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## Abstract

In this paper, we explore the link between stress in the domestic financial sector and the capital flight faced by countries in the 2008-9 global crisis. Both the timing of emergence of internal financial stress in developing economies, and the size of the peak-trough declines in the stock price indices was comparable to that in high income countries, indicating that there was no decoupling, even before Lehman Brothers' demise. Deleveraging of OECD positions seemed to dominate the patterns of capital flows during the crisis. While high income countries on average saw net capital inflows and net portfolio inflows during the crisis quarters, compared to net outflows for developing economies, the indicators of banking sector stress were higher for high income economies on average than for developing economies. Internal and external distress during crisis was closely interlinked with common underlying causes of both the severity of stress during the crisis and the recovery. External vulnerabilities were important in both phases, and higher international reserves did not insulate countries from stress.

*JEL classification: F32, G15*

*Bank classification: Balance of payments and components; Financial markets; International topics*

## Résumé

Les auteurs étudient la relation entre les tensions observées dans le secteur financier national et les fuites de capitaux survenues pendant la crise mondiale de 2008-2009. Tant le moment où les tensions financières internes sont apparues dans les pays en développement que l'ampleur du repli des indices boursiers du sommet au creux du cycle se comparent à ce qui s'est produit dans les pays à haut revenu, de sorte qu'il n'y a pas eu de découplage, même avant l'effondrement de Lehman Brothers. La réduction des leviers financiers par les entreprises des pays de l'OCDE semble avoir été le trait dominant du comportement des flux de capitaux durant la crise. Le plus souvent, les pays à haut revenu ont connu des entrées nettes de capitaux et d'investissements de portefeuille au cours des deux trimestres de la crise, tandis que les pays en développement enregistraient des sorties nettes. Par contre, les indicateurs de tension dans le secteur bancaire ont été plus élevés en moyenne dans le premier groupe de pays que dans le second. Les tensions internes et externes pendant la crise avaient un rapport étroit avec les facteurs sous-jacents communs qui expliquent la gravité des tensions à la fois lors de la crise et durant la reprise. Les vulnérabilités externes ont été importantes dans les deux phases, et de hauts niveaux des réserves de change n'ont pas fourni de protection contre les tensions financières.

*Classification JEL : F32, G15*

*Classification de la Banque : Balance des paiements et composantes; Marchés financiers; Questions internationales*

The financial crisis that started in the US in 2007 spread rapidly to the rest of the world and resulted in the Great Recession. By mid 2009, the financial crisis was over in most countries, although the timing of the tenuous economic recovery is more varied across countries. In this paper, we aim to understand the spread of financial distress from the US to the rest of the world, the determinants of its severity and of the tenuous recovery. We distinguish between external and internal financial stress, defined respectively as pressure of capital outflows and pressure inducing declines in stock markets and expansions in central banks' balance sheets. We analyze the extent to which the internal financial stress was driven by outflows of capital. Next, we examine the macroeconomic factors that could explain the differences between countries in terms of the severity of internal and external financial stress they experienced during the crisis. We also ask to what extent the differences in the pattern of recovery from financial stress could be explained by the differences in pre-existing fundamentals (rather than endogenous policy responses).

A growing body of literature seeks to examine the cross-country determinants of the incidence of the crisis (Rose and Spiegel, 2010 a, b, c; Blanchard et. al., 2010; Frankel and Saravelos, 2010; Lane and Milesi-Ferretti, 2010; Beckman et. al., 2009, Giannone et. al., 2010). We make three contributions to this literature. First, while most studies focus on real macroeconomic variables, particularly GDP growth, or on a combination of real and financial variables, we focus narrowly on the severity of financial stress, as it was the main 'shock' in the recent crisis.<sup>1</sup> The real impact of the financial crisis would depend not only on the size of the shock but also on the endogenous policy responses and on the real financial linkages within the economy. By focusing on the financial sector stress only, we seek to determine the macroeconomic conditions or linkages that determined the susceptibility of countries to the shock. We do this in a manner that allows us to test the robustness of the link between a given variable and financial stress. Second, the emerging consensus narrative on the spread of the crisis holds that the financial crisis spread from the US, first to the high income countries through financial sector linkages and later to emerging markets, which seemed to have 'decoupled' until capital fled these economies in the wake of the Lehman Bankruptcy filing on September 15<sup>th</sup>, 2008. We test the validity of this narrative by examining the timing of the emergence of financial stress for both high-income and developing economies.<sup>2</sup> Finally, we contribute to the literature by examining the determinants of financial recovery, as well as of financial stress.

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<sup>1</sup> Notable exceptions are Claessens et. al. (2010) which uses an index of financial stress which incorporates measures of both internal and external stress and Milesi-Ferretti and Tille (2010) which looks at gross capital flows.  
<sup>2</sup> At the time that the first draft of this paper came out, this had simply not been done. However, since then, there has been an IMF working paper by Llaudes et al (2010), which also examines the decoupling hypothesis but focuses on differentiating between emerging economies themselves – i.e. between those that fared better and others.

Our results indicate that as far as the stock markets were concerned, there was no decoupling of emerging markets, even before the financial crisis peaked. While net capital inflows to emerging economies did not reverse significantly until after Lehman Brothers, their stock markets had already seen considerable decline by then, in tandem with the markets in developed economies. This suggests that the markets participants (as opposed to academics or commentators) did not believe that emerging markets would remain insulated from problems in the US. However, our regressions results also suggest that both internal and external stress experienced by countries were related to external vulnerabilities. In addition, we find that higher foreign reserve levels were not associated with lower external stress during the crisis – rather there is some evidence to indicate that countries that had larger reserve stockpiles before the crisis experienced greater external stress and slower recovery in capital flows.

The next section describes the indicators of internal and external financial stress and looks at the timing of the emergence of financial stress and the relationship between external and internal stress. Section 3 deals with the determinants of financial stress and section 4 with the determinants of financial recovery. Section 5 concludes.

## **II. Internal and external financial stress during the crisis**

### **II.1 Data**

Our sample consists of 107 countries, which is the maximum number of countries for which data on at least one financial stress indicator is available, after removing from the universe of countries, those with populations of less than a million (latest available figures), those that were classified as offshore financial centers or tax havens, and USA. We define ‘high income’ countries as those that are classified by World Bank as high income (OECD or non-OECD), except Singapore, Hong Kong and Israel.<sup>3</sup> These three and all other countries are referred to as ‘low and middle income’ countries or ‘developing’ countries.

### **II.2 Indicators of internal and external financial stress**

Our measures of **external financial stress** are designed to capture the pressure of capital outflows. They include:

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<sup>3</sup> However, Hong Kong and Singapore are also offshore financial centers so excluded from the analysis.

- (1) Relative Net Capital Inflows<sup>4</sup> ( $\Delta$ Net Capital Inflows): This variable is the difference between net capital inflows during the crisis quarter(s) and the average net capital inflows during 2006, normalized by 2006 GDP. We discuss the choice of indicator (relative rather than absolute value of net capital inflows) and the base year below.
- (2) Relative Net Portfolio Inflows ( $\Delta$ Net Portfolio Inflows): This variable is defined as the difference between net portfolio inflows during crisis quarter(s) and the average net capital inflows during 2006, normalized by 2006 GDP.

Several considerations guided the choice of reversals rather than absolute net capital inflows as the indicator, and the choice of the base year. The net capital inflows are taken relative to the base year inflows to capture the counterfactual –the level of inflows the economy would be receiving in the absence of a crisis. In non-crisis periods, the direction of net capital inflows may also reflect factors like the age-dependency ratio (relative to the rest of the world). Additionally, to capture accurately the stress during the crisis, it is important to use the most recent non-crisis period level of inflows, rather than a trend over the previous 4 or 5 years, or a hypothetical equilibrium level. Taking the example of a country which saw significant positive net inflows reversed during the crisis, the stress experienced by domestic agents would depend on degree to which the funds that were coming or were expected to come in, were withheld or taken out.

Out of the 72 developing economies in sample, 52 saw greater average net capital inflows in 2007 than in 2006. Milesi-Ferretti and Tille (2010) use gross flows and banking statistics data to show that for advanced economies, a slowdown in banking flows started in 2007Q3 but for emerging economies, capital flows slowed down only after Bear Sterns episode (i.e. after 2008Q2). The 2006 average net capital inflows try to balance the objective of capturing the most recent inflow from which the reversal took place, and using a non-crisis level of inflows. As a robustness check, we use 2007 as an alternative base value, and the main results are unchanged.<sup>5</sup>

**Internal financial stress** is measured by the following three variables:

- (1) Peak-trough fall in banking or financial sector equity index
- (2) Peak-trough fall in a general equity index

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<sup>4</sup> Note that this definition of net capital inflows reversals differs from the commonly used definition in the literature, which defines a reversal as a ‘large’ switch from net inflows to net outflows.

<sup>5</sup> The results with 2007 base are available in the previous version of this paper, published as NBER WP 16605.

(3) Increase in central bank's assets as a percentage of GDP between 2007 and 2009, as it reflects the stimulus provided by the central bank.<sup>6</sup>

There are several reasons, both theoretical and empirical, for using stock market declines as measures of internal stress. First and foremost, equity prices are leading indicators of the economy – they reflect market expectations of future growth. A large decline in stock prices in an economy as the crisis in the US unfolded would suggest that investors assessed its vulnerability to be high. In addition, stock price declines, by influencing corporate investment decisions can themselves influence future growth. Further, when balance sheets are highly leveraged, stock price crashes, especially in the financial sector can lead to a self-perpetuating cycle of deleveraging and asset price declines.

Empirical evidence also supports the use of stock price declines as measures of financial stress. As we will show below, the median decline in stock prices during the recent crisis was quite large - the peak to trough fall (through July 2010) for developing countries was about 60 percent and for high income countries, about 64 percent. Barro and Ursua (2009) studied stock market crashes and depressions in 30 countries using long term data (going as far back as the late 1800's for some countries) and found that “conditional on a stock market crash (return of -25 percent or less) in a non-war environment, the probability of a minor depression (macroeconomic decline of at least 10 percent) is 22 percent and of a major depression (macroeconomic decline of at least 25 percent) is 3 percent.” When these stock market declines occur in the context of currency or banking crises in times of global distress, these probabilities rise to 46 percent and 8 percent, respectively. This suggests that the large stock price declines seen during the recent financial crisis would be associated with larger GDP declines. Llaudes et. al. (2010) show that this was indeed the case - during the recent crisis, those emerging markets that saw larger financial declines also saw larger GDP declines.

#### ***II.4 Crisis Quarters***

We refer to 2008Q4 and 2009Q1 as crisis quarters, because these were the quarters where the stress measures peaked for the largest number of countries. Table 1 lists, for each quarter from 2007Q1 to 2010Q3, the number of countries that saw their banking sector equity indices or stock market indices bottom in that quarter and the number of countries that saw the lowest relative net capital inflows or relative net portfolio inflows in that quarter. 49 out of the 50 countries for which we have data saw their bank equity indices bottom in either 2008Q4 or 2009Q1, and 58 out of the 62 countries saw their stock

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<sup>6</sup> Where 2009 values were not available, the 2008 values were used. The correlation between this variable and an alternative version - the absolute change between 2009 and 2007 central bank assets normalized by 2007 GDP - is 0.7. Moreover, the results in Table 6, on the determinants of financial stress do not change when using this alternative version of internal stress measure.



market indices bottom in these crisis quarters. The peak reversals in net capital inflows or net portfolio inflows were less concentrated, but 23 and 29 countries, respectively, saw these flows trough in one of the crisis quarters.

We use an additional indicator to identify peak external stress periods in table 1, the peak exchange market pressure (EMP). We follow Frankel and Wei (2007) in defining the EMP as the percentage depreciation in exchange rate against Special Drawing Rights (SDR) plus the fall in SDR value of foreign exchange reserves (less gold), normalized by the monetary base. Higher values of EMP denote pressure of outflows.<sup>7</sup> The EMP is computed using monthly data and the peaks are those obtained since January 2008. 61 out of the 107 countries for which we have data, saw their exchange market pressure peak in either 2008Q4 or 2009Q1.

Having defined 2008Q4 and 2009Q1 as crisis periods, we focus on net capital inflow reversals and net portfolio inflow reversals during each of these two quarters as indicators of crisis severity, in addition to the other stress indicators defined in this section. Throughout the paper, net capital outflows and net portfolio outflows refer to their values relative to 2006 average and expressed as percentage of 2006 GDP.

## ***II.2. Summary Statistics of financial stress indicators***

*The average emerging economy saw a reversal of capital inflows during the crisis, and the net capital outflows exceeded the outflows of portfolio investment. The peak to trough percentage decline in stock prices was about the same, but more dispersed for developing economies than for high income economies. The average percentage decline in banking sector stocks was higher for high income countries.*

Table 2 presents the summary statistics on measures of financial stress during the crisis. Developing countries on average saw larger net capital outflows during the crisis than high income countries. Developing countries on average also saw larger net capital outflows in 2009Q1 than in 2008Q4, even though net portfolio inflows had turned positive during the first quarter of 2009. This, coupled with a relative stability of their FDI flows (mean of 0.37 and standard deviation of 1.54 in 2008Q4, and mean of -0.24 and standard deviation of 1.1 in 2009Q1), suggests an important and prolonged role for other investment, including trade credit and bank lending, and financial derivatives in the reversal of capital inflows to developing countries during the crisis. Further confirmation of the role of non-portfolio and non-FDI flows is provided by the fact that 26 out of the 32 developing economics

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<sup>7</sup> Ideally, exchange market pressure would be measures using exchange rates relative to an anchor currency or a basket of currencies, either trade weighted or one which the monetary authorities use as a reference basket, in order to capture the potential shock to the real economy from the exchange market pressure. However, for our purposes, this choice is not crucial. Results are robust to use of exchange rates measured against the US Dollar.

which saw net capital outflows during 2008Q4 also saw net capital outflows exceeding their net portfolio outflows during this quarter (another four countries saw net capital inflows that were lower than their net portfolio inflows).<sup>8</sup> In 2009Q1, this pattern held for 25 out of 31 developing countries which saw net capital outflows during this quarter. These statistics indicate that net capital inflows to developing countries recovered later than portfolio flows.

On the other hand, high income countries continued to be net capital inflow recipients on average during 2008Q4, as well as net portfolio inflow recipients during both quarters. However, high income countries also exhibited considerably higher dispersion in their level of net portfolio inflows than in their net capital inflows. 15 out of 25 high income countries saw net capital inflows during 2008Q4, but only 9 of these saw net portfolio inflows. These figures suggest that other investment, including bank lending flowed from developing to high income countries, because of deleveraging pressures or to buffer the capital bases of their holding companies.

While high income countries on average saw higher net capital inflows and net portfolio inflows during the crisis quarters, compared to net outflows for developing economies, table 2 also shows that the percentage decline in stock indices was comparable between the two groups of countries. High income countries saw bank equity prices fall more and their central banks respond more on average, by increasing the size of their balance sheets relative to the country's GDP. This leads us to the question of whether there was decoupling between developing and high income countries pre-Lehman, which we explore in the next section.

### ***II.3. Was there decoupling before Lehman Brothers' demise?***

*Stock prices had started declining in all over the world before net capital inflow reversals peaked.*

To answer the question of whether there was decoupling before Lehman Brother's demise, in this section, we first look at the timing of emergence of internal financial stress and relate it to the timing of emergence of external financial stress for both groups of countries. Next, we compare the size of internal financial stress between the two groups of countries, pre-Lehman. Finally, we look at correlations between indicators of internal and external stress on a quarter-by-quarter basis.

Our first set of results suggest that most emerging as well as high income countries saw their stock markets and the banking sector stock prices peak before Lehman brothers filed for bankruptcy on

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<sup>8</sup> There are 52 developing economies for which data on both net capital inflows and net portfolio inflows is available for 2008Q4 and 38 for which this data is available for 2009Q1.

September 15, 2008, in 2008Q3. Figure 1 shows for each quarter since 2005Q1, the number of countries in each income group, that had their stock markets and bank equity indices peak in that quarter. Most banking sector peaks for high income countries occur in 2007Q2, and all but one high income countries had seen their banking equity index peaks by the end of 2007Q4. Their overall stock market indices peaked later but 86.7 percent of the stock markets in high income countries had peaked by the end of 2007Q4. All of the high income countries had seen their stock markets and bank equity sector indices peak before the end of 2008Q2.

The picture for developing countries is, surprisingly, not much different. 78 percent of developing economy banking sector equity price indices had peaked by the end of 2007Q4, and 59.4 percent of their stock indices had also peaked before 1 Jan 2008, or roughly 3 quarters before Lehman Brothers collapsed. Moreover, all of the developing country banking sector equity indices had peaked before the end of 2008Q2, and only one developing economy, Tunisia, did not see the beginning of a stock market decline before the end of 2008Q2, i.e. before 30 June, 2008. In contrast, most developing economies saw their net capital inflow reversals peak in 2008Q4, after Lehman's bankruptcy.<sup>9</sup>

Not only was the timing of emergence of internal financial stress in developing economies comparable to that of emergence of internal stress in high income countries, but the size of the declines in the price indices was also comparable. Figures 2 and 3 depict the percentage of total peak-trough decline in banking sector and benchmark stock market indices that had already taken place by the end of 2008Q2, or roughly two months and a half before Lehman's bankruptcy filing. The median decline in banking sector stocks (as percentage of total peak-trough decline for that country) is 51.1 percent, about the level for USA. As is evident from the relatively equal distribution of blue and red dots around the median line in both the graphs, the median decline is close for the two groups of countries. The median peak to trough decline for high income countries is 48.4 and for low income countries it is 53. The declines in the banking sector and overall stock indices in the two groups of countries are comparable even when measured as percentage of peak value (instead of as percentage of total peak to trough decline). For high income countries, the median percentage decline from peak in stock market index by the end of 2008Q2 was 27.5 percent, compared to 25.4 percent for developing economies. The median decline from peak in banking sector stocks in high income countries by the end of 2008Q2 was 36.4 percent, compared to 32.3 percent in developing economies. This pattern is consistent with the possibility that problems in the banking sectors had emerged even in developing countries before the emergence of significant external

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<sup>9</sup> The median developing country saw positive net capital inflows (relative to 2006 average) in 2008Q2 and 2008Q3.

financial stress, or that the market was pricing the risk of future contagion, i.e. that it did not quite believe in decoupling.

To provide further insight on the issue, it is useful to look at the correlations between the indicators of external financial stress and the peak to trough declines in banking and overall stock prices. The correlations between the measures of external financial stress and peak to trough measures of internal financial stress are presented in Table 3. The peak to trough change in banking sector equity indices is not significantly correlated with any external stress indicator. However, the overall significance masks important differences between high income, which were net recipient of capital inflows during the crisis and developing countries, which on average saw net capital outflows during the crisis. Figure 4 plots the relative net capital inflows and net portfolio inflows during 2008Q4 and 2009Q1 against the peak trough change in banking sector indices and figure 5 does the same against peak to trough change in stock market indices. The slopes of the simple regression lines are different for high income and for developing economies. For high income countries, the correlations between capital inflows and peak to trough declines in banking or benchmark stock price indices change signs, and none of the eight correlations is significantly different from zero.<sup>10</sup> However, for the developing economies, the correlation between peak to trough equity price *declines* in bank or general stock market indices and net capital or portfolio inflows is negative and significant in 2009Q1 but not in 2008Q4 (table 4).<sup>11</sup> The fact that only the correlations in 2009Q1 are significant but not those in 2008Q4 leaves open the possibility of reverse causality – that countries that faced larger net outflows in 2009Q1 were the ones where the banking sector problems were more acute or where the impact of financial shocks on the overall economy was larger.

In table 5, we present the correlations between indicators of external and internal stress on a quarterly basis, for developing economies only. The quarterly change in banking sector index is not significantly correlated with net capital or portfolio inflows in any quarter of 2008 or during 2009Q1. The quarterly change in stock index is significantly correlated with net capital and portfolio inflows only in 2009Q1. However, the size of the correlations coefficients is not very high – less than 0.48. Keeping in mind the fact that half the developing countries had seen a stock market trough before 2009Q1 (17 out of 32), these results suggest that each country's banking sector stress was not entirely determined by contagion. They are consistent with the possibility that the same factors were driving the two measures.

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<sup>10</sup> The correlations or p-values for high income countries are not shown in the figures but available are on request. Unless otherwise noted, significance is evaluated at 10 percent level.

<sup>11</sup> Table 4 gives the negative of the values on the x-axis in the corresponding figures.

To summarize, the picture that emerges is that developing countries' stock markets were not insulated from stress pre-Lehman and that they suffered internal stress comparable in size to high income countries on average, even while they saw positive net capital inflows.

### **III. Determinants of Internal and External Financial Stress**

We now turn to a formal investigation of the determinants of internal and external financial stress. Since the sample is not very large (38 to 74, depending on specification), and there are many potential explanatory measures of the attributes of interest, we ran sequential regressions. All regressions are ordinary least squares, with robust standard errors. Each regression includes 11 explanatory variables. All variables are at their pre-crisis values (2006 or the last pre-2006 value available). Six of the 11 explanatory variables are common to all regressions, and are commonly accepted measures of the underlying fundamentals that we are trying to capture. These common explanatory variables are:

1. per capita real GDP,
2. international reserves-to-GDP ratio,
3. an interaction term between international reserves-GDP ratio and a dummy variable indicating whether the country was a recipient of a swap line by the Federal Reserve, the European Central Bank (ECB) or the People's Bank of China (PBC),
4. Trade-GDP ratio,
5. a dummy variable for whether the country was a commodity exporter, and
6. de-jure restrictions on capital flows measured by the Chinn-Ito index.

In addition to these six, each regression includes one indicator each of a country's de-facto external exposure, the quality of its institutions, financial development, and banking sector competitiveness or health, as well as an interaction term between the indicator of institutional quality and banking sector competitiveness or health. The indicators used for each category of variables, are:

7. De-facto external exposure:
  - a. balance sheet exposure, defined as  $(\text{total external debt} - \text{international reserves}) / \text{GDP}$ ,
  - b. short term balance sheet exposure, defined as  $\text{short term debt} - \text{international reserves} / \text{GDP}$ ,
  - c. aggregate foreign exchange exposure from Lane and Shambaugh (2010), where higher values indicate that the country is long on foreign currency assets,

- d. external portfolio debt assets/GDP from Lane and Milesi Ferreti (2007), and
  - e. external portfolio debt liabilities/GDP from Lane and Milesi Ferreti (2007).
8. Institutions:
- a. regulatory quality, and
  - b. banking supervision.
9. Financial Development:
- a. private credit by domestic banks/GDP,
  - b. stock market value traded/GDP.
10. Banking sector competition/health:
- a. Herfindahl Hirschman Index (HHI),
  - b. concentration ratio,
  - c. net interest margins,
  - d. bank non-performing loans rate,
  - e. bank liquid reserves/assets, and
  - f. bank capital to asset ratio.
11. An interaction term between the indicator of institutions and banking sector competition/health.

We summarize the results of the regressions in tables 6 and 7. The second column of each table lists the number of regressions in which the explanatory variable in that row was included, the ‘% Sig.’ column lists the percentage of these regressions in which that explanatory variable was significant at 10 percent level of significance. The cells in this column are shaded dark to light, depending on the number contained. The darkest shadings indicate that the estimated coefficient of the relevant variable is significant (at 10 percent level) in all regressions in which it is included, medium shading that it is significant in 95 percent of the regressions or more but not in all, and a light shading that it is significant in at least 90 percent but less than 95 percent of the regressions in which it is included. The ‘Sign’ column lists the sign of the estimated coefficient. For variables for which the sign of the coefficient changed with specification, this column lists +/- . The table tells us the sign of the coefficients associated with each explanatory variable and gives us information on the robustness of the impact of this variable. When discussing our results, we use an arbitrary 90 percent cut-off for robustness, i.e., we consider a variable to be robustly linked to a measure of stress if it is of the same sign and significant in at least 90 percent of regressions in which it is included.

### **III.1. Determinants of External Financial Stress**

The results for the determinants of external stress are summarized in table 6. The  $R^2$  for these regressions varied between 0.19 to 0.52, and the regressions had between 47-74 observations, depending on specification. The results indicate that only seven of the 33 explanatory variables considered can be robustly associated with deeper external financial stress in either of the crisis quarters, corroborating the results from other studies (Rose and Speigel, 2010 a and b) and pointing to the difficulties in creating a successful early warning system.

Of the seven variables that are robustly linked to greater capital outflows and greater portfolio outflows in table 6, four are measures of de-facto openness, and indicate that countries with greater openness experienced higher stress during the crisis. Specifically, countries with greater external portfolio debt assets or liabilities as percentage of GDP in 2006 saw smaller net capital inflows and smaller net portfolio inflows during each of the crisis quarters. The estimated coefficients of these variables are always negative. They are also always significant in the regressions explaining net capital inflows, and net portfolio inflows during the first crisis quarter. Countries with greater balance sheet exposure or short term balance sheet exposure in 2006 were also more prone to net capital outflows during the crisis quarters. Net portfolio inflows during 2009Q1 are robustly linked to only one variable – external portfolio debt liabilities, although two other variables, international reserves and external portfolio debt assets are significant in a majority of regressions and always of the same sign (negative).

The sign and significance of the pre-crisis level of international reserves is an important result. The estimated coefficient is negative in all specifications and for all external stress measures, indicating that countries with higher reserves saw greater external stress. The coefficient is significantly different from zero in all regressions for net capital outflows in 2009Q1, and in a majority of regressions for other external stress indicators. To check whether these results are dominated by high income countries which have lower reserves to GDP ratios, we re-ran the regressions for the developing country sample only. For this sample, the reserves/GDP ratio is still negatively related to net capital inflows in all but one regressions, but significantly different from zero only in 58 percent and 72 percent of regressions for 2008Q4 and 2009Q1 respectively. The coefficient on reserves/GDP changes sign in regressions explaining net portfolio reversals in developing countries and is not significant. However, two caveats attach to these results. One, the number of observations in these regressions is very low – between 24 and 49. Second, for most developing economies, absolute net capital inflows continued to rise during 2007 and even up to 2008Q2 (in 50 out of 61 countries, absolute net capital inflows were higher in 2007 than in 2006), so that taking 2006 as the base year may underestimate the size of the reversal. Taking 2007 as the

base year for computing relative net capital inflows and net portfolio inflows, in the developing country sample, the reserves/GDP ratio in 2007 is negatively related to net capital inflows in all regressions, and significantly different from zero in 81 percent and 68 percent of regressions for 2008Q4 and 2009Q1 respectively. The coefficient on reserves/GDP still changes sign in regressions explaining net portfolio reversals in developing countries. But it is significant in a larger number of regressions (in 42 percent of regressions for 2008Q4 and in 64 percent of the regressions for 2009Q1), and whenever it is significant, it is negative. These results suggest that higher international reserves did not insulate developing countries from external shock – rather they may have been associated with stronger outflows, particularly in countries where net capital inflows continued to rise in 2007.

To further understand the relationship between reserves and external stress, and how, if at all the relationship changed during the crisis quarters, in figures 6 and 7, we graph the net capital inflows during each quarter in 2008 against the reserves GDP ratio in 2006. The red line in these figures gives the unconditional correlation between the net capital or portfolio inflows and reserves/GDP for developing countries, as opposed to the conditional correlations estimated for the both developing and high income countries through the regressions. Nevertheless, these are instructive, not only because of what these correlations are, but because of what they are not. The correlation between net capital inflows and the 2006 reserves/GDP ratio is mildly positive during 2008Q1 to 2008Q3 for developing countries, but negative during 2008Q4.<sup>12</sup> During the first quarter of external financial distress for these countries, having higher reserves stockpiles did not reduce the capital outflows for developing countries. For high income countries, for which external stress began earlier, the relationship remains negative in at least three quarters of 2008, including 2008Q4, for both sets of countries. Figure 7 shows that the correlation between net portfolio inflows and initial reserves/GDP was negative in the last three quarters of 2008. One possible explanation of the negative correlation between reserves/GDP and external stress during the crisis, yet to be tested, is related to moral hazard associated with rapid reserve accumulation – larger reserves stockpiles may have encouraged build-up of risks by subsidizing cross-border borrowing and discouraging hedging of exposures. Another possible explanation is that countries that expected greater vulnerability to global shocks hoarded more reserves. Our analysis does not allow us to differentiate between these possibilities. In fact, Llaudes et. al. (2010) show that countries with higher reserves saw smaller GDP declines, suggesting that reserves did help in cushioning the impact of the shock. However, even allowing for the fact that reserves hoardings were ex-post rational given the higher shock but higher growth experienced by countries with higher reserves, leaves open the question of whether reserves

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<sup>12</sup> The correlations for 2008Q2 and 2008Q3 are 0.29 and 0.23 respectively, and significantly different from zero. The correlations from the other two quarters in 2008 are not significantly different from zero.



accumulation was the most efficient or cost-effective strategy for these countries, and whether other policy actions were or could have been taken to mitigate the vulnerability to shocks ex-ante.

Going back to the other determinants of external financial stress, the only domestic variables that are robustly significant are two interaction terms. These variables are the interaction terms between regulatory quality and banking sector capital to assets ratio, and the interaction between banking supervision and the (negative of ) HHI. Both of these variables are positively associated with net capital inflows in one of the crisis quarters and significant in all of the 10 regressions in which they are included, indicating that countries with better banking supervision and more competitive banking systems, or those with better banking supervision and higher bank capital to assets ratios were more insulated from external shock. None of the other variables measuring institutions or financial development or banking sector competition or health are consistently of the same sign and robustly correlated with the measures of external stress. These results signal that policy mattered only when it led to favourable outcomes like higher capital adequacy ratio.

The lack of robust negative association between measures of banking sector health and external financial stress does not necessarily imply that banking sector health was not important in determining the degree of external stress. It may imply that there were important differences between high income and other countries or that our proxies do not adequately capture the health of the banking sector, or the fundamentals that were important in determining susceptibility during this crisis. With the latter interpretation, the lack of results here does provide a cautionary note on the adequacy of these measures as part of an early warning system.

### ***III.2. Determinants of Internal Financial Stress***

The results on the determinants of internal financial stress are presented in table 7. The number of observations in these regressions varies between 38 and 47 and the  $R^2$  therefore are higher, between 0.62 and 0.83. The measures of stock market price changes in table 7 are defined as peak to trough *declines*, so that a negative coefficient value of an explanatory variable would imply lower fall in these, i.e. lower internal stress. There is no single indicator that is robustly significantly associated with all three measures of internal stress, but here too, external openness variables seem to be important.

Countries with greater de-facto openness measured by portfolio debt assets or liabilities as percentage of GDP saw greater stock market declines and greater responses by central banks. These effects are significant in all specifications in which the variables are included. In addition, central banks responded more in countries with greater external balance sheet exposure. While none of the external explanatory

variables are significant in over 90 percent of specifications in explaining banking sector equity price declines, four of the external vulnerability variables are significant in at least 75% of specifications.

The other key results in table 7 are that commodity exporters saw smaller declines in overall stock and banking sector indices and that as before, policy variables are not important by themselves in explaining internal stress, some interaction terms are significant. Countries with better banking supervision and more competitive banking sectors saw smaller declines in banking stock prices. Countries with better regulatory quality and higher bank capital to assets ratio saw smaller declines in stock markets (and as we saw above, also larger net capital inflows during 2008Q4). Further, countries with more developed financial sectors (measured by private credit by domestic banks as percentage of GDP) or with higher bank capital to assets saw greater declines in stock markets.

To summarize, the both external and internal financial stress had two common factors associated with them: countries with greater de-factor openness saw larger shocks and countries with more competitive banking systems were less vulnerable if their banking systems were also better capitalized or better supervised. In addition, countries with higher international reserves saw greater external stress and commodity exporters saw lower internal stress.

#### **IV. Determinants of the Tentative Recovery**

Our measures of recovery are defined analogously to the measures of stress. We consider the net capital inflows and net portfolio inflows (in excess of the average levels in 2006 and expressed as percentage of 2006 GDP) in each of the quarters 2009Q2, 2009Q3 and 2009Q4. In addition, we consider the trough to peak percentage increase in bank equity price indices and stock price indices, in the period from the trough date to 7 July 2010.

The regressions results for determinants of net capital inflows are summarized in table 8 and for net portfolio inflows in table 9. The set of variables explaining the external stress during the recovery phase is even smaller, although it overlaps to a large extent with the set of variables explaining distress during the crisis quarters. The pattern of net capital inflows during 2009Q2 and 2009Q3 is hard to explain – countries with greater external portfolio debt assets saw lower net capital inflows in 2009Q3, and countries with better institutions and higher bank liquid reserves may have seen lower inflows during 2009Q2, while those with better supervision and less profitable banking systems (measured by lower net interest margins) may have seen higher net capital inflows during 2009Q3. But in 2009Q4, the pattern becomes more identifiable. Countries with greater initial values of balance sheet exposure (external debt less reserves) saw lower net capital inflows during 2009Q4, as did those with greater initial values of

portfolio debt assets or liabilities as percentage of GDP. This suggests that countries with greater external vulnerabilities before the crisis saw greater external financial stress during the crisis as well as slower recovery in net capital inflows.

Higher initial level of international reserves/GDP is associated with lower net capital inflows in 2009Q4. Higher reserves are also negatively correlated with net capital inflows during 2009Q2, although the coefficient is significant in only 18% of the regressions, and the coefficient of reserves/GDP changes sign in the regressions of net capital inflows in 2009Q2, but is negative whenever it is significant. The overall patterns can be seen in Figure 8. This result is significant because it contradicts the popular assumption that larger reserves stockpiles helped insulate countries from outflows. However, it is consistent with two possibilities – first, that higher reserves accumulation endogenously determined vulnerability and second, that countries accumulated higher reserves because they expected larger or longer lasting shocks.

As far as net portfolio inflows are concerned, larger external vulnerabilities, measured by greater (total external debt-reserves)/GDP and external portfolio debt assets or liabilities/GDP were associated with lower net portfolio inflows during 2009Q2 (as they were during the crisis quarters), but with higher net portfolio inflows in the subsequent two quarters. Countries with better banking supervision and more competitive banking sectors also saw greater net portfolio inflows during the last quarter of 2009.

The recovery in internal stress measures seems to be unrelated to most macroeconomic variables, whether real sector (GDP per capita, trade/GDP, commodity exporter) or measuring institutional development or banking sector competitiveness, or regulation (table 10). The exception is that the recovery in banking sector stock prices is positively related to the measures of de-facto external openness, including external portfolio debt assets of liabilities as percentage of GDP. The banking sector recovery is also positively linked with balance sheet exposure (total external debt less reserves/GDP). Figure 9 graphs the relationships between peak to trough decline in banking sector index and post-crisis trough to peak rise in the index, against the initial balance sheet exposures. The top panel plots the entire sample, whereas the bottom panel excludes the outlier, Ireland. Both panels show a positive relationship, although, it seems to be driven by the relationship in high income countries.

The only two variables that are robustly associated with the trough to peak percentage rise in stock index are the aggregate foreign exchange exposure and the private credit by domestic banks as percentage of GDP. The sign of both these variables is negative – i.e. countries that were long in foreign exchange or had better developed banking sectors, saw smaller post-crisis recovery in stock indices.

To summarize, we find few robust associations between pre-crisis fundamentals and post-crisis recovery, suggesting that policy responses may have been important in determining the pace of recovery. However, external vulnerabilities played a role in determining the severity of external and internal financial stress during the crisis phase, as well as the recovery phase.

## **V. Conclusions**

The global crisis of 2008-9 painfully illustrated that, beyond idiosyncratic deviations, practically all countries were exposed to a fast moving, common global shock propagated from the US. Our analysis showed that the timing of emergence of internal financial stress in developing economies was in tandem with the emergence of the stress in high income countries, and that internal stress preceded external stress. In addition, the size of the peak-trough declines in the stock price indices, about 60 percent, was comparable to that in high income countries. The main difference seems to be in the greater dispersion of the decline in low and middle countries, with a standard deviation that was twice that of the high income countries. As far as stock markets go, there was no decoupling between developing and high income countries, pre-Lehman.<sup>13</sup>

We found clear evidence that deleveraging of developed country positions dominated the patterns of capital flows during the crisis quarters. While high income countries on average saw net capital inflows and net portfolio inflows during the crisis quarters, compared to net outflows for developing economies, the indicators of banking sector stress were higher for high income economies on average than for developing economies. The evidence is consistent with the notion that banking systems in the high income countries were, on average, more exposed to pressure, and that the central banks in high income countries responded more aggressively to that pressure. High income countries saw larger average peak to trough declines in bank equity prices than developing countries, and saw their central banks respond more by increasing the size of their balance sheets relative to the country's GDP.

In line with the effects of greater integration of markets, we found that de-facto openness was associated with greater capital outflows and greater portfolio outflows. Specifically, countries with greater external portfolio debt assets or liabilities as percentage of GDP in 2006 saw greater net capital inflow reversals and greater net portfolio reversals during each of the crisis quarters. Countries with greater balance sheet exposure or short term balance sheet exposure, defined as the excess of total or short term external debt over reserves as percentage of GDP in 2006, were also most prone to net capital outflows during each of the crisis quarters. Banking sector stock price declines were lower in countries with better

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<sup>13</sup> Intriguingly, this is exactly the outcome one may expect with deep diversification of financial markets.

banking supervision and more competitive sectors. Countries with greater external debt less reserves also saw greater declines in stock prices.

The results suggest that, while openness increases exposure to global shocks, deeper capital markets and lower balance sheet exposures tend to increase the resilience of markets. Specifically, commodity exporters and countries with more developed financial sectors saw smaller declines in their overall stock markets. Countries with greater de-facto openness measured by portfolio debt assets or liabilities as percentage of GDP saw greater stock market declines. Central banks also seem to have responded more in countries with greater de-facto openness. Small total external debt minus reserves, external portfolio assets/GDP and external portfolio liabilities/GDP are all associated with lower internal financial stress.

We close the paper with analysis of the onset of the tentative recovery following the peak of the crisis. Evidence suggests that countries with greater external vulnerabilities before the crisis saw greater external financial stress during the crisis as well as slower recovery in net capital inflows, but not in net portfolio inflows. Countries with better regulatory quality and more competitive banking sector saw greater net portfolio inflows during the last quarter of 2009. The recovery in banking sector stock prices is positively related to the measures of de-facto external openness, including external portfolio debt assets of liabilities as percentage of GDP. These results suggest that the internal and external distress was closely interlinked with common underlying causes of both the severity of stress during the crisis and the recovery. However, there was nothing deterministic about the recovery, as evidenced by the paucity of robust associations of recovery indicators with pre-crisis fundamentals. While external vulnerabilities played a role in determining the severity of stress during the crisis as well as the recovery phase, they had different, sometimes opposite impact on different indicators of recovery.

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**Table 1: Number of countries with peak financial stress in each quarter since 2007**

<b>Quarter</b>	<b>ΔNet Capital Inflow, Trough</b>	<b>ΔNet Portfolio Inflow, Trough</b>	<b>Peak EMP</b>	<b>Bank Equity Index Trough</b>	<b>Stock Index Trough</b>
2007Q1	6	7	0	0	0
2007Q2	4	4	0	0	0
2007Q3	5	5	0	0	0
2007Q4	6	7	0	0	0
2008Q1	8	4	14	0	0
2008Q2	6	7	6	0	0
2008Q3	11	6	14	0	0
2008Q4	14	26	43	14	22
2009Q1	9	2	18	32	35
2009Q2	6	3	6	0	2
2009Q3	5	4	2	0	1
2009Q4	4	4	3	1	0
2010Q1	0	0	1	0	0
2010Q2	0	0	0	1	0
2010Q3	0	0	0	2	2
<b>2008Q4 or Q9</b>	<b>23</b>	<b>29</b>	<b>61</b>	<b>46</b>	<b>57</b>
<b>Total</b>	<b>84</b>	<b>79</b>	<b>107</b>	<b>50</b>	<b>62</b>

Note: Δ Net Capital Inflows = (Net capital inflows for that quarter – Average quarterly net capital inflow in 2006)\*100/GDP in 2006. Δ Net Portfolio Inflows = (Net portfolio inflows for that quarter – Average quarterly net portfolio inflow in 2006)\*100/GDP in 2006.



**Table 2: Summary Statistics, Financial Stress Indicators**

	Low and Middle Income				High Income			
	N	Median	Mean	Std. Dev	N	Median	Mean	Std. Dev
<b>ΔNet K Inflows/GDP (2008Q4 - 2006 mean)</b>	58	-0.24	-0.21	4.84	25	1.04	0.61	3.12
<b>ΔNet K Inflows/GDP (2009Q1 - 2006 mean)</b>	42	-1.28	-1.90	3.19	24	-0.29	0.14	2.37
<b>ΔNet Portfolio Inflows/GDP (2008Q4 - 2006 mean)</b>	52	-0.32	-0.66	1.66	25	0.85	0.53	6.72
<b>ΔNet Portfolio Inflows/GDP (2009Q1 - 2006 mean)</b>	38	-0.09	-0.15	1.50	24	1.62	1.78	3.40
<b>Peak to Trough Fall in Bank Equity Index (as % of Peak Value)</b>	23	59.0	61.2	15.9	25	79.8	77.4	11.5
<b>Peak to Trough Fall in Stock Index (as % of Peak Value)</b>	32	60.3	58.4	17.3	30	64.3	63.9	8.5
<b>Δ (Central Bank Assets/GDP) (2009-2007)</b>	56	1.46	0.85	7.07	23	0.56	4.55	10.6

ΔNet K Inflows/GDP (2008Q4 - 2006 mean) = (Net Capital Inflows in 2008Q4 – Average Quarterly Net Capital Inflow in 2006)\*100/GDP in 2006. ΔNet K Inflows/GDP (2009Q1 - 2006 mean) is defined similarly for 2009Q1. ΔNet Portfolio Inflows/GDP (2008Q4 - 2006 mean) = (Net Portfolio Inflows in 2008Q4 – Average Quarterly Net Portfolio Inflows in 2006)\*100/GDP in 2006. (Trough-Peak) Bank Equity Index (as % of Peak value) = (Trough-Peak)\*100/Peak for peak and trough values of banking sector stock price index. (Trough-Peak) Stock Index (as % of Peak value) is similarly defined for the benchmark stock market index. Δ Central Bank Assets/GDP (2009-2007) is the change between 2009 and 2007 in the central bank's assets to GDP ratio, expressed as a percentage. Std. Dev refers to the standard deviation.

**Table 3: Correlations between Measures of External and Internal Financial Stress: All Countries**

		1	2	3	4	5	6	7
$\Delta$ Net K Inflows/GDP (2008Q4 - 2006 mean)	1	1						
$\Delta$ Net K Inflows/GDP (2009Q1 - 2006 mean)	2	<b>0.47</b> 0.00	1					
$\Delta$ Net Portfolio Inflows/GDP (2008Q4 - 2006 mean)	3	<b>0.36</b> 0.00	0.24 0.06	1				
$\Delta$ Net Portfolio Inflows/GDP (2009Q1 - 2006 mean)	4	<b>0.31</b> 0.02	<b>0.33</b> 0.01	<b>0.44</b> 0.00	1			
(Peak-Trough) Bank Equity Index (as % of Peak value)	5	0.09 0.56	-0.11 0.50	0.11 0.47	0.13 0.43	1		
(Peak-Trough) Stock Index (as % of Peak value)	6	-0.11 0.43	<b>-0.40</b> 0.01	-0.07 0.62	-0.09 0.58	<b>0.69</b> 0.00	1	
$\Delta$ Central Bank Assets/GDP (2009-2007)	7	0.02 0.89	-0.14 0.32	<b>-0.49</b> 0.00	-0.05 0.73	<b>0.33</b> 0.06	0.22 0.15	1

Note: The second row for each variable gives the p-value for the null that the correlation coefficient is zero. The correlations in bold are those that are significantly different from zero at 10 percent level of significance.

**Table 4: Correlations between Measures of External and Internal Financial Stress:  
Developing Countries**

		1	2	3	4	5	6	7
$\Delta$ Net K Inflows/GDP (2008Q4 - 2006 mean)	1	1						
$\Delta$ Net K Inflows/GDP (2009Q1 - 2006 mean)	2	<b>0.40</b> 0.01	1					
$\Delta$ Net Portfolio Inflows/GDP (2008Q4 - 2006 mean)	3	<b>0.49</b> 0.00	-0.03 0.86	1				
$\Delta$ Net Portfolio Inflows/GDP (2009Q1 - 2006 mean)	4	<b>0.26</b> 0.11	<b>0.18</b> 0.27	<b>0.38</b> 0.02	1			
(Peak-Trough) Bank Equity Index (as % of Peak value)	5	-0.12 0.60	<b>-0.64</b> 0.00	0.07 0.77	<b>-0.59</b> 0.01	1		
(Peak-Trough) Stock Index (as % of Peak value)	6	-0.30 0.13	<b>-0.53</b> 0.01	-0.13 0.52	<b>-0.63</b> 0.00	<b>0.90</b> 0.00	1	
$\Delta$ Central Bank Assets/GDP (2009-2007)	7	0.14 0.39	-0.04 0.81	0.16 0.34	0.27 0.15	0.21 0.43	0.09 0.69	1

Note: The second row for each variable gives the p-value for the null that the correlation coefficient is zero. The numbers in bold are correlations that are significantly different from zero at 10 percent level of significance.

**Table 5: Correlations of quarterly net capital or net portfolio inflow reversals and quarterly changes in measure of internal financial stress for developing countries.**

	$\Delta$ Net Portfolio Inflows/2006 GDP		$\Delta$ Net Capital Inflows/2006 GDP	
	% Change in Bank Equity Index	% Change in Stock Index	% Change in Bank Equity Index	% Change in Stock Index
2008Q1	0.13	<b>-0.32</b>	0.25	-0.04
	<i>0.55</i>	<i>0.10</i>	<i>0.26</i>	<i>0.85</i>
2008Q2	0.09	-0.12	0.32	0.28
	<i>0.69</i>	<i>0.56</i>	<i>0.15</i>	<i>0.16</i>
2008Q3	-0.28	-0.19	-0.05	0.16
	<i>0.20</i>	<i>0.35</i>	<i>0.84</i>	<i>0.41</i>
2008Q4	0.12	0.25	-0.09	0.06
	<i>0.60</i>	<i>0.21</i>	<i>0.70</i>	<i>0.77</i>
2009Q1	0.37	<b>0.39</b>	0.20	<b>0.48</b>
	<i>0.12</i>	<i>0.08</i>	<i>0.41</i>	<i>0.03</i>

Note: The second row for each quarter gives the p-value for the null that the correlation coefficient is zero. The numbers in bold are correlations that are significantly different from zero at 10 percent level of significance.

**Table 6: Determinants of External Financial Stress**

		<b>ΔNet Capital Inflows/GDP<sub>2006</sub></b>				<b>ΔNet Portfolio Inflows/GDP<sub>2006</sub></b>			
		2008Q4		2009Q1		2008Q4		2009Q1	
<b>Explanatory Variables</b>	<b># of Reg.</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>
<b>All regressions included these...</b>									
GDP per capita (constant USD), 2006	120	72	+	8	+/-	26	+/-	24	+
International Reserves less Gold, % of GDP, 2006	120	88	-	100	-	60	-	73	-
(Reserves/GDP)* Swap Line	120	73	-	14	+	82	-	1	+/-
Trade, % of GDP, 2006	120	88	+	20	+/-	68	+	6	+/-
Commodity Exporter	120	13	+/-	0	+/-	4	+/-	0	+/-
De-Jure Openness (Chinn-Ito Index), 2006	120	13	+/-	0	+/-	0	+/-	0	+/-
<b>...and one indicator from each group:</b>									
<i>De-facto External Openness:</i>									
(Total External Debt-Reserves), % of GDP, 2006	24	83	-	100	-	83	-	0	+/-
(Short Term External Debt-Reserves), % of GDP, 2006	24	100	-	100	-	17	-	0	+/-
Aggregate Forex Exposure, 2005	24	88	+	0	+	0	+/-	13	+
External Portfolio Debt Assets, % of GDP, 2006	24	100	-	100	-	100	-	63	-
External Portfolio Debt Liabilities, % of GDP, 2006	24	100	-	100	-	100	-	96	-
<i>Institutions:</i>									
Regulatory Quality, 2006	60	23	+/-	0	+/-	3	+/-	3	+/-
Banking Supervision, 2006	60	22	+/-	33	-	2	+/-	13	+/-
<i>Financial Development:</i>									
Private Credit by Domestic Banks, % of GDP, 2006	60	3	+/-	5	+/-	0	+/-	0	-
Stock Market Value Traded, % of GDP, 2006	60	0	+/-	8	+	0	+	0	-

(continued on next page...)

**Table 6 (continued): Determinants of External Financial Stress**

		$\Delta$ Net Capital Inflows/GDP <sub>2006</sub>				$\Delta$ Net Portfolio Inflows/GDP <sub>2006</sub>			
		2008Q4		2009Q1		2008Q4		2009Q1	
<b>Explanatory Variables</b>	<b># of Reg.</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>	<b>% Sig.</b>	<b>Sign</b>
<i>Banking Sector Competition/Health:</i>									
Herfindahl Hirschman Index (HHI), 2006	20	0	+	35	+	0	+/-	0	+
3-Bank Concentration ratio, 2006	20	0	+	10	+	0	+/-	5	+/-
Net Interest Margins, 2006	20	5	+/-	0	+/-	0	+/-	10	-
Bank Non-Performing Loans Rate, 2006	20	0	+/-	35	+/-	0	+/-	0	+/-
Bank Liquid Reserves, % of Assets, 2006	20	40	+	0	+/-	5	+/-	0	+/-
Bank Capital to Assets ratio, 2006	20	0	+/-	0	+/-	5	+/-	0	+/-
<i>Interactions:</i>									
Regulatory Quality*(-HHI)	10	0	+/-	0	+	0	+/-	0	-
Banking Supervision*(-HHI)	10	0	+	100	+	0	+/-	0	+/-
Regulatory Quality*(-Concentration)	10	0	+/-	0	+/-	20	-	10	-
Banking Supervision*(-Concentration)	10	0	+	0	+	0	+/-	0	-
Regulatory Quality*(-Net Interest Margin)	10	0	+/-	0	-	0	+/-	0	+/-
Banking Supervision*(-Net Interest Margin)	10	10	+/-	0	+/-	0	+/-	40	-
Regulatory Quality*(-Bank NPL Rate)	10	10	-	40	+/-	0	+/-	0	+/-
Banking Supervision*(-Bank NPL Rate)	10	0	+/-	20	-	10	+/-	0	+/-
Regulatory Quality* Bank Liquid Reserves/Assets	10	40	-	0	+/-	0	+/-	0	+/-
Banking Supervision* Bank Liquid Reserves/Assets	10	10	-	0	+/-	0	+/-	0	+/-
Regulatory Quality*Bank Capital to Assets Ratio	10	100	+	0	+	0	+	40	+
Banking Supervision*Bank Capital to Assets Ratio	10	0	+	0	+/-	0	-	0	+/-

Notes:  $\Delta$ Net capital inflow and  $\Delta$ net portfolio inflows are defined with respect to the average quarterly values during 2006. The dependent variable in the column labelled  $\Delta$ Net Capital Inflows/GDP<sub>2006</sub> (2008Q4), therefore, is the difference between net capital inflows in 2008Q4 and the average quarterly net capital inflows in 2006. 'No. of Reg.' is the number of regressions in which the explanatory variable in the relevant row was used. '% Sig' is the number of regressions in which that explanatory variable was significant at 10% level, using robust standard errors. 'Sign' denotes the sign of the estimated coefficient. If the estimated coefficient changes signs in different regressions for the same dependent variable, the 'Sign' column lists +/- . All regressions excluded countries with population less than a million and offshore financial centers and tax havens. All interactions terms are defined such that larger values indicate better institutions and more competitive/developed banking sector (in the interaction term between Regulatory quality and HHI, for example, HHI is preceded by a negative sign).

**Table 7: Determinants of Internal Financial Stress**

Explanatory Variables	# of Reg.	Peak-Trough Fall in Bank Equity Index		Peak-Trough Fall in Stock Index		Increase in Central Bank Assets/GDP, 2009-2007	
		% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<b>All regressions included these...</b>							
GDP per capita (constant USD), 2006	120	64	+	6	+/-	10	+/-
International Reserves less Gold, % of GDP, 2006	120	3	+/-	58	+/-	3	+/-
(Reserves/GDP)* Swap Line	120	0	+/-	3	+/-	5	+/-
Trade, % of GDP, 2006	120	20	+/-	0	+/-	2	+/-
Commodity Exporter	120	100	-	98	-	3	+/-
De-Jure Openness (Chinn-Ito Index), 2006	120	3	+/-	5	+/-	17	+/-
<b>...and one indicator from each group:</b>							
<i>De-facto External Openness:</i>							
(Total External Debt-Reserves), % of GDP, 2006	24	88	+	58	+	100	+
(Short Term External Debt-Reserves), % of GDP, 2006	24	83	+	13	+/-	83	+
Aggregate Forex Exposure, 2005	24	42	-	0	+/-	8	-
External Portfolio Debt Assets, % of GDP, 2006	24	75	+	100	+	100	+
External Portfolio Debt Liabilities, % of GDP, 2006	24	79	+	100	+	100	+
<i>Institutions:</i>							
Regulatory Quality, 2006	60	60	+/-	12	+/-	2	+/-
Banking Supervision, 2006	60	45	+/-	22	+/-	3	+/-
<i>Financial Development:</i>							
Private Credit by Domestic Banks, % of GDP, 2006	60	25	+/-	100	-	10	+/-
Stock Market Value Traded, % of GDP, 2006	60	0	+/-	3	+/-	5	-

(continued on next page...)

**Table 7 (continued): Determinants of Internal Financial Stress**

Explanatory Variables	# of Reg.	Peak-Trough Fall in Bank Equity Index		Peak-Trough Fall in Stock Index		Increase in Central Bank Assets/GDP, 2009-2007	
		% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<i>Banking Sector Competition/Health:</i>							
Herfindahl Hirschman Index (HHI), 2006	20	50	+/-	0	+/-	20	-
3-Bank Concentration ratio, 2006	20	45	+/-	0	+/-	0	+/-
Net Interest Margins, 2006	20	60	+	30	+/-	20	+/-
Bank Non-Performing Loans Rate, 2006	20	0	+/-	0	-	50	+/-
Bank Liquid Reserves, % of Assets, 2006	20	10	+	50	+/-	0	+/-
Bank Capital to Assets ratio, 2006	20	0	+/-	90	+	55	+/-
<i>Interactions:</i>							
Regulatory Quality*(-HHI)	10	0	+/-	0	+/-	20	-
Banking Supervision*(-HHI)	10	100	-	0	+/-	40	-
Regulatory Quality*(-Concentration)	10	0	+/-	0	+/-	10	+/-
Banking Supervision*(-Concentration)	10	90	-	0	+/-	0	+/-
Regulatory Quality*(-Net Interest Margin)	10	0	+/-	10	+/-	10	-
Banking Supervision*(-Net Interest Margin)	10	80	+	0	+/-	0	-
Regulatory Quality*(-Bank NPL Rate)	10	10	-	0	+/-	0	+
Banking Supervision*(-Bank NPL Rate)	10	0	-	0	+/-	60	+
Regulatory Quality* Bank Liquid Reserves/Assets	10	20	+	0	+/-	20	+
Banking Supervision* Bank Liquid Reserves/Assets	10	0	+/-	0	+	0	+/-
Regulatory Quality*Bank Capital to Assets Ratio	10	80	-	100	-	0	+/-
Banking Supervision*Bank Capital to Assets Ratio	10	0	-	30	-	50	+

Notes: 'No. of Reg.' is the number of regressions in which the explanatory variable in the relevant row was used. '% Sig' is the number of regressions in which that explanatory variable was significant at 10% level, using robust standard errors. 'Sign' denotes the sign of the estimated coefficient. If the estimated coefficient changes signs in different regressions for the same dependent variable, the 'Sign' column lists +/- . All regressions excluded countries with population less than a million and offshore financial centers and tax havens. All interactions terms are defined such that larger values indicate better institutions and more competitive/developed banking sector (in the interaction term between Regulatory quality and HHI, for example, HHI is preceded by a negative sign).



**Table 8: Determinants of Recovery: External Financial Stress**

		$\Delta$ Net Capital Inflows/GDP <sub>2006</sub> (2009Q2)		$\Delta$ Net Capital Inflows/GDP <sub>2006</sub> (2009Q3)		$\Delta$ Net Capital Inflows/GDP <sub>2006</sub> (2009Q4)	
Explanatory Variables	# of Reg.	% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<b>All regressions included these...</b>							
GDP per capita (constant USD), 2006	120	18	+	0	+/-	8	+/-
International Reserves less Gold, % of GDP, 2006	120	18	-	47	+/-	97	-
(Reserves/GDP)* Swap Line	120	0	+/-	4	+	1	+/-
Trade, % of GDP, 2006	120	0	+/-	11	+/-	13	+/-
Commodity Exporter	120	2	+/-	8	+/-	0	+/-
De-Jure Openness (Chinn-Ito Index), 2006	120	13	+/-	0	+/-	0	+/-
<b>...and one indicator from each group:</b>							
<i>De-facto External Openness:</i>							
(Total External Debt-Reserves), % of GDP, 2006	24	0	+/-	71	-	100	-
(Short Term External Debt-Reserves), % of GDP, 2006	24	0	-	25	-	50	-
Aggregate Forex Exposure, 2005	24	58	+	0	+/-	38	+
External Portfolio Debt Assets, % of GDP, 2006	24	4	+	100	-	100	-
External Portfolio Debt Liabilities, % of GDP, 2006	24	54	+	67	-	92	-
<i>Institutions:</i>							
Regulatory Quality, 2006	60	3	+/-	3	+/-	33	-
Banking Supervision, 2006	60	27	+/-	20	+/-	33	-
<i>Financial Development:</i>							
Private Credit by Domestic Banks, % of GDP, 2006	60	2	+	18	+	0	+/-
Stock Market Value Traded, % of GDP, 2006	60	3	+/-	0	+/-	35	+

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**Table 8 (continued): Determinants of Recovery in Net Capital Inflows**

Explanatory Variables	# of Reg.	ΔNet Capital Inflows/GDP <sub>2006</sub> (2009Q2)		ΔNet Capital Inflows/GDP <sub>2006</sub> (2009Q3)		ΔNet Capital Inflows/GDP <sub>2006</sub> (2009Q4)	
		% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<i>Banking Sector Competition/Health:</i>							
Herfindahl Hirschman Index (HHI), 2006	20	0	+/-	25	+/-	10	+/-
3-Bank Concentration ratio, 2006	20	0	+/-	0	+/-	40	+/-
Net Interest Margins, 2006	20	40	+/-	20	+/-	40	+/-
Bank Non-Performing Loans Rate, 2006	20	10	+/-	25	+/-	25	+/-
Bank Liquid Reserves, % of Assets, 2006	20	40	+/-	10	+/-	0	+/-
Bank Capital to Assets ratio, 2006	20	0	+/-	0	+/-	0	+
<i>Interactions:</i>							
Regulatory Quality*(-HHI)	10	0	+/-	40	+	0	+/-
Banking Supervision*(-HHI)	10	0	+/-	80	+	10	+
Regulatory Quality*(-Concentration)	10	0	+/-	0	+	40	-
Banking Supervision*(-Concentration)	10	0	+/-	50	+	0	+/-
Regulatory Quality*(-Net Interest Margin)	10	0	+/-	0	+	0	+/-
Banking Supervision*(-Net Interest Margin)	10	80	+	50	+	0	+
Regulatory Quality*(-Bank NPL Rate)	10	0	+/-	0	-	0	+/-
Banking Supervision*(-Bank NPL Rate)	10	0	-	50	-	30	-
Regulatory Quality* Bank Liquid Reserves/Assets	10	80	-	30	-	0	+/-
Banking Supervision* Bank Liquid Reserves/Assets	10	80	-	0	-	0	+/-
Regulatory Quality*Bank Capital to Assets Ratio	10	0	+	0	-	60	+
Banking Supervision*Bank Capital to Assets Ratio	10	0	+/-	10	+/-	0	+/-

Notes: ΔNet capital inflow and Δnet portfolio inflows are defined with respect to the average quarterly values during 2006. The dependent variable in the column labelled ΔNet Capital Inflows/GDP<sub>2006</sub> (2008Q4), therefore, is the difference between net capital inflows in 2008Q4 and the average quarterly net capital inflows in 2006. 'No. of Reg.' is the number of regressions in which the explanatory variable in the relevant row was used. '% Sig' is the number of regressions in which that explanatory variable was significant at 10% level, using robust standard errors. 'Sign' denotes the sign of the estimated coefficient. If the estimated coefficient changes signs in different regressions for the same dependent variable, the 'Sign' column lists +/- . All regressions excluded countries with population less than a million and offshore financial centers and tax havens. All interactions terms are defined such that larger values indicate better institutions and more competitive/developed banking sector (in the interaction term between Regulatory quality and HHI, for example, HHI is preceded by a negative sign).

**Table 9: Determinants of Recovery in Net Portfolio Inflows**

		$\Delta$ Net Portfolio Inflows/GDP <sub>2006</sub> (2009Q2)		$\Delta$ Net Portfolio Inflows/GDP <sub>2006</sub> (2009Q3)		$\Delta$ Net Portfolio Inflows/GDP <sub>2006</sub> (2009Q4)	
Explanatory Variables	# of Reg.	% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<b>All regressions included these...</b>							
GDP per capita (constant USD), 2006	120	32	+	0	+/-	0	+/-
International Reserves less Gold, % of GDP, 2006	120	0	+/-	8	+/-	18	+/-
(Reserves/GDP)* Swap Line	120	0	+/-	69	+	0	+/-
Trade, % of GDP, 2006	120	3	+/-	4	+/-	46	+/-
Commodity Exporter	120	0	+/-	35	+/-	0	+
De-Jure Openness (Chinn-Ito Index), 2006	120	9	+/-	0	+/-	0	+/-
<b>...and one indicator from each group:</b>							
<i>De-facto External Openness:</i>							
(Total External Debt-Reserves), % of GDP, 2006	24	100	-	100	+	100	+
(Short Term External Debt-Reserves), % of GDP, 2006	24	8	-	17	+	17	+
Aggregate Forex Exposure, 2005	24	0	+	0	+/-	4	+/-
External Portfolio Debt Assets, % of GDP, 2006	24	100	-	100	+	100	+
External Portfolio Debt Liabilities, % of GDP, 2006	24	100	-	100	+	100	+
<i>Institutions:</i>							
Regulatory Quality, 2006	60	0	+/-	0	+/-	3	+/-
Banking Supervision, 2006	60	7	+/-	5	+/-	2	+/-
<i>Financial Development:</i>							
Private Credit by Domestic Banks, % of GDP, 2006	60	0	+/-	0	+/-	0	-
Stock Market Value Traded, % of GDP, 2006	60	52	-	0	-	0	+/-

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**Table 9 (continued): Determinants of Recovery in Net Portfolio Inflows**

Explanatory Variables	# of Reg.	ΔNet Portfolio Inflows/GDP <sub>2006</sub> (2009Q2)		ΔNet Portfolio Inflows/GDP <sub>2006</sub> (2009Q3)		ΔNet Portfolio Inflows/GDP <sub>2006</sub> (2009Q4)	
		% Sig.	Sign	% Sig.	Sign	% Sig.	Sign
<i>Banking Sector Competition/Health:</i>							
Herfindahl Hirschman Index (HHI), 2006	20	0	+/-	0	+/-	40	+
3-Bank Concentration ratio, 2006	20	15	+/-	0	+	60	+
Net Interest Margins, 2006	20	0	+/-	0	+	0	+/-
Bank Non-Performing Loans Rate, 2006	20	0	+/-	5	+/-	0	+/-
Bank Liquid Reserves, % of Assets, 2006	20	35	+/-	0	+/-	5	+
Bank Capital to Assets ratio, 2006	20	0	+/-	0	+/-	0	+/-
<i>Interactions:</i>							
Regulatory Quality*(-HHI)	10	0	+/-	0	+/-	0	+
Banking Supervision*(-HHI)	10	0	-	0	+/-	90	+
Regulatory Quality*(-Concentration)	10	0	+/-	0	+/-	0	+/-
Banking Supervision*(-Concentration)	10	30	-	0	+	0	+
Regulatory Quality*(-Net Interest Margin)	10	0	-	10	+	90	+
Banking Supervision*(-Net Interest Margin)	10	0	+	0	+/-	0	+/-
Regulatory Quality*(-Bank NPL Rate)	10	0	-	0	+/-	0	+
Banking Supervision*(-Bank NPL Rate)	10	10	+/-	0	+/-	0	+/-
Regulatory Quality* Bank Liquid Reserves/Assets	10	0	-	0	+/-	0	+/-
Banking Supervision* Bank Liquid Reserves/Assets	10	80	-	0	+/-	10	-
Regulatory Quality*Bank Capital to Assets Ratio	10	0	+/-	0	+/-	0	+
Banking Supervision*Bank Capital to Assets Ratio	10	0	+/-	0	+/-	0	+/-

Notes: ΔNet capital inflow and Δnet portfolio inflows are defined with respect to the average quarterly values during 2006. The dependent variable in the column labelled ΔNet Capital Inflows/GDP<sub>2006</sub> (2008Q4), therefore, is the difference between net capital inflows in 2008Q4 and the average quarterly net capital inflows in 2006. 'No. of Reg.' is the number of regressions in which the explanatory variable in the relevant row was used. '% Sig' is the number of regressions in which that explanatory variable was significant at 10% level, using robust standard errors. 'Sign' denotes the sign of the estimated coefficient. If the estimated coefficient changes signs in different regressions for the same dependent variable, the 'Sign' column lists +/- . All regressions excluded countries with population less than a million and offshore financial centers and tax havens. All interactions terms are defined such that larger values indicate better institutions *and* more competitive/developed banking sector (in the interaction term between Regulatory quality and HHI, for example, HHI is preceded by a negative sign).

**Table 10: Determinants of internal financial recovery**

		Recovery in Bank Equity Index (Trough-Peak % rise, post-crisis)		Recovery in Stock Index (Trough-Peak % rise, post-crisis)	
Explanatory Variables	# of Reg.	% Sig.	Sign	% Sig.	Sign
<b>All regressions included these...</b>					
GDP per capita (constant USD), 2006	120	8	+/-	9	+/-
International Reserves less Gold, % of GDP, 2006	120	30	+/-	0	+/-
(Reserves/GDP)* Swap Line	120	0	+/-	0	+/-
Trade, % of GDP, 2006	120	7	+/-	5	+/-
Commodity Exporter	120	0	+/-	0	+/-
De-Jure Openness (Chinn-Ito Index), 2006	120	0	+/-	3	+/-
<b>...and one indicator from each group:</b>					
<i>De-facto External Openness:</i>					
(Total External Debt-Reserves), % of GDP, 2006	24	100	+	38	+/-
(Short Term External Debt-Reserves), % of GDP, 2006	24	21	+	4	+/-
Aggregate Forex Exposure, 2005	24	38	-	100	-
External Portfolio Debt Assets, % of GDP, 2006	24	100	+	21	+/-
External Portfolio Debt Liabilities, % of GDP, 2006	24	100	+	38	+/-
<i>Institutions:</i>					
Regulatory Quality, 2006	60	3	+/-	20	+/-
Banking Supervision, 2006	60	0	+/-	7	+/-
<i>Financial Development:</i>					
Private Credit by Domestic Banks, % of GDP, 2006	60	58	+/-	98	-
Stock Market Value Traded, % of GDP, 2006	60	2	-	50	+/-

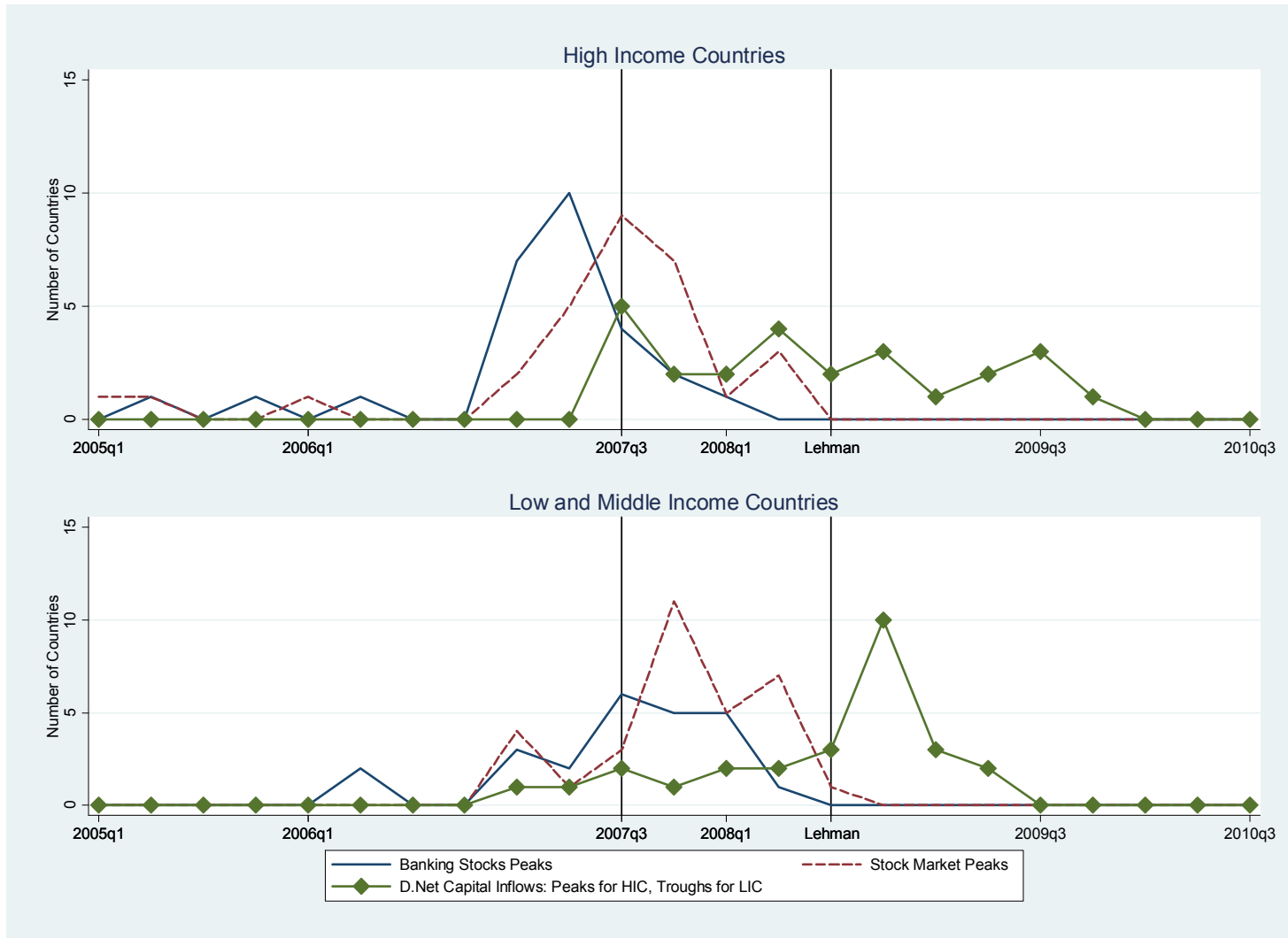
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**Table 10 (continued): Determinants of internal financial recovery**

Explanatory Variables	# of Reg.	Recovery in Bank Equity Index (Trough-Peak % rise, post-crisis)		Recovery in Stock Index (Trough-Peak % rise, post-crisis)	
		% Sig.	Sign	% Sig.	Sign
<i>Banking Sector Competition/Health:</i>					
Herfindahl Hirschman Index (HHI), 2006	20	10	+/-	15	-
3-Bank Concentration ratio, 2006	20	0	+/-	20	+/-
Net Interest Margins, 2006	20	0	+/-	10	+/-
Bank Non-Performing Loans Rate, 2006	20	0	+/-	15	+/-
Bank Liquid Reserves, % of Assets, 2006	20	10	+/-	50	+/-
Bank Capital to Assets ratio, 2006	20	0	+/-	20	+/-
<i>Interactions:</i>					
Regulatory Quality*(-HHI)	10	0	+/-	80	-
Banking Supervision*(-HHI)	10	30	+/-	50	-
Regulatory Quality*(-Concentration)	10	0	+/-	50	+/-
Banking Supervision*(-Concentration)	10	0	+/-	20	-
Regulatory Quality*(-Net Interest Margin)	10	0	+/-	80	-
Banking Supervision*(-Net Interest Margin)	10	0	+/-	0	-
Regulatory Quality*(-Bank NPL Rate)	10	0	+	20	+
Banking Supervision*(-Bank NPL Rate)	10	0	+/-	20	+/-
Regulatory Quality* Bank Liquid Reserves/Assets	10	40	+	0	+
Banking Supervision* Bank Liquid Reserves/Assets	10	20	+	20	+
Regulatory Quality*Bank Capital to Assets Ratio	10	0	+/-	10	+/-
Banking Supervision*Bank Capital to Assets Ratio	10	0	+/-	20	+/-

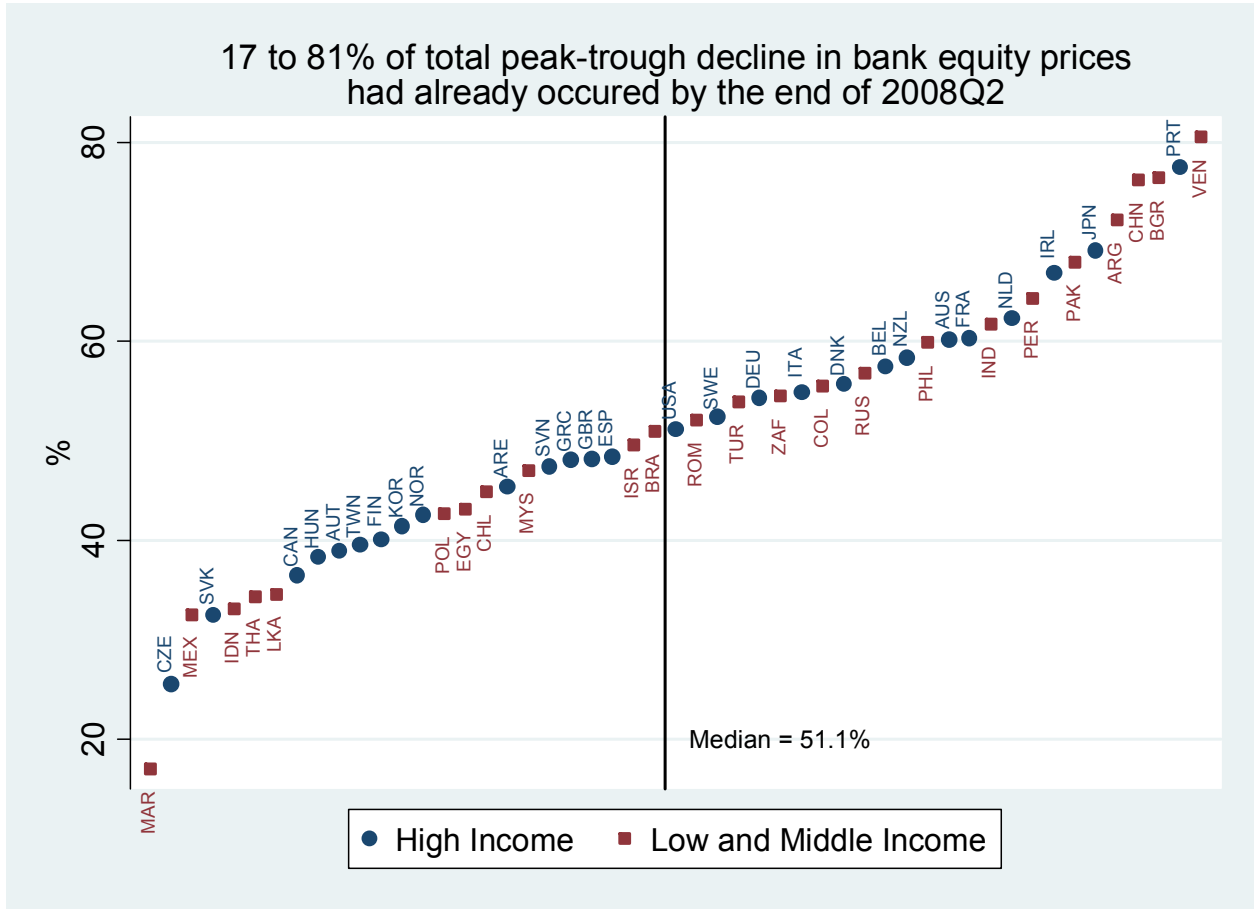
Notes: 'No. of Reg.' is the number of regressions in which the explanatory variable in the relevant row was used. '% Sig' is the number of regressions in which that explanatory variable was significant at 10% level, using robust standard errors. 'Sign' denotes the sign of the estimated coefficient. If the estimated coefficient changes signs in different regressions for the same dependent variable, the 'Sign' column lists +/- . All regressions excluded countries with population less than a million and offshore financial centers and tax havens. All interactions terms are defined such that larger values indicate better institutions *and* more competitive/developed banking sector (in the interaction term between Regulatory quality and HHI, for example, HHI is preceded by a negative sign).

**Figure 1: Stock prices had started declining all over the world before net capital inflow reversals peaked.**



Note: Only countries for which data on at least one equity price index is available are included in computing frequencies for net capital inflow troughs. Full data is presented in Table 1.

**Figure 2: Decline in banking sector equity prices as percentage of total peak to trough decline.**





**Figure 3: Decline in general stock market price index by end of 2008Q2, as percentage of its peak to trough decline**

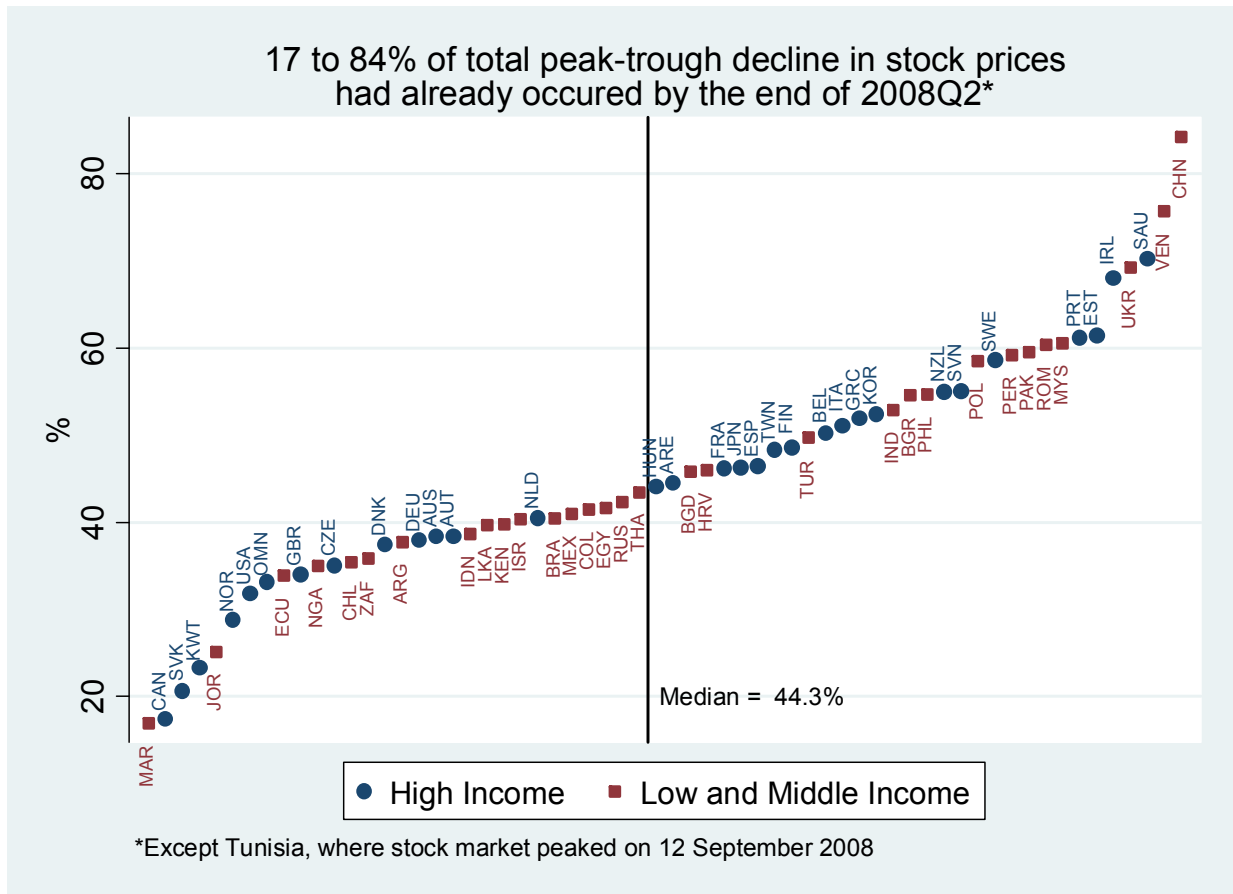




Figure 5: Net capital and portfolio inflows and peak-trough change in stock prices



Figure 6: Quarterly net capital inflows during 2008 and reserves/GDP in 2006

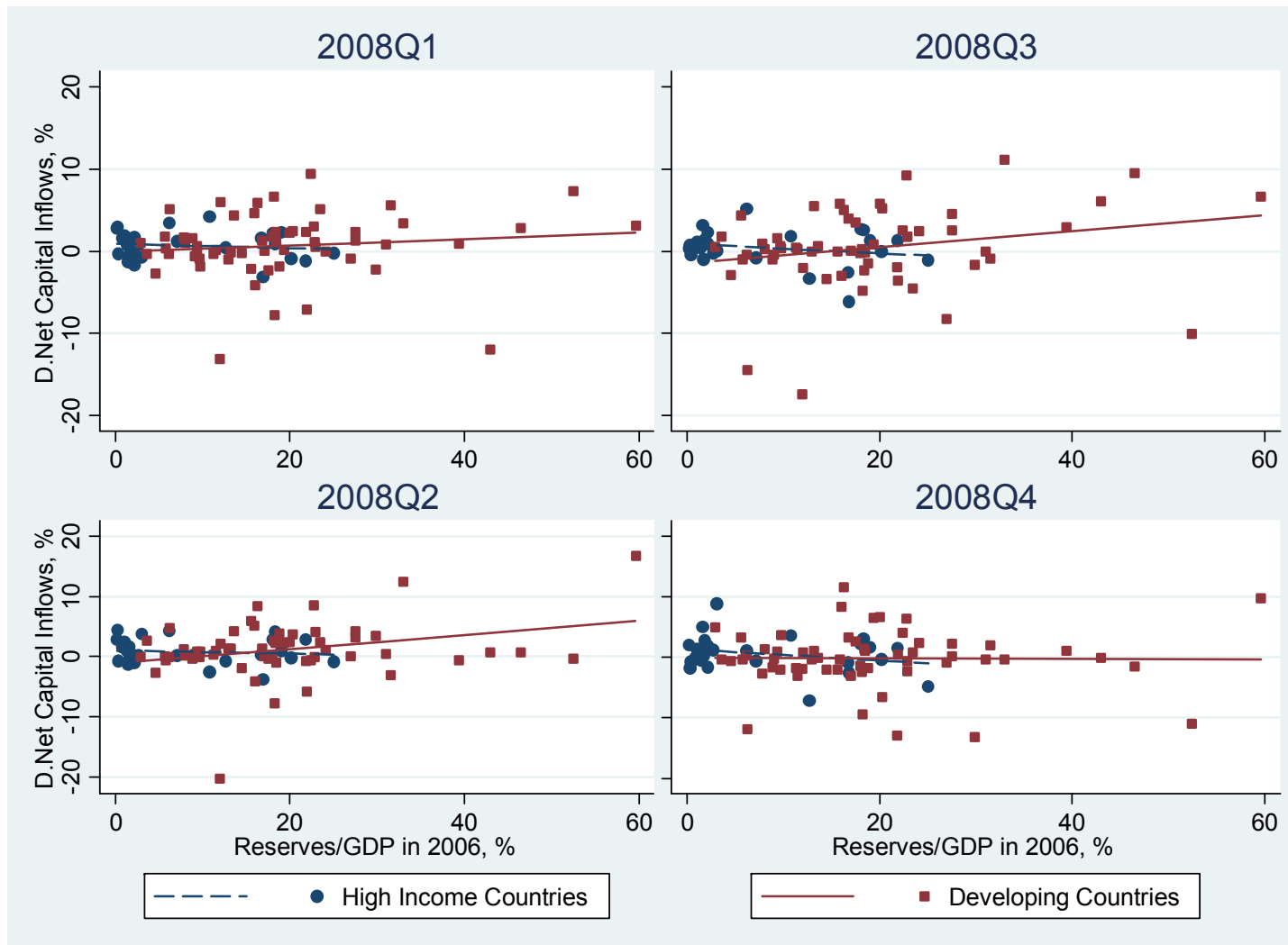


Figure 7: Quarterly net portfolio inflows during 2008 and reserves/GDP in 2006

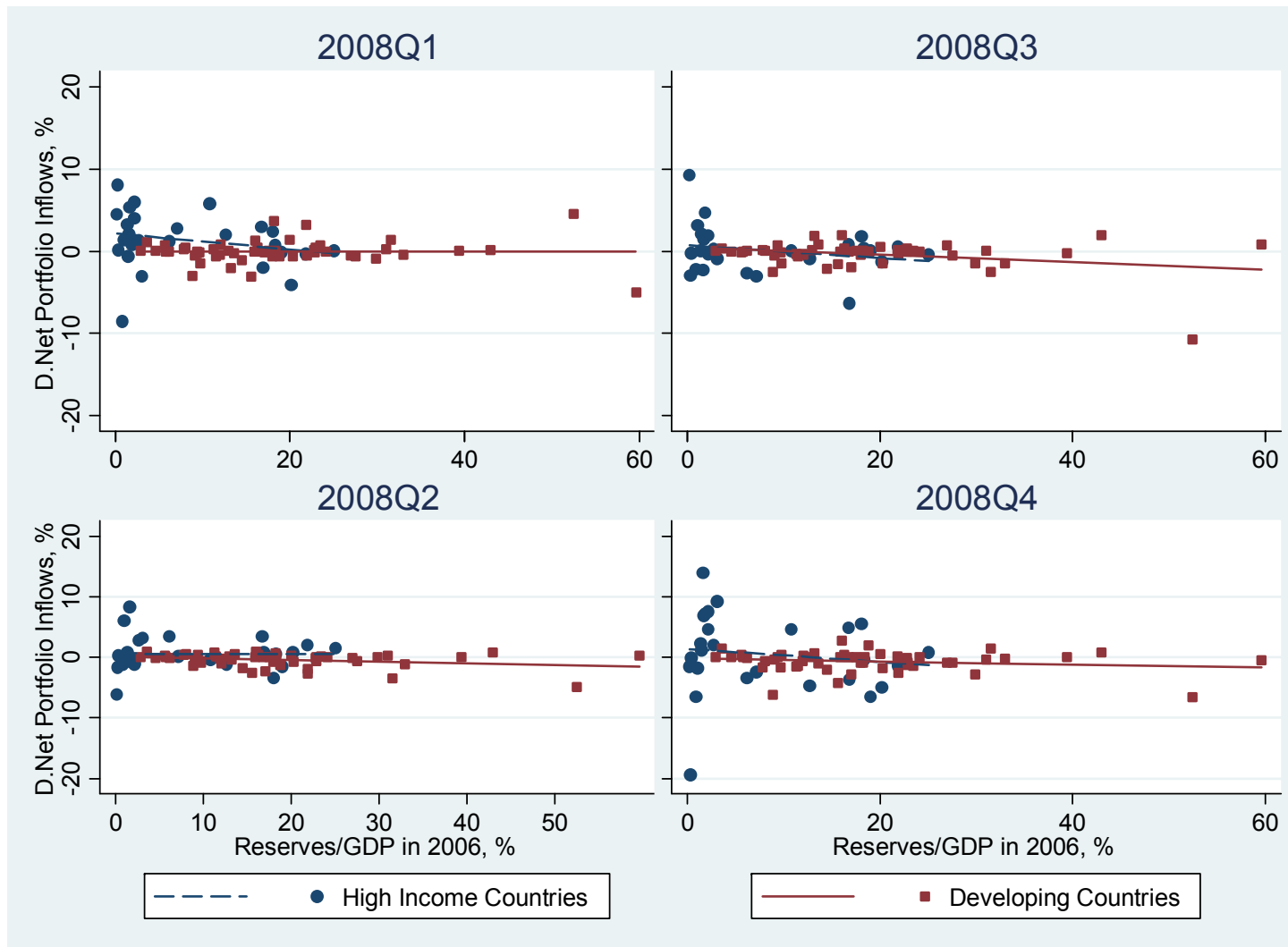
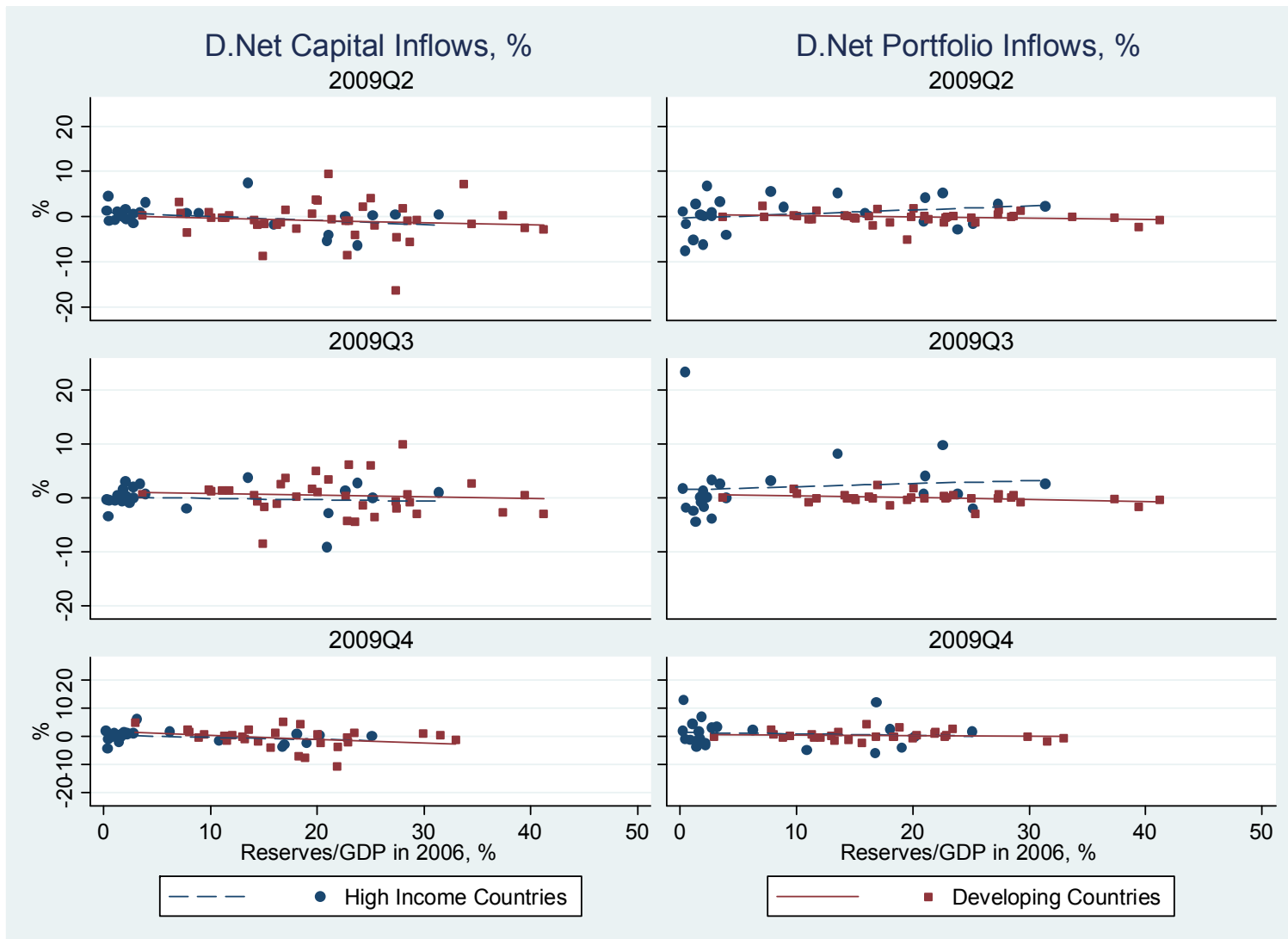
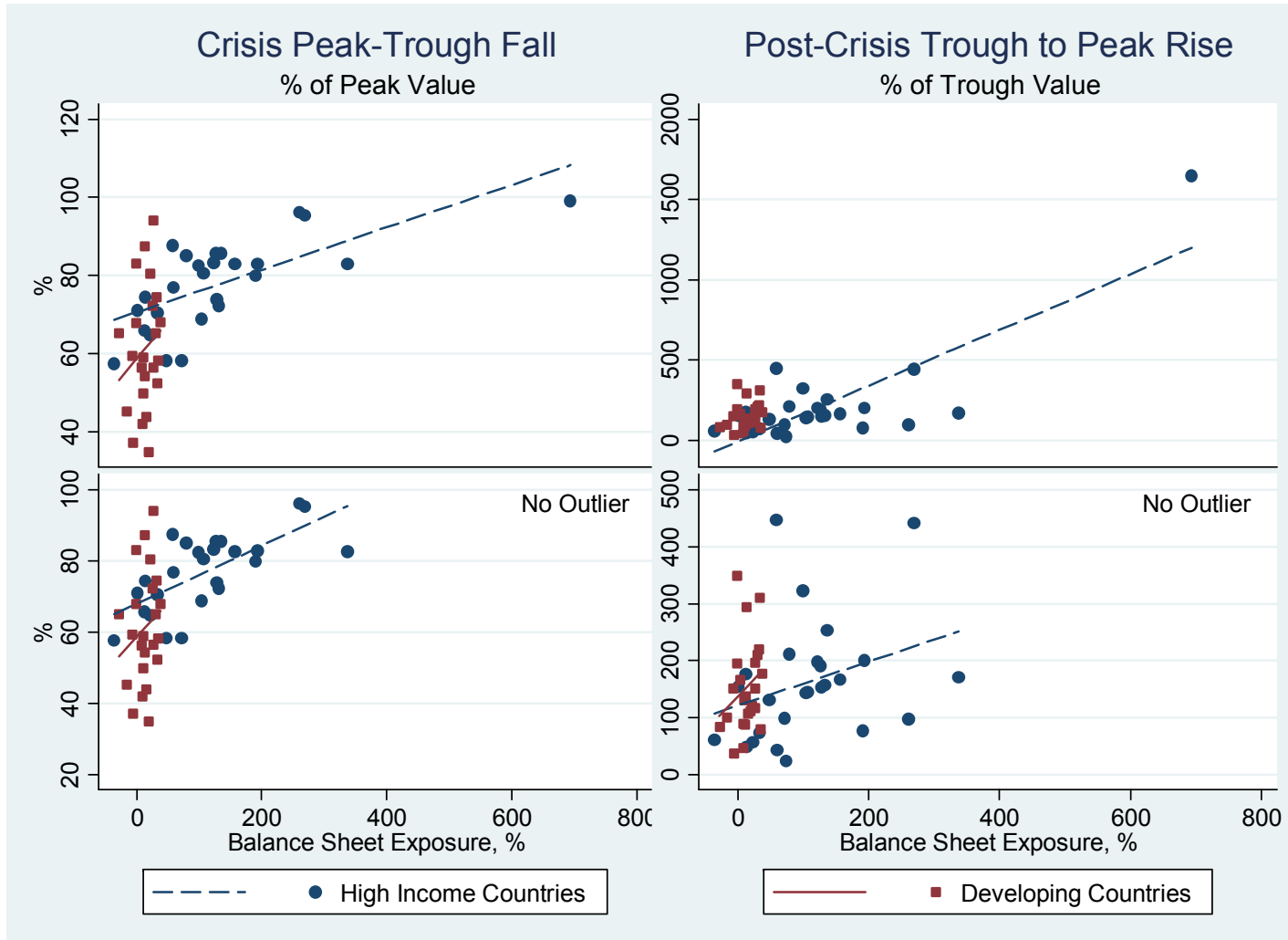


Figure 8: Quarterly net capital and net portfolio inflows during 2009Q2-2009Q4 and reserves/GDP in 2006



**Figure 9: Bank Equity Index changes and Balance Sheet Exposure**



Note: Balance Sheet Exposure is defined as  $(\text{Total External Debt} - \text{Reserves}) * 100 / \text{GDP}$  in 2007. Bottom panels exclude Ireland.

## Data Appendix

Variable Name	Description	Source
3-Bank Concentration Ratio, 2006	Assets of three largest banks as a share of assets of all commercial banks.	Beck et. al (2009)
Aggregate Forex Exposure, 2005	Aggregate foreign currency exposure, as at the end of 2005. It is the difference between foreign assets and liabilities denominated in foreign currencies, expressed as a ratio to total foreign assets and liabilities.	Lane and Shambaugh (2010)
Bank Capital to Assets Ratio, 2006	Bank capital to assets is the ratio of bank capital and reserves to total assets. Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Capital includes tier 1 capital (paid-up shares and common stock), which is a common feature in all countries' banking systems, and total regulatory capital, which includes several specified types of subordinated debt instruments that need not be repaid if the funds are required to maintain minimum capital levels (these comprise tier 2 and tier 3 capital). Total assets include all nonfinancial and financial assets.	World Bank WDI
Bank Liquid Reserves, % of Assets, 2006	Ratio of bank liquid reserves to bank assets is the ratio of domestic currency holdings and deposits with the monetary authorities to claims on other governments, nonfinancial public enterprises, the private sector, and other banking institutions.	World Bank WDI
Bank Non-Performing Loans Rate, 2006	Bank nonperforming loans to total gross loans are the value of nonperforming loans divided by the total value of the loan portfolio (including nonperforming loans before the deduction of specific loan-loss provisions).	World Bank WDI
Banking Supervision, 2006	Prudential regulations and supervision of the banking sector. Values range from 0 to 3, with higher values indicating better supervision.	Financial Supervision database, Abiad et. Al. 2009
Commodity Exporter	Dummy variable, equal to 1 if the country is a major commodity exporter. We follow Rose and Spiegel (2010) in defining 36 countries as commodity exporters. These include: 1. All past and present OPEC countries; 2. Australia, Canada, Mexico, Kazakhstan, Norway, New Zealand and Russia; 3. Any country listed in CIA world factbook as having more than 50 percent exports from commodities; 4. Any country listed in Cashin et. al. (2003).	Rose and Spiegel (2010 a)



$\Delta$ Net Capital Inflows/GDP, 200`i`Q`j`	(Net Capital inflows in year 200`i`, quarter`j` - average quarterly net capital inflows in 2006)*100/GDP in 2006.	IMF IFS
$\Delta$ Net Portfolio Inflows/GDP, 200`i`Q`j`	(Net Portfolio inflows in year 200`i`, quarter`j` - average quarterly net portfolio inflows in 2006)*100/GDP in 2006.	IMF IFS
De-Jure Openness, 2006	Chinn-Ito index of the degree of legal restrictions on capital flows for the year 2006. It varies from -1.811621 to 2.531836, with higher values denoting greater openness	Chinn and Ito (2006), updated
External Portfolio Debt Assets, % of GDP, 2006		updated data from Lane and Milesi-Ferreti (2007)
External Portfolio Debt Liabilities, % of GDP, 2006		updated data from Lane and Milesi-Ferreti (2007)
GDP per capita (constant USD), 2006	GDP per capita in 2006, expressed in constant (2000) US dollars.	World Bank WDI
Increase in Central Bank's Assets, 2009-2007	Central bank's assets/GDP in 2009, % - Central bank's assets/GDP in 2007, %. Central bank assets are computed as the sum of IFS lines 11, 12a, 12e and 12s. Where 12s is not available, it is computed as the sum of IFS lines 12b, 12c, 12d and 12g. Where 2009 values were not available, 2008 values were used.	IMF IFS
Reserves/GDP, 2006	International Reserves, less gold in current US dollars in 2006, expressed as percentage of GDP (in current US dollars) in 2006	World Bank WDI

Variable Name	Description	Source
Herfindahl Hirschman Index (HHI), 2006	Sum of squared shares of top 50 firms in industry assets. Individual firm data was collected from bankscope on all banks (commercial, savings, cooperative and islamic), bank holding companies and investment banks. Consolidated statements were used where available. Bankscope provides data on individual firms and to compute the share of each firm in industry assets, the firm level data was aggregated for each country-year observation. The coverage of bankscope data is uneven, due to which some filters were applied. First, wherever BIS data on industry assets was available (and larger than bankscope totals), the BIS data was used. Second, (country-year) observations where industry assets or number of banks available were less than the 1st percentile of all observations were dropped. Third, observations for which there were extreme changes in number of banks or industry assets (outside the (1 99) percentile range) were dropped. For example, if the number of banks in the next year jumped by an extremely large value, the current year's observations were dropped, but if the next year's number of banks was unusually lower than the current year's then the next year's observations were dropped. The percentiles were defined for the whole sample (all country-year observations). Finally, the same extreme value and extreme changes filters were applied to the HHI. In cases where the resulting HHI series had gaps, the data was interpolated using linear interpolation.	BvDep's Bankscope database and Bank for International Settlements
Relative Net Capital Inflows	See $\Delta$ Net Capital Inflows/GDP	
Net Interest Margins, 2006	Average net interest margin in banking sector	Beck et. al (2009)
Relative Net Portfolio Inflows	See $\Delta$ Net Portfolio Inflows/GDP	
Offshore Financial Center (OFC) or Tax haven	OFC data from IMF "Offshore Financial Centers: The Assessment Program -- An Update" March 12, 2004 and tax havens from "Offshore Pariahs?" by Mark P. Hampton and John Christensen" in World Development 2002	IMF and World Development, 2002

<b>Variable Name</b>	<b>Description</b>	<b>Source</b>
Peak EMP	The maximum value attained by the monthly exchange market pressure (EMP) index between 2007 and 2009. EMP is defined as the percentage depreciation in SDR exchange rate + fall in SDR value of foreign exchange reserves less gold, as percentage of the monetary base.	IMF IFS
Peak to Trough fall in Bank Equity Index	(Peak value of banking sector equity price index between 2007 and 2009 - trough value of banking sector equity price index between 2007 and 2009)*100/Peak value of banking sector equity price index between 2007 and 2009. Where banking sector equity price index was not available, a financial sector equity index was used.	Thomson Financial Datastream
Peak to Trough fall in Stock Index	(Peak value of stock market price index between 2007 and 2009 - trough value of stock market price index between 2007 and 2009)*100/Peak value of stock market price index between 2007 and 2009	Thomson Financial Datastream
Private Credit by Deposit Money Banks, % of GDP, 2006		Beck et. al (2009)
Recovery in Bank Equity Index	(Post-Crisis Peak (between the crisis trough date and July 7, 2010) in bank equity index - trough value of bank equity index (between 2007 and 2009) ) *100/trough value of bank equity index	Thomson Financial Datastream
Recovery in Stock Index	(Post-Crisis Peak (between the crisis trough date and July 7, 2010) in stock index - trough value of stock index (between 2007 and 2009) ) *100/trough value of stock index	Thomson Financial Datastream
Regulatory Quality	Captures perceptions of the ability of government to formulate and implement sound policies and regulations that permit private sector development.	WB Governance Indicators
(Reserves/GDP)*Swap Line	Interaction term between International Reserves less Gold, % of GDP, 2006 and Swap Line	
Stock Market Value Traded, % of GDP, 2006		World Bank WDI

<b>Variable Name</b>	<b>Description</b>	<b>Source</b>
(Short Term External Debt -Reserves)/GDP, %, 2006		World Bank WDI
Swap Line	Dummy variable, equal to 1 if the country was a recipient of a swap line by the Federal Reserve, European Central Bank or the People's Bank of China	Aizenman et. al. (2010)
(Total External Debt - Reserves)/GDP, %, 2006	Total external debt equals total debt liabilities (portfolio debt + other investment) from LMF. If missing, then we used total external debt from EDJH database. Reserves are international reserves less gold, from LMF. GDP is from WDI. All variables are in current US dollars and as of or as of the end of 2006.	Lane and Milesi-Ferreti (LMF), External Debt Joint Hub (EDJH) and WDI
Trade, % of GDP, 2006	Trade/GDP in 2006, expressed as a percentage	World Bank WDI

Note: IMF IFS refers to International Monetary Fund's International Financial Statistics database and World Bank WDI refers to World Bank's World Development Indicators database.