difficult to small and medium enterprises (Forbes, 2007) and domestically-owned firms (Harrison, Love and McMillan, 2004), suggesting that prudential measures may be preferable on these grounds as well. However, the issue is not completely clear-cut. While capital controls may indeed make financing for small and medium enterprises (SMEs) more difficult, these firms typically rely more on domestic bank financing than on foreign flows, whereas larger and internationally-known firms are more likely to be able to access foreign financing. Therefore, prudential measures on the domestic banking system are also likely to affect adversely the availability of finance to SMEs.

Third, by definition, prudential measures can only have traction on flows that are intermediated through the regulated financial institutions ("banks"). Direct borrowing from abroad, through branches of foreign banks, or intermediated through unregulated institutions such as finance companies, may not be subject to domestic prudential regulation. Moreover, applying prudential measures to domestic banks may cause flows to migrate to unregulated corners of the financial system as a result of regulatory arbitrage.[31] This can also create an un-level playing field for domestic banks relative to foreign competitors and non-banks. While it may be possible to widen the perimeter of regulation, this normally takes time, and at least in the interim, capital controls may have a useful role.

Together, these considerations imply that there may not be clear-cut answers to which type of measure is preferable, and much will depend on country-specific circumstances. Indeed, it is possible that a combination of FX-related prudential measures and capital controls (either economy-wide or financial-sector specific) is more effective and less distortionary than relying on either type of measure alone.

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[30] Conversely, when measures are being imposed mainly for macroeconomic reasons (e.g., concerns about exchange rate appreciation in the face of capital inflows), capital controls would be preferable to prudential measures (see Ostry et al. 2011).

[31] For example, when Croatia imposed "speed limits" on credit growth in 2003, banks moved part of their loan portfolio to affiliated leasing companies. That speed limit was later replaced by higher marginal reserve requirements on foreign liabilities, with regulations being continuously refined to close loopholes exploited by the banks). Their experience suggests that targeted controls may lead to migration to unregulated corners of the financial sector, and a shift towards direct borrowing from abroad.

Beyond the basic choice between prudential measures and capital controls, there are a number of issues in the design of capital controls for financial-stability purposes. For example, prudential measures are typically quantity based (e.g., a maximum net open position as a percentage of bank capital) whereas economists' usual instinct is that capital controls should be price-based, including to reduce the scope for rent-seeking. [32] Likewise, prudential measures are typically a permanent feature of the financial landscape, whereas conventional wisdom is that capital controls should only be deployed in the face of temporary surges of inflows (here a distinction might usefully be made between capital controls imposed for macroeconomic reasons, where the economy should adjust to permanent shocks, and those imposed for financial-stability reasons, where persistent flows may be more dangerous in terms of fuelling asset price booms than temporary flows). In addition, there are questions about the breadth of coverage of the measure. Capital controls imposed for macroeconomic reasons would normally be applied broadly across types of inflow, since it is the aggregate inflow that matters for the exchange rate and competitiveness. For financial-stability concerns, controls can be targeted more narrowly on the riskiest forms of inflows (generally, short-term, foreign-currency denominated debt, some types of portfolio flows), but doing so may reduce effectiveness as narrowly-applied measures can be circumvented more easily through re-labeling.[33] These, and other design issues are left to future research.

[32] The trade literature suggests that, while it is always possible to find equivalent price and quantitative controls, the former are preferable because they are less opaque and/or subject to arbitrary enforcement (see Schuknecht (1999), and Magud et al. (2006) on the (non)-equivalence of price- and quantity-based measures). But when the authorities face information asymmetries and uncertainty about the private sector's response, it can be difficult to calibrate the price-based measure appropriately (Weitzman, 1974). In practice, countries often introduce price and quantitative measures simultaneously. For example, Colombia (2004), Russia (2004), and Thailand (2008) adopted quantitative restrictions along with a URR.

[33] Most instances of broad price-based controls involved URRs, with Brazil's inflow tax being an exception. Typically the Central Bank has authority to impose a URR, while an inflow tax may require parliamentary approval; in the particular case of Brazil the inflow tax already existed, albeit at a zero rate, and the Ministry of Finance had authority to change its rate.

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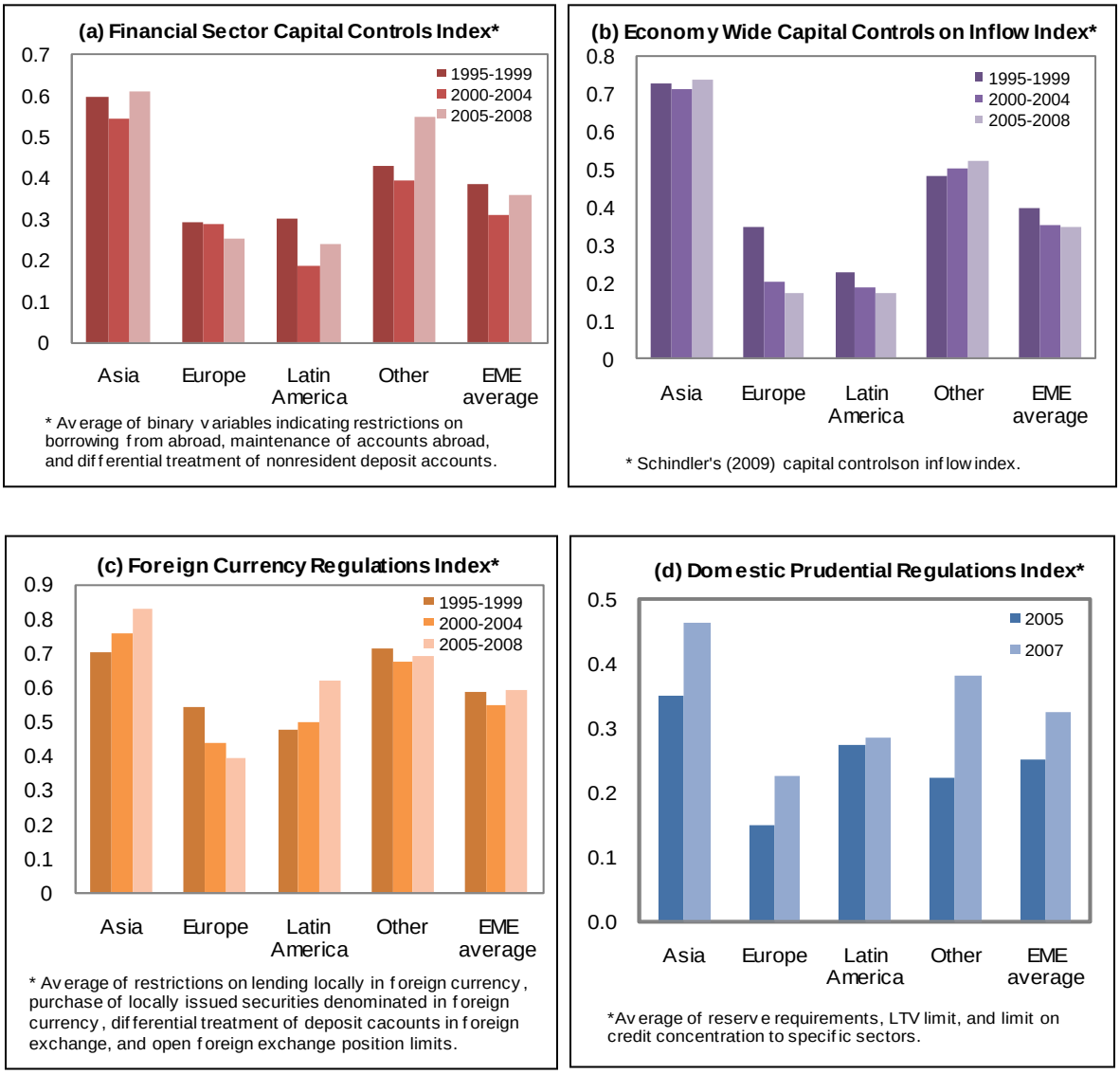
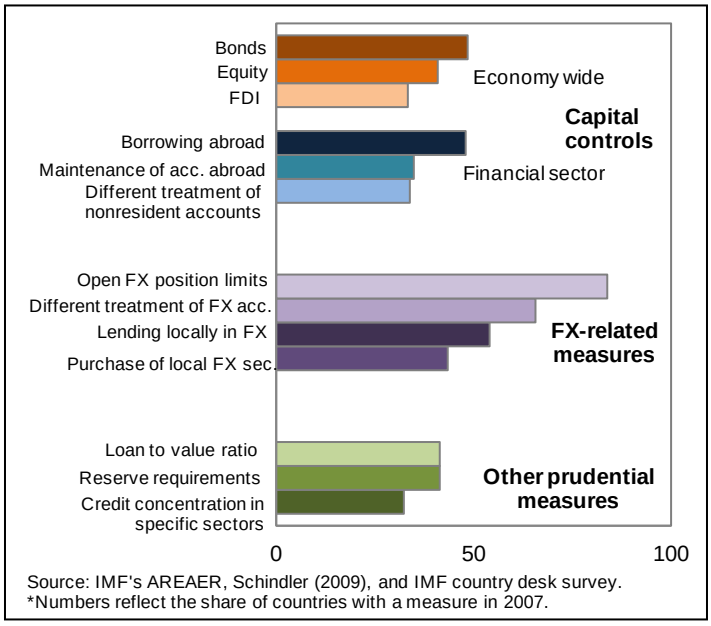
Figure 1. Capital Controls and Prudential Measures in EMEs, 1995-2008



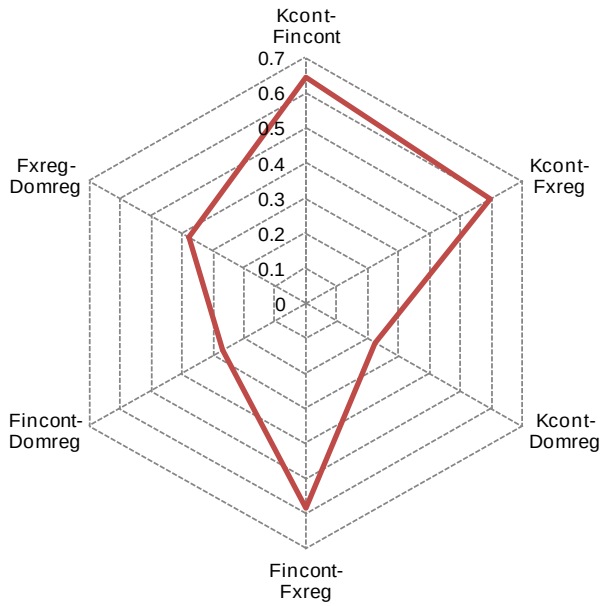
Source: Authors' estimates based on IMF's AREAER and Schindler (2009).

Figure 2. Frequency Distribution of Pre-Crisis Policy Measures*
(in percent of total observations)



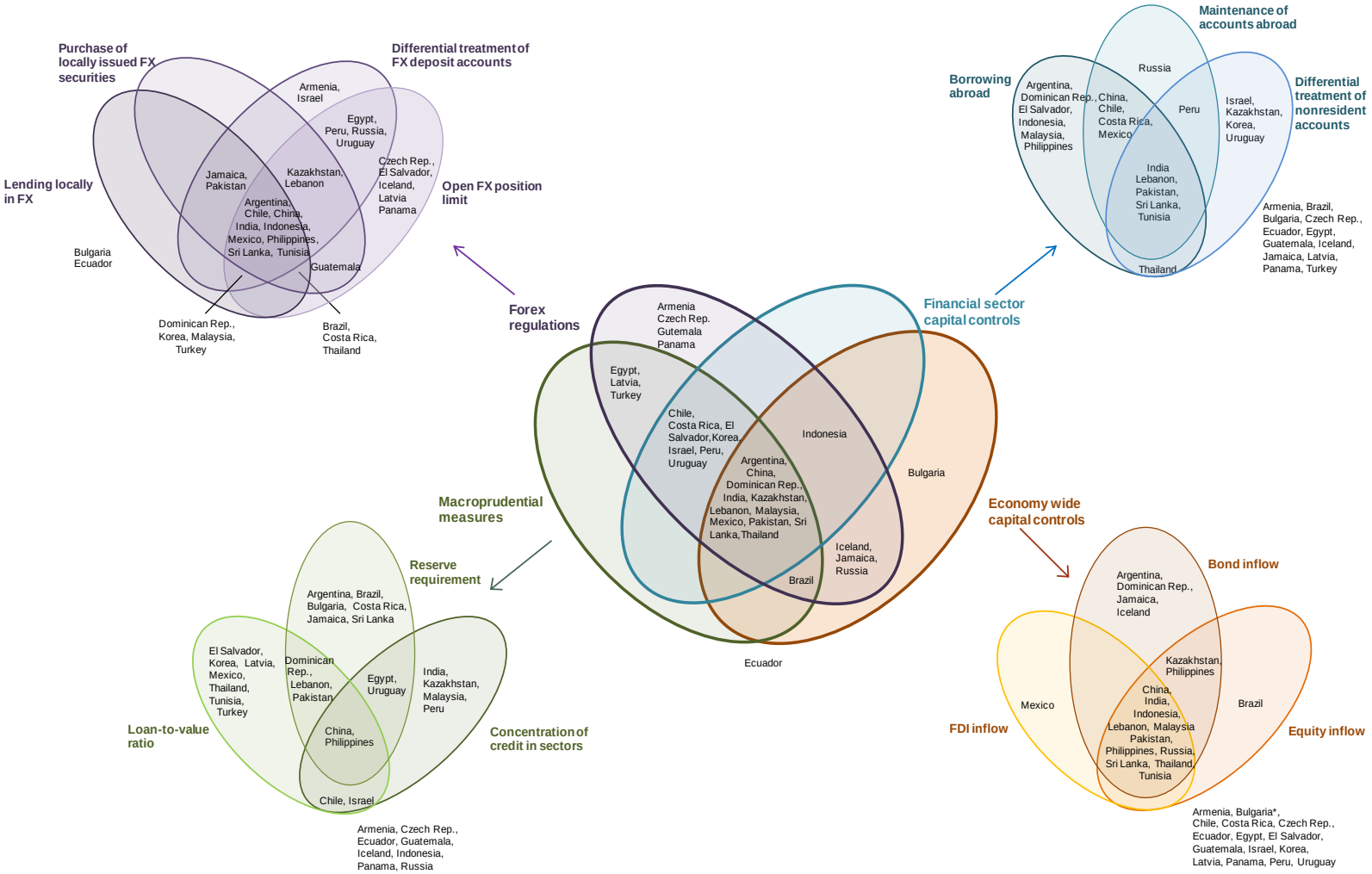
Source: IMF's AREAER, Schindler (2009), and IMF country desk survey.
*Numbers reflect the share of countries with a measure in 2007.

Figure 3. Correlation between Policy Measures*



Source: Authors' estimates.
* Kcont=Schindler's (2009) capital controls on inflow index. Fincont=mean of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenance of accounts abroad, and differential treatment of accounts held by nonresidents. Fxreg=mean of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in foreign exchange, differential treatment of deposit accounts in foreign exchange, and limits on open forex positions. Domreg=average of binary variables reflecting LTV ratio, limit on credit concentration in specific sectors, and reserve requirements.

Figure 4. Pre-Crisis Country Coverage of Policy Measures, 2007*



Source: IMF staff estimates based on AREAER, Schindler (2009), and country desk survey. The universe comprises 34 countries for which data on all measures is available. Countries outside the ovals are those for which the relevant policy measures were not in place. In 2007, Bulgaria did not have controls on bond, equity and FDI inflows, but had restrictions on financial credit inflow. For analytical purposes, only cases where the reserve requirement exceeds 10 percent are counted as having reserve requirements; countries in the sample where reserve requirements existed in 2007 but were less than 10 percent are Armenia, Chile, Ecuador, El Salvador, India, Indonesia, Kazakhstan, Korea, Latvia, Malaysia, Panama, Peru, Russia, and Turkey.

Table 1: Policy Measures and Debt Liabilities

	Recent crisis[a]													Panel data (1995-2008)[b]											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Kcont	**-12.009*** **							**-8.286***	-3.670	**-7.020***	-8.784	**-13.693*** **	**-12.324*** **	**-9.883*** **							**-9.192*** **	**-4.701***	**-9.266*** **	**-10.909*** **	-4.423	-2.206
	(3.852)							(4.134)	(5.946)	(4.000)	(5.884)	(4.055)	(3.943)	(2.151)							(2.555)	(2.723)	(2.503)	(2.721)	(5.594)	(5.741)
Fincont1		**-11.605** **						-6.980							**-4.113** **						0.507					
		(5.367)						(6.324)							(1.908)						(2.498)					
Fincont2			**-16.047** **						-13.300							**-9.202*** **						**-8.377*** **				
			(6.092)						(8.949)							(2.018)						(2.768)				
Fxreg1				**-12.664** **						-8.941							-1.943						-2.177			
				(4.783)						(5.713)							(1.592)						(2.086)			
Fxreg2					**-13.645***						-7.120							-2.843						-0.393		
					(7.056)						(10.054)							(2.055)						(2.912)		
Domreg1						-8.105						-7.308							-6.615						-6.230	
						(7.285)						(6.809)							(6.617)						(6.821)	
Domreg2							-13.391						-11.312							-5.075						-8.620
							(9.006)						(8.830)							(7.602)						(8.620)
Observations	38	35	35	37	37	32	30	35	35	37	37	32	30	476	502	499	541	507	79	75	409	406	446	427	67	63
R-squared	0.513	0.512	0.549	0.541	0.518	0.503	0.612	0.532	0.552	0.555	0.536	0.580	0.679	0.348	0.361	0.378	0.332	0.335	0.269	0.238	0.349	0.361	0.334	0.340	0.260	0.280

Source: Authors' estimates.

a/ Dependent variable is share of debt liabilities in total liabilities in 2007 (in percent). Kcont, Fincontrol, and Fxreg are averaged over 2000-05. Domreg pertain to the measures in place in 2005. Constant and a (lagged) composite index of external vulnerability included as a control in all regressions. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

b/ Dependent variable is share of debt liabilities in total liabilities (in percent). Kcont, Fincontrol, Fxreg and Domreg are lagged one year. Domreg is available for 2005 and 2007 only. Constant, and region specific, income group specific and time effects included in all regressions. Lagged composite index of external vulnerability and (log of) real GDP per capita included as controls in all regressions. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and open FX position limits.

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table 2: Policy Measures and Foreign-Currency Lending

	Recent crisis[a]													Panel data (1995-2008)[b]											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Kcont	**-40.827*** **							**-38.605*** **	**-35.363*** **	**-33.305*** **	**-23.566*** **	**-33.076*** **	**-34.446*** **	**-31.481*** **							**-28.071*** **	**-25.237*** **	**-26.800*** **	**-21.998*** **	**-27.484*** **	**-26.787*** **
	(11.798)							(12.164)	(13.829)	(11.204)	(9.327)	(16.259)	(15.016)	(2.815)							(3.190)	(3.256)	(3.230)	(3.358)	(7.077)	(7.985)
Fincont1		-23.569						-20.537							**-12.585*** **						**-10.040*** **					
		(18.986)						(16.481)							(3.813)						(4.028)					
Fincont2			**-33.175***						-18.409							**-20.699*** **						**-13.485*** **				
			(17.502)						(16.696)							(3.716)						(4.338)				
Fxreg1				**-27.230*** **						-14.168							**-17.410*** **						**-8.449*** **			
				(9.838)						(9.912)							(3.071)						(3.245)			
Fxreg2					**-45.903*** **						**-31.790*** **							**-28.259*** **						**-19.377*** **		
					(10.210)						(9.579)							(4.003)						(4.506)		
Domreg1						13.807						7.460							**19.881** **						17.909	
						(14.792)						(15.833)							(9.855)						(11.287)	
Domreg2							0.066						-5.014							14.713						9.775
							(15.976)						(17.533)							(13.036)						(16.908)
Observations	28	25	25	28	28	24	24	25	25	27	27	23	23	320	332	331	364	359	56	55	277	276	309	308	48	47
R-squared	0.409	0.225	0.261	0.312	0.443	0.176	0.151	0.442	0.426	0.434	0.495	0.353	0.348	0.474	0.330	0.363	0.393	0.430	0.421	0.391	0.444	0.452	0.481	0.503	0.512	0.480

Source: Authors' estimates.

a/ Dependent variable is FX credit to total credit in 2007. Kcont, Fincontrol, and Fxreg are averaged over 2003-05. Domreg pertain to the measures in place in 2005. Constant, a dummy variable for a de facto fixed exchange rate regime in place in 2007, and private credit to GDP in 2005 included as control variables in all regressions.Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

b/ Dependent variable is FX credit to total credit. Kcont, Fincontrol, Fxreg, and Domreg are lagged by one year. Domreg is available for 2005 and 2007 only. Constant, and region specific, income group specific, and time effects included in all regressions. Lagged private credit to GDP, a dummy variable for a de facto fixed exchange rate regime, (log) of real GDP per capita, and political stability index included as control variables in all regressions.Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels

Notes: Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and limits on open forex

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table 3: Policy Measures and Domestic Credit Booms

	Recent crisis[a]													Panel data (1995-2008)[b]											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Kcont	-2.097							-6.899	-6.315	-2.655	-1.272	-8.370	-1.474	2.562							4.446*	3.930	5.015**	3.223	-11.495	-5.935
	(7.862)							(11.218)	(13.739)	(10.731)	(10.741)	(8.848)	(7.879)	(1.970)							(2.670)	(3.007)	(2.396)	(2.929)	(8.844)	(7.940)
Fincont1		6.872						9.918							-2.096						-3.477					
		(6.286)						(9.507)							(1.956)						(2.851)					
Fincont2			3.749						7.554							0.025						-2.270				
			(6.921)						(12.724)							(2.065)						(3.159)				
Fxreg1				0.517						1.826							-1.512						-3.783			
				(6.966)						(9.209)							(2.006)						(2.342)			
Fxreg2					-1.293						-0.549							0.707						-0.212		
					(7.676)						(10.237)							(2.721)						(3.704)		
Domreg1						**-22.563*** **						**-25.104** **							**-12.328***					**-16.403***	
						(7.133)						(8.932)							(7.312)					(9.251)	
Domreg2							**-18.162***						**-18.639***							-12.944					-8.640
R-squared	0.432	0.481	0.469	0.433	0.433	0.563	0.561	0.491	0.476	0.434	0.433	0.581	0.561	0.265	0.336	0.336	0.323	0.325	0.487	0.505	0.357	0.357	0.335	0.333	0.556	0.604

Source: Authors' estimates.

a/ Dependent variable is the change in private credit to GDP over 2003-07. Kcont, Fincontrol, and Fxreg are averaged over 2000-02. Domreg1 and Domreg2 pertain to the measures in place in 2005. All regressions include a constant, (log) real GDP per capita in 2005, and political stability index, stock market capitalization, dummy variable for fixed exchange rate regime, and a dummy variable for public or private credit registries/bureau in 2007. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

b/ Dependent variable is the cumulative three year change in private credit to GDP. Kcont, Fincontrol, and Fxreg are lagged by four years. Domreg is available for 2005 and 2007 only, and is lagged by one year. All regressions include a constant, and region specific, income group specific and time effects, and political stability index, stock market capitalization, dummy variable for fixed exchange rate regime, dummy variable for public or private credit registries/bureau, and (four-year lagged) log of real GDP per capita. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

Notes: Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table 4. Policy Measures and Crisis Resilience

	Recent crisis[a]													Past Crises (1995-2008)[b]								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Kcont	**5.543****							**6.207*****	**7.336*****	2.815	**5.733***	**4.152***	3.975	**6.122*****					**6.949*****	**7.067*****	**6.099*****	**5.465*****
	(2.187)							(2.263)	(2.529)	(2.586)	(3.185)	(2.245)	(2.583)	(1.705)					(1.765)	(1.847)	(1.649)	(1.814)
Fincont1		0.760						-2.568							0.248				-0.602			
		(3.072)						(2.969)							(2.302)				(2.064)			
Fincont2			1.604						-3.964							2.056				-0.618		
			(2.933)						(3.311)							(2.686)				(2.808)		
Fxreg1				**5.457****						3.854							1.772				0.632	
				(2.043)						(2.304)							(2.228)				(2.307)	
Fxreg2					**4.716***						-0.214							4.616				1.996
					(2.656)						(3.149)							(2.963)				(3.587)
Domreg1						**4.928***						**4.782***										
						(2.591)						(2.538)										
Domreg2							3.630						3.010									
							(2.187)						(2.312)									
Observations	41	37	37	40	40	34	32	37	37	40	40	34	32	31	32	32	33	32	28	28	29	28
R-squared	0.239	0.182	0.188	0.266	0.175	0.164	0.082	0.286	0.295	0.285	0.239	0.259	0.172	0.324	0.104	0.119	0.124	0.182	0.338	0.337	0.313	0.321

Source: Authors' estimates.

Notes: All regressions include a constant and control variables (growth in trading partners, and terms of trade change). Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively. Kcont is Schindler's (2009) capital controls on inflow index. Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts. Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents. Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange. Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and limits on open forex positions. Domreg1 is the average

a/ Dependent variable is the difference between real GDP growth rates averaged over 2008-09, and 2003-07. Kcont, Fincont, and Fxreg are averaged over 2000-02. Domreg1 and Domreg2 pertain to the measures in place in 2005.

b/ Dependent variable is the difference between real GDP growth rate in crisis year and the average growth rate over past 5 years. Kcont, Fincont, and Fxreg are lagged one year.

APPENDIX A: DATA SOURCES

Table A1. List of Countries in the Sample

Algeria	Ecuador	Kazakhstan	Romania
Argentina	Egypt	Korea, Republic of	Russian Federation
Armenia	El Salvador	Latvia	Serbia, Republic of
Bosnia & Herzegovina	Estonia	Lebanon	South Africa
Brazil	Guatemala	Lithuania	Sri Lanka
Bulgaria	Hungary	Malaysia	Thailand
Chile	Iceland	Mexico	Tunisia
China,P.R.: Mainland	India	Morocco	Turkey
Colombia	Indonesia	Pakistan	Ukraine
Costa Rica	Israel	Peru	Uruguay
Croatia	Jamaica	Philippines	Venezuela, Rep. Bol.
Dominican Republic	Jordan	Poland	Vietnam

Table A2. Variable Description and Sources

Variable	Description	Obs.	Mean	Std. Dev	Source
Capital controls on the financial sector	Index (between 0 (no restrictions) to 1 (restrictions))	542	0.4	0.3	Authors' calculations based on IMF's AREAER
Foreign currency regulations	Index (between 0 (no restrictions) to 1 (restrictions))	546	0.6	0.3	Authors' calculations based on IMF's AREAER
Domestic prudential measures	Index (between 0 (no restrictions) to 1 (restrictions))	75	0.3	0.2	Authors' calculations based on IMF's AREAER
Capital controls on inflows index	Index (between 0 (no restrictions) to 1	506	0.4	0.4	Schindler (2009)
Debt liabilities/total external	In percent	672	61.7	17.8	Milesi-Ferretti and Lane (2007)
FX loans to total loans	In percent	474	35.0	26.9	IMF's External Vulnerability database
Private credit to GDP	In percent	626	42.7	33.5	International Financial Statistics
Real GDP growth	In percent	714	4.4	4.2	IMF's WEO database
Real GDP per capita	In constant 2000 USD	686	7.8	0.9	World Development Indicators
Foreign reserves to GDP	In percent	715	16.4	12.2	IMF's WEO database
Exchange rate regime	Binary variable equal to one if fixed exchange rate regime, and zero otherwise	724	0.2	0.4	Ghosh, Ostry and Tsangarides (2010)
Stock market capitalization	Value of listed shares to GDP	600	0.4	0.5	Beck and Demirguc-Kent (2009)
Bank return on equity	In percent	676	0.1	0.5	Beck and Demirguc-Kent (2009)
Terms of trade	Index	699	104.1	17.3	IMF's WEO database
Growth in trading partners	In percent	709	2.3	1.7	IMF's WEO database
Political stability index	Index (between 0 (high political risk) to 1 (low political risk))	693	0.7	0.1	IMF's External Vulnerability database
External vulnerability index	Index (between 0 (low external vulnerability) to 1 (high external	723	0.4	0.2	IMF's External Vulnerability database
Bilateral Investment Treaty (BIT)	Binary variable equal to one if a BIT exists with the US, and zero otherwise				Trade Compliance Center (http://tcc.export.gov/Trade_Agreements/All_Trade_Agreements/exp_002699.asp)

APPENDIX B. ESTIMATION RESULTS FOR THE SENSITIVITY ANALYSIS

Table B1. Policy Measures and Debt Liabilities: 1995-2008[1]

	1	2	3	4	5	6	7	8	9	10	11	12	13
Kcont	**-6.898*** **							**-8.199*** **	**-4.996** **	**-7.810*** **	**-6.597*** **	-1.563	-1.113
	(1.770)							(2.306)	(2.452)	(2.130)	(2.267)	(4.752)	(4.817)
Fincont1		0.778						5.483**					
		(1.685)						(2.296)					
Fincont2			**-4.331*** **						-2.142				
			(1.662)						(2.495)				
Fxreg1				0.229						1.201			
				(1.464)						(1.875)			
Fxreg2					**-3.012***						-2.386		
					(1.746)						(2.324)		
Domreg1						1.431						1.955	
						(5.465)						(5.849)	
Domreg2							4.642						4.511
							(5.926)						(6.989)
Observations	423	432	429	464	446	70	67	368	365	400	382	60	57
R-squared	0.518	0.510	0.510	0.504	0.494	0.447	0.422	0.515	0.502	0.507	0.496	0.427	0.404

Source: Authors' estimates.

1/ Dependent variable is share of debt liabilities in total liabilities (in percent). Kcont, Fincontrol, Fxreg and Domreg are lagged one year. Domreg is available for 2005 and 2007 only. Constant, and region specific, income group specific and time effects included in all regressions. Lagged composite index of external vulnerability, (log of) real GDP per capita, political stability index, and stock market capitalization variable included as controls in all regressions. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and open FX position limits.

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table B2. Policy Measures and Debt Liabilities: Recent Crisis[1]

	Real GDP per capita												
Kcont	**-13.251*** **							**-10.831** **	-7.377	**-9.474***	**-10.646***	**-13.830*** **	**-12.527*** **
	(4.006)							(4.831)	(7.041)	(4.745)	(5.980)	(4.211)	(4.174)
Fincont1		**-10.187***						-4.315					
		(5.204)						(6.260)					
Fincont2			**-14.241** **						-8.698				
			(5.965)						(9.435)				
Fxreg1				**-11.755** **						-6.812			
				(4.373)						(5.405)			
Fxreg2					**-13.443** **						-5.715		
					(6.161)						(8.717)		
Domreg1						-6.532						-6.135	
						(7.429)						(6.920)	
Domreg2							-11.042						-9.170
							(8.934)						(8.543)
Observations	37	34	34	36	36	31	29	34	34	36	36	31	29
R-squared	0.514	0.477	0.513	0.515	0.501	0.466	0.575	0.516	0.526	0.542	0.531	0.556	0.653
	Political stability index												
Kcont	**-13.251*** **							**-10.831** **	-7.377	**-9.474***	**-10.646***	**-13.830*** **	**-12.527*** **
	(4.006)							(4.831)	(7.041)	(4.745)	(5.980)	(4.211)	(4.174)
Fincont1		**-10.187***						-4.315					
		(5.204)						(6.260)					
Fincont2			**-14.241** **						-8.698				
			(5.965)						(9.435)				
Fxreg1				**-11.755** **						-6.812			
				(4.373)						(5.405)			
Fxreg2					**-13.443** **						-5.715		
					(6.161)						(8.717)		
Domreg1						-6.532						-6.135	
						(7.429)						(6.920)	
Domreg2							-11.042						-9.170
							(8.934)						(8.543)
Observations	37	34	34	36	36	31	29	34	34	36	36	31	29
R-squared	0.514	0.477	0.513	0.515	0.501	0.466	0.575	0.516	0.526	0.542	0.531	0.556	0.653
	Financial development												
Kcont	**-8.237***							-5.108	-1.478	-5.461	-5.179	**-9.797***	**-11.255** **
	(4.245)							(4.025)	(5.188)	(3.657)	(4.937)	(5.163)	(4.685)
Fincont1		-10.158						-7.064					
		(6.207)						(7.274)					
Fincont2			**-13.170** **						-12.050				
			(6.364)						(8.901)				
Fxreg1				-9.163						-6.120			
				(5.843)						(6.789)			
Fxreg2					-10.661						-6.902		
					(7.100)						(9.318)		
Domreg1						-5.581						-5.306	
						(7.805)						(7.562)	
Domreg2							-9.015						-7.931
							(9.301)						(8.929)
Observations	35	32	32	34	34	29	28	32	32	34	34	29	28
R-squared	0.582	0.596	0.618	0.611	0.610	0.615	0.632	0.604	0.618	0.619	0.616	0.654	0.687

Source: Authors' estimates.

1/ Dependent variable is share of debt liabilities in total liabilities in 2007 (in percent). Kcont, Fincontrol, and Fxreg are averaged over 2000-05. Domreg pertain to the measures in place in 2005. Constant and a composite index of external vulnerability included as a control in all regressions. Real GDP per capita is log of real GDP per capita in 2007; political stability index is the ICRG index in 2007; financial development is proxied by stock market capitalization in 2007. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1percent levels respectively.

Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and open FX position limits.

Domreg1is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table B3. Policy Measures and Foreign Currency Credit: 1995-2008[1]

	1	2	3	4	5	6	7	8	9	10	11	12	13
Kcont	**-26.375*** **							**-19.637*** **	**-14.952*** **	**-18.528*** **	**-12.363*** **	**-19.891***	-19.756
	(3.699)							(4.130)	(4.339)	(4.078)	(4.128)	(11.711)	(11.789)
Fincont1		**-14.714*** **						**-21.426*** **					
		(4.483)						(4.758)					
Fincont2			**-19.822*** **						**-24.730*** **				
			(4.526)						(4.902)				
Fxreg1				**-17.985*** **						**-17.340*** **			
				(3.677)						(3.840)			
Fxreg2					**-28.596*** **						**-30.887*** **		
					(4.441)						(4.620)		
Domreg1						14.089						17.007	
						(10.282)						(12.520)	
Domreg2							-0.985						3.931
							(11.918)						(13.598)
Observations	311	326	325	354	353	56	55	273	272	301	300	48	47
R-squared	0.459	0.364	0.381	0.411	0.446	0.416	0.395	0.466	0.471	0.491	0.525	0.453	0.427

Source: Authors' estimates.

1/ Dependent variable is FX credit to total credit. Kcont, Fincontrol, Fxreg, and Domreg are lagged by one year. Domreg is available for 2005 and 2007 only. Constant, and region specific, income group specific, and time effects included in all regressions. Lagged stock market capitalization, a dummy variable equal to one if the country has a defacto fixed exchange rate regime, political stability index, and (log) real GDP per capita included as control variables in all specifications. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels

Notes: Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table B4. Policy Measures and Foreign Currency Lending: Recent Crisis[1]

	Real GDP per capita												
Kcont	**-42.936*** **							**-39.862*** **	**-36.856** **	**-34.781** **	**-25.535** **	**-34.452***	**-35.769** **
	(12.952)							(13.539)	(15.459)	(12.546)	(9.283)	(16.417)	(14.905)
Fincont1		-24.232						-20.170					
		(19.258)						(17.254)					
Fincont2			**-32.807***						-18.001				
			(17.998)						(17.038)				
Fxreg1				**-26.181** **						-13.469			
				(10.475)						(10.351)			
Fxreg2					**-45.502*** **						**-31.575*** **		
					(11.060)						(9.699)		
Domreg1						13.713						7.761	
						(15.422)						(16.584)	
Domreg2							-0.040						-4.581
							(16.211)						(16.980)
Observations	28	25	25	28	28	24	24	25	25	27	27	23	23
R-squared	0.414	0.238	0.269	0.320	0.444	0.176	0.151	0.444	0.429	0.435	0.499	0.363	0.357
	Political stability index												
Kcont	**-39.203*** **							**-37.283*** **	**-32.400** **	**-31.329** **	**-22.164** **	**-33.307***	**-34.351** **
	(12.349)							(12.700)	(15.114)	(11.274)	(9.552)	(16.989)	(15.818)
Fincont1		-22.017						-20.063					
		(18.802)						(16.697)					
Fincont2			**-35.572***						-20.874				
			(18.024)						(18.185)				
Fxreg1				**-26.181** **						-14.909			
				(10.083)						(10.064)			
Fxreg2					**-44.303*** **						**-31.857*** **		
					(10.665)						(10.022)		
Domreg1						12.362						7.732	
						(16.401)						(16.812)	
Domreg2							-1.808						-5.120
							(16.952)						(18.761)
Observations	28	25	25	28	28	24	24	25	25	27	27	23	23
R-squared	0.416	0.256	0.312	0.340	0.458	0.181	0.162	0.446	0.438	0.442	0.501	0.353	0.348
	Financial development												
Kcont	**-34.119** **							**-31.173** **	**-29.768***	**-28.871** **	**-19.195***	-25.078	**-29.429***
	(12.385)							(12.954)	(14.616)	(12.170)	(10.708)	(17.423)	(15.711)
Fincont1		**-41.334** **						**-34.765***					
		(17.131)						(17.309)					
Fincont2			**-34.825***						-22.308				
			(17.787)						(17.640)				
Fxreg1				**-26.687** **						-14.367			
				(10.897)						(12.641)			
Fxreg2					**-41.890*** **						**-29.880*** **		
					(10.112)						(10.437)		
Domreg1						**23.239***						13.554	
						(11.251)						(15.023)	
Domreg2							7.004						-1.306
							(16.502)						(19.880)
Observations	26	23	23	26	26	22	22	23	23	25	25	21	21
R-squared	0.460	0.396	0.364	0.393	0.499	0.303	0.243	0.519	0.467	0.480	0.535	0.394	0.375

Source: Authors' estimates.

1/ Dependent variable is FX credit to total credit in 2007 (in percent). Kcont, Fincontrol, and Fxreg are averaged over 2000-05. Domreg pertain to the measures in place in 2005. Constant, a dummy variable for a de facto fixed exchange rate regime, and private credit to GDP in 2005 included as control variables in all regressions. Real GDP per capita is log of real GDP per capita in 2007; political stability index is the ICRG index in 2007; financial development is proxied by stock market capitalization in 2007. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1percent levels respectively.

Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and open FX position limits.

Domreg1is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

Table B5. Policy Measures and Growth Resilience: Past Crises[1]

	Foreign reserves to GDP								
Kcont	**6.127*** **					**7.045*** **	**7.182*** **	**6.089*** **	**5.318** **
	(1.661)					(1.909)	(2.001)	(1.742)	(2.128)
Fincont1		0.196				-1.160			
		(2.475)				(2.097)			
Fincont2			2.099				-0.940		
			(2.556)				(2.591)		
Fxreg1				1.980				0.705	
				(2.404)				(2.707)	
Fxreg2					5.260				2.505
					(3.215)				(4.461)
Observations	31	32	32	33	32	28	28	29	28
R-squared	0.324	0.104	0.120	0.126	0.191	0.343	0.340	0.313	0.323
	Political stability index								
Kcont	**5.640*** **					**6.432*** **	**7.004*** **	**5.789*** **	**5.918*** **
	(1.720)					(1.804)	(1.788)	(1.697)	(1.882)
Fincont1		-0.299				-1.599			
		(2.549)				(2.393)			
Fincont2			1.206				-2.512		
			(3.157)				(3.522)		
Fxreg1				0.688				-0.497	
				(2.295)				(2.577)	
Fxreg2					3.895				0.294
					(3.084)				(3.842)
Observations	30	31	31	32	31	27	27	28	27
R-squared	0.349	0.154	0.159	0.156	0.194	0.379	0.381	0.347	0.356
	Financial development								
Kcont	**5.756*** **					**6.609*** **	**6.753*** **	**5.453*** **	**4.530***
	(1.772)					(1.898)	(2.086)	(1.819)	(2.186)
Fincont1		0.621				-0.446			
		(2.527)				(2.463)			
Fincont2			1.738				-0.706		
			(2.736)				(3.061)		
Fxreg1				2.348				1.215	
				(2.445)				(2.751)	
Fxreg2					5.058				2.755
					(3.050)				(4.037)
Observations	29	30	30	31	30	26	26	27	26
R-squared	0.314	0.126	0.135	0.159	0.218	0.327	0.327	0.312	0.322

Source: Authors' estimates.

Notes: All regressions include a constant and control variables (growth in trading partners, and terms of trade change). Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1percent levels respectively. Kcont is Schindler's (2009) capital controls on inflow index. Fincont1is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts. Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents. Fxreg1is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange. Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and limits on open forex positions. Domreg1is the average of reserve requirements and restrictions on concentration in sectors. Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

1/ Dependent variable is the difference between real GDP growth rate in crisis year and the average growth rate over past 5 years. Kcont, Fincont, and Fxreg are lagged one year. Foreign reserves is log of stock of reserves to GDP (in %); political stability index is the ICRG index; financial development is proxied by stock market capitalization.

Table B6. Policy Measures and Growth Resilience: Recent Crisis[1]

	Foreign reserves to GDP												
Kcont	**4.993****							**5.462****	**6.545****	1.986	5.032	**4.450***	4.218
	(2.427)							(2.552)	(2.685)	(2.784)	(3.600)	(2.449)	(2.814)
Fincont1		1.160						-1.942					
		(2.915)						(2.842)					
Fincont2			1.599						-3.366				
			(2.924)						(3.028)				
Fxreg1				**5.228****						**4.128***			
				(2.107)						(2.420)			
Fxreg2					4.248						0.046		
					(2.821)						(3.555)		
Domreg1						**5.022***						**4.994***	
						(2.687)						(2.636)	
Domreg2							3.637						2.998
							(2.215)						(2.347)
Observations	41	37	37	40	40	34	32	37	37	40	40	34	32
R-squared	0.257	0.227	0.230	0.300	0.210	0.166	0.083	0.299	0.307	0.309	0.257	0.272	0.180
	Political stability index												
Kcont	**5.153****							**5.980****	**7.120*****	2.335	**5.426***	**4.198***	3.657
	(2.300)							(2.311)	(2.523)	(2.648)	(3.139)	(2.380)	(2.654)
Fincont1		0.133						-2.914					
		(3.271)						(3.119)					
Fincont2			1.198						-4.106				
			(3.073)						(3.379)				
Fxreg1				5.277**						3.969			
				(2.160)						(2.471)			
Fxreg2					4.231						-0.333		
					(2.780)						(3.103)		
Domreg1						**4.650***						**4.725***	
						(2.715)						(2.701)	
Domreg2							3.115						2.749
							(2.534)						(2.487)
Observations	40	36	36	39	39	33	31	36	36	39	39	33	31
R-squared	0.236	0.190	0.194	0.272	0.180	0.151	0.086	0.287	0.293	0.285	0.237	0.242	0.156
	Financial development												
Kcont	**5.356****							**6.616*****	**8.027*****	2.668	**5.675***	**4.461***	4.100
	(2.147)							(2.315)	(2.727)	(2.822)	(3.300)	(2.260)	(2.541)
Fincont1		0.739						-3.293					
		(3.611)						(3.608)					
Fincont2			1.126						-5.037				
			(3.066)						(3.596)				
Fxreg1				**5.624****						4.002			
				(2.189)						(2.769)			
Fxreg2					4.449						-0.296		
					(2.636)						(3.312)		
Domreg1						**6.097****						**6.234****	
						(2.428)						(2.485)	
Domreg2							3.333						3.024
							(2.500)						(2.509)
Observations	38	34	34	37	37	31	30	34	34	37	37	31	30
R-squared	0.251	0.186	0.188	0.279	0.189	0.201	0.107	0.291	0.307	0.295	0.253	0.310	0.196

Source: Authors' estimates.

Notes: All regressions include a constant and control variables (growth in trading partners, and terms of trade change). Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1percent levels respectively. Kcont is Schindler's (2009) capital controls on inflow index. Fincont1is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts. Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents. Fxreg1is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange. Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and limits on open forex positions. Domreg1is the average of reserve requirements and restrictions on concentration in sectors. Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.

1/ Dependent variable is the difference between real GDP growth rates averaged over 2008-09, and 2003-07. Kcont, Fincont, and Fxreg are averaged over 2000-02. Domreg1and domreg2 pertain to the measures in place in 2005. Foreign reserves is log of stock of reserves to GDP (in %); political stability index is the ICRG index; financial development is proxied by stock market capitalization.

Table B7. Estimation Results of Instrumental Variable Approach, 1995-2008

	Debt liabilities[a]							Growth resilience[b]				
	1	2	3	4	5	6	7	8	9	10	11	12
Kcont	**-35.722*** **	**-35.378** **	**-31.685** **	**-31.045** **	**-33.572** **	-70.276	-57.091	**12.833** **	**17.759** **	24.738	**15.297** **	**17.151***
	(12.162)	(14.528)	(16.023)	(13.568)	(16.083)	(54.109)	(52.067)	(5.544)	(9.000)	(16.457)	(7.109)	(9.574)
Fincont1		12.215*							-1.080			
		(7.163)							(2.841)			
Fincont2			6.357							-7.466		
			(10.288)							(7.916)		
Fxreg1				4.288							-1.504	
				(6.530)							(2.391)	
Fxreg2					8.049							-4.177
					(10.765)							(4.960)
Domreg1						-10.489						
						(11.066)						
Domreg2							-4.140					
							(15.328)					
Observations	506	408	405	445	426	65	61	30	26	26	27	26

Source: Authors' estimates.

a/ Dependent variable is share of debt liabilities in total liabilities (in percent). Kcont is instrumented with a binary variable that takes the value of one if the country has a bilateral investment treaty with the US in year t (and zero otherwise). Fincontrol, Fxreg and Domreg are lagged one year. Domreg is available for 2005 and 2007 only. Constant, and income group specific and time effects included in all regressions. Lagged composite index of external vulnerability and (log of) real GDP per capita included as controls in all regressions.

b/ Dependent variable is the difference between real GDP growth rate in crisis year and the average growth rate over past 5 years. Kcont is instrumented with a binary variable that takes the value of one if the country has a bilateral investment treaty with the US in year t (and zero otherwise). Fincont, and Fxreg are lagged one year. All regressions include a constant and control variables (growth in trading partners, and terms of trade change).

Notes:All specifications estimated using the instrumental variable-two stage least squares approach. Robust standard errors in parentheses; *, **, and *** indicate signficance at 10, 5, and 1 percent levels respectively.

Kcont is Schindler's (2009) capital controls on inflow index.

Fincont1 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, and differential treatment of nonresident accounts.

Fincont2 is the average of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenanance of accounts abroad, and differential treatment of accounts held by nonresidents.

Fxreg1 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, and differential treatment of deposit accounts in foreign exchange.

Fxreg2 is the average of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issued securities denominated in forex; differential treatment of deposit accounts in foreign exchange; and open FX position limits.

Domreg1 is the average of reserve requirements and restrictions on concentration in sectors.

Domreg2 is the average of reserve requirements, restrictions on concentration in specific sectors, and LTV ratios.