ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Aizenman, Joshua; Lee, Jaewoo; Sushko, Vladyslav

Working Paper

From the great moderation to the global crisis: Exchange market pressure in the 2000s

Working Paper, No. 10-18

Provided in Cooperation with:
University of California Santa Cruz, Santa Cruz Institute for International Economics (SCIIE)

Suggested Citation: Aizenman, Joshua; Lee, Jaewoo; Sushko, Vladyslav (2010) : From the great moderation to the global crisis: Exchange market pressure in the 2000s, Working Paper, No. 10-18, University of California, Santa Cruz Institute for International Economics (SCIIE), Santa Cruz, CA

This Version is available at:
https://hdl.handle.net/10419/64046

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

October 2010

From the Great Moderation to the global crisis: Exchange market pressure in the 2000s

Joshua Aizenman, UCSC and the NBER; Jaewoo Lee, the IMF; Vladyslav Sushko UCSC

Abstract*

This paper investigates the factors explaining exchange market pressures (EMP) and the hoarding and use of international reserves (IR) by emerging markets during the 2000s, as the Great Moderation turned to the 2008-9 global crisis and great recession. According to our results, both financial and trade factors played important roles, yet the relative magnitude of financial considerations dominated, both during the Great Moderation and during the crisis. The coefficient of gross short-term external debt *quintuples* during the onset of the crisis, and then gradually declines as we let the crisis window roll forward. Capital outflow (induced by global deleveraging) was the force behind the emerging markets EMP rise during the global financial crisis, with the emerging markets' stock markets themselves only playing a secondary role. In addition, emerging markets were greatly affected by the fall in commodity prices during the initial phase of the crisis, although the relative impact of trade factors remained virtually the same in magnitude during the financial crisis and the Great Moderation period that preceded it. We also study the association between several country-level indicators, as of 2007, and the EMP measure during the height of the crisis in 2008:Q4 in a cross sectional regression. We found that that richer EMs experienced greater EMP during the crisis. Greater FDI inflows prior to the crisis were associated with a lower crisis EMP, while greater portfolio debt inflows with a higher crisis EMP, and this effect is much larger than the mitigation effect associated with greater FDI inflows. We conclude with an analysis of the factors that account for the trade and financial exposure of emerging markets during the crisis, finding that pre-crisis financial and trade openness are significant predictors of the financial and trade shock during the crisis. The severity of the financial shock was further exacerbated by financial ties to the U.S., while the trade shock was more severe in EMs with a larger commodity export share.

Joshua Aizenman,
UCSC and the NBER
Economics E2
Santa Cruz
CA, 95064
jaizen@ucsc.edu

Jaewoo Lee,
Research Dept.
IMF
700 19th st. NW
Washington, DC, 20431
JLEE3@imf.org

Vladyslav Sushko
UCSC
Economics E2
Santa Cruz
CA, 95064
vsushko@ucsc.edu

Keywords: exchange market pressure, financial and trade factors, international reserves, global crisis

JEL Classification: F15, F21, F31, F32

---

* The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

Introduction and overview:

The precursor of the global crisis in 2008 has been the remarkable drop in macro volatility and the cost of risk in advanced countries, a period dubbed as the "Great Moderation".[1] The developments in emerging markets have seen two separate phases during the twenty-year period of the Great Moderation. During the first phase of the Great Moderation (the 1990s), emerging markets (EMs) moved towards deeper financial integration and greater exchange rate flexibility. The growing financial integration, however, exposed emerging markets to a series of virulent financial crises, starting with the Mexican 1994-5 Tequila balance of payment crisis, continuing with the 1997 East Asian crisis, followed by the Russian and Brazilian crises. The resulting turbulence forced emerging markets to deal with fundamental deficiencies: consolidating their fiscal positions, reducing their overall balance sheet exposure, and buffering their positions with an unprecedented accumulation of reserves. The remarkable decline in the risk premia for emerging markets during the 1990s was thus achieved in the old fashioned way, by improving their balance sheet, solidifying their tax base and rationalizing their public expenditure. Consequently, during the second phase of the Great Moderation (the 2000s), most emerging markets found themselves sharing the benefits of the low macro volatility with advanced countries, including a remarkable further drop in country risk premia, and large inflows of capital from advanced countries which were chasing after higher yields.

The Great Moderation period came to an abrupt end with the global crisis of 2008-9 that originated in the US. The unfolding of this crisis provided a unique challenge for emerging markets having to cope with a global crisis which involved few domestic causes, unlike the typical emerging-market crises of the 1990s. Most emerging markets entered the 2008-9 crisis with a sizable buffer of international reserves, and managed exchange rate flexibility. Furthermore, there has been a gradual shift in the mix of positions, reducing the weight of debt liability, and increasing the weight of equity liabilities in emerging markets [see Figure 1]. Arguably, this configuration should have allowed EMs a broader choice of adjustment than the ones facing them during the financial crises of the 1990s. The purpose of this paper is to analyze this conjecture, focusing on external pressures facing EMs and contrasting their adjustments during the 2000-2006 Great Moderation phase with the adjustment

[1] See Stock and Waston (2002) for analysis of the Great Moderation hypothesis. Recent observers refer to 1987-2007 as the "Great Moderation" period.

observed during the 2008-9 crisis. The focus of our study on EMs stems from several observations. First, these countries were the source of most of the pre-crisis economic growth, and most of the global population lives there. Second, the process of globalization rapidly increased the financial and trade linkages of emerging markets with advanced countries, relative to the limited integration of developing, non EMs countries. Furthermore, the advanced countries have had elastic access to large dollar swap lines extended by the US FED during the crisis (either directly or via FED's large swap line with the ECB). Thereby, most advanced countries were able to meet excess demand for dollar liquidity by borrowing dollar reserves from the FED, facilitating the adjustment to the deleveraging pressures. In contrast, most EMs were not able to rely on borrowed reserves via swap lines, and were thereby more exposed to the need to adjust abruptly to the global crisis.

The body of this paper is an empirical analysis of quarterly panel data during the Great Moderation and the crisis period. We study the developments of exchange market pressure (EMP) for emerging markets, and the role of reserves in them.[2] To recall, exchange market pressure is a weighted sum of exchange rate depreciation and international reserves loss, pioneered by Girton and Roper (1977), and applied frequently in the analysis of EMs [see Frankel (2009) for a recent application and further discussion].[3] Exchange market pressure is the response to forces coming from the financial sector (various capital flows) and the international trade (trade of goods and services). One of our aims is to compare the role of financial and trade factors before and during the crisis. We capture trade factors by changes in the balance of trade and in the commodity terms of trade, and financial factors by changes in short-term and portfolio debt, equity and FDI inflows. We contrast adjustment patterns in EMs between the 2000s period of Great Moderation (2000-2007Q1) and the global crisis of 2008-9, investigating how the crisis changed the economic and statistical association between EMP and financial and trade factors.

---

[2] The literature dealing with EMP in emerging countries during the crisis includes Rose and Spiegel (2009) and Frankel and Saravelos (2010), focusing on the degree to which leading indicators of financial crises had been useful in assessing country vulnerability; and Aizenman and Hutchison (2010) investigating in a cross country study the extent to which the crisis caused external market pressures in emerging markets, and whether the absorption of the shock was mainly through exchange rate depreciation or the loss of international reserves.

[3] A positive (negative) EMP indicates a net excess demand (supply) for foreign currency, alleviated by a combination of reserve loss (gain) and depreciation (appreciation).

During the Great Moderation period, higher EMP is associated with lower income growth, higher inflation, deteriorating trade account and commodities' terms of trade, higher domestic credit growth, net outflows of portfolio investment debt, and a fall in the gross short-term external debt. During the crisis period, the correlations between the EMP and income, and between the EMP and measures associated with deleveraging (reduction in gross short-term external debt and net portfolio debt inflows) remained significant. Moreover, the coefficient of gross short-term external debt *quintupled* at the onset of the crisis and then gradually declined. The coefficients suggest that cross-border deleveraging was the main force behind emerging markets' EMP rise during the global financial crisis, with emerging markets' stock markets themselves only playing a secondary role. In addition to cross-border deleveraging, emerging markets were greatly affected by the fall in commodity prices during the initial phase of crisis.

We find suggestive evidence that financial factors played a much greater role in accounting for EMs hoarding of international reserves both before and during the global crisis. While the correlation between international reserves and financial factors (especially short-term debt) rose sharply during the crisis, the correlation between international reserves and trade factors (trade balance and changes in commodity terms of trade) were similar before and during the crisis. In addition, if we compare the effects of one-standard deviation changes in trade and financial variables on changes in international reserve holdings, we find that financial factors, especially changes in "hot money" inflows, played a much greater role than trade factors in both periods.[4] Specifically, during the Great Moderation period, the effect of a one standard deviation increase in the combined hot money variables on international reserves is more than *twice* as large as the effect of a one standard deviation increase in trade balance (3.7% versus 1.6%). This suggests the prominence of financial factors in accounting for the reserve hoarding by emerging markets during the Great Moderation, possibly associated with precautionary motives. The same comparison based on one standard deviation variations suggests that the relative impact of "hot money" flows almost doubled during the height of the global financial crisis (2008:Q1-2008:Q4) compared to the Great Moderation period.

---

[4] There is no natural unit of comparison, and we use the one-standard deviation change in each variable as the variation in each variable that is likely to occur with similar probability (68 percent).

1. Sample Characteristics

1.1 Emerging Markets

The cross-section consists of 28 EMs selected following Balakrishnan et al. (2009)[5]: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Romania, Russia, Slovak Republic, Slovenia, South Africa, Sri Lanka, Thailand, and Turkey. Balakrishnan et al. (2009) compare the transmission of financial stress from advanced economies to emerging markets during the 2008-09 crisis to three previous major episodes of global distress: the 1998 Russian default and the collapse of LTCM, the 2000 burst of the dot-com bubble, and the WorldCom, Enron, and Arthur Anderson defaults of 2002. They find that the transmission of financial stress during 2008-09 crisis differs markedly from the three preceding episodes. EMP was a major component of the financial stress in EMs during the 2008-9 crisis, while it played virtually no role in the preceding episodes. One of the goals of this paper is to identify the factors that explain the different patterns EMP during the 2008-09 crisis and the Great Moderation period, so for consistency we preserve the same sample of countries.

1.2 Identification of the Great Moderation period

While the bankruptcy of the Lehman Brothers in September 2008 and the global collapse of stock markets that followed constitute one of the most prominent chapters in the spread of the financial crisis from the U.S. to the world economy, the first signs of distress emerged much earlier. We identify the end of the Great Moderation period based on structural breaks in global risk indicators and an indicator directly linked to emerging markets. The risk measures we consider are the CBOE S&P 500 Options Implied Volatility Index (VIX), the spread between London interbank lending rate and overnight index swap rate (LIBOR-OIS spread), and the average EM sovereign debt spread (EMBI). Figure 2 plots VIX and the LIBOR-OIS spread. During the first three quarter of 2007 the VIX adjusted

---

[5] The definition of EMs varies across studies. The EM sample of Tanner (2002) includes 32 countries while another popular definition of emerging markets follows Morgan Stanley Capital International (MSCI) Emerging Markets Index which includes 23 countries. Compared to the country list in MSCI (as of December 31, 2009), the Balakrishnan et al. (2009) includes five additional countries as EMs: Argentina, Pakistan, Romania, Slovak Republic and Slovenia. As evident from the scatter plots in Figures 6-9 show, the addition of these countries does not affect our main findings.

to a higher stationary level from approximately 10 to 25 percentage points while the LIBOR-OIS spread jumped at the end of 2007:Q2 from less than 10 to approximately 75 basis points.

Next, we idenfity trend-breaks in the LIBOR-OIS spread and the average EMBI via a unit-root test following Clemente et. al.(1998). Figures 3 and 4 show the results for LIBOR-OIS and EMBI, respectively. The top panel of each figure shows the trend of the first-difference of the time-series, and the bottom panel plots the associated break-point t-statistic. Both breaks, in June and October 2007 respectively, are statistically significant at 1% level, indicating that emerging economies sovereign credit markets began pricing in higher risk during the middle of 2007. Based on these indicators we consider 2007:Q1 to be the last quarter of the Great Moderation period.

1.3 Crisis intensity measures and the crisis window

We use exchange market pressure (EMP) to measure the intensity of the crisis facing the emerging markets. EMP measures the combined exchange rate depreciation and loss of international reserves. We consider three variations of EMP indices[6]. Our main EMP measure is the un-weighted sum or percentage nominal depreciation and percentage loss of reserves:

$$EMP_{i,t} = \frac{\Delta e_{i,t}}{e_{i,t-1}} - \frac{\Delta IR_{i,t}}{IR_{i,t-1}} \tag{1}$$

where $e_{i,t}$ stands for nominal local currency exchange rate per U.S. dollar and $IR_{i,t}$ denotes international reserves holdings (excluding gold) by emerging market i during quarter t. $\Delta e_{i,t}$ and $\Delta IR_{i,t}$ stand for level changes in nominal exchange rate and international reserve holdings respectively between quarter t and $t-1$.

The second measure, EMP (IR/M-Base), is an un-weighted sum of percentage exchange rate depreciation and international reserve loss, with reserve loss deflated by the monetary base:

$$EMP_{i,t}^{IR/M-Base} = \frac{\Delta e_{i,t}}{e_{i,t-1}} - \frac{\Delta IR_{i,t}}{M_{i,t-1} / e_{i,t-1}} \tag{2}$$

[6] See Table A1 for details on the construction of EMP indices.

where $M_{i,t-1}$ stands for monetary base (in local currency units) of emerging market i in quarter $t-1$, and the monetary base is converted to U.S. dollars. For a number of emerging markets, where the quarterly data on base money was not available, we substituted $M1$ for monetary base. Following the monetary model-based EMP of Girton and Roper (1977), specification (2) provides a real measure of the loss of international reserves, normalized by the monetary base. We use this measure to check the consistency and robustness of our regression results.

The third measure, EMP (Standardized), is a weighted sum of demeaned percentage nominal exchange rate depreciation and percentage loss of international reserves; the weights are inverses of the historical standard deviation of each series:

$$EMP_{i,t}^{S\tan dardized} = \frac{1}{\sigma_{i,\Delta e}}\left(\frac{\Delta e_{i,t}}{e_{i,t-1}} - \mu_{i,\Delta e}\right) - \frac{1}{\sigma_{i,\Delta RES}}\left(\frac{\Delta IR_{i,t}}{IR_{i,t-1}} - \mu_{i,\Delta RES}\right) \tag{3}$$

where $\mu_{i,\,\Delta e}$ and $\mu_{i,\,\Delta IR}$ denote historical means of percent nominal depreciation and international percent changes in the holdings of reserves and $\sigma_{i,\,\Delta e}$ and $\sigma_{i,\,\Delta IR}$ stand for historical standard deviations of these series for emerging market i.[7] We add this measure for consistency checks. However, due to their ease of interpretation, we rely more heavily on the un-weighted measures, equations (1) and (2). Further details on the three EMP measure are available in the appendix. Figure 5 shows the time-series of the three EMP indices, with EMP (Standardized) on the left axis and the un-weighted measure, EMP and EMP (IR/M-Base), on the right axis. From 2000 to 2007 all three EMP indices exhibit a mild downward sloping trend. Starting in 2002, the EMPs are negative (on average), indicating nominal appreciation and the accumulation of international reserves by EMs during that period. This trend is abruptly interrupted by a sharp increase in all three EMP measures beginning in 2008:Q1, and peaking in 2008:Q4. The un-weighted measure of EMP (right axis) indicate that between 2008:Q1 and 2008:Q4 EMs went from an average 10% combined nominal appreciation and gains in international reserves holdings to a 20% combined nominal depreciation and international reserve loss. By 2009:Q2, on average, EMs switched back to net nominal appreciation combined with hoarding IR, and this trend continued during the rest of 2009 and beginning of 2010. We define the most intensive phase of the

[7] Balakrishnan et al. (2009) incorporate this measure into a more comprehensive Financial Stress Index (IFS).

crisis facing the EMs by the spike in average of all three EMPs (Figure 5, shaded in grey), 2008:Q1-2009:Q2.

2. Data

We collect quarterly data on emerging markets from 2000:Q1 through 2007:Q1, the Great Moderation period, and from 2008:Q1 through 2009:Q2, the height of the spillover of the global financial crisis to Ems.[8] We obtain data on population, GDP, CPI inflation, international reserves (minus gold), base money (or M1), trade balance, domestic credit, domestic stock market indices, portfolio debt, portfolio equity, and FDI flows from IMF International Financial Statistics (IFS) CD-ROM. The gross short-term external debt data is obtained from the Quarterly External Debt Statistics (QEDS) database, joint IMF and the World Bank, and is available only for a subset of emerging markets that subscribe to the IMF's Special Data Dissemination Standard (SDDS). The country specific commodity terms of trade index was constructed by Ricci et. al (2008), defined by commodity prices weighted by the shares of each commodity in the country's exports and imports:

$$CTOT_i = \prod_j (P_j / MUV) X_j^i / \prod_j (P_j / MUV) M_j^i \tag{4}$$

where P_j is the price index for six commodity categories (food, fuels, agricultural raw materials, metals, gold, and beverages), and X^i_j and M^i_j are the average shares of commodity j in country i's exports and imports over the period 1980 through 2001. Commodity prices are deflated by the manufacturing unit value index (MUV). Spatafora and Tytell (2009) point out that since X^i_j and M^i_j are averaged over time, the movements in $CTOT_i$ are invariant to changes in export and import volumes in response to price fluctuations and thus isolate the impact of commodity prices on a county's terms of trade.

The top panel of Table 1 lists summary statistics of the explanatory variables and reserves – in first differences if deflated by GDP, in percentage changes (first difference of log values) for price indices, and in net value for the stationary flow variables. The left (right) panel reports summary statistics during the Great Moderation (crisis period). A comparison of the means of selected variables

[8] Further details on sources and variable construction are provided in Table A1.

conveys the degree of the severity of the crisis: the average GDP per capita quarterly growth falls from approximately $75 to -$66, and mean stock market quarterly returns fall from 4% to -8%. The average trade balance (% GDP) also deteriorates from a 1% quarterly surplus to zero, and commodity terms of trade (% GDP) show greater volatility (standard deviation of 7% during the crisis compared to 4% before the crisis), with some the most severely hit countries suffering up to a 21% quarterly decline in commodity terms of trade during the crisis. The average net portfolio debt and equity inflows (% GDP) decline to zero during the crisis period with substantial drops in minimum and maximum values compared to the Great Moderation period. FDI inflows exhibit higher volatility (standard deviation of 16% during the crisis compared to 6% during Great Moderation), but show a rise in the average value. Thus, these less elastic flows were not affected by deleveraging in the same way as portfolio investment flows. The bottom panel of Table 1 shows the summary statistics for the three EMP measures. Consistently with the trends in Figure 5, the three EMPs indices rose from negative values during the Great Moderation to positive average values during the crisis period.

Due to the large number of time-series and data limitations we have an unbalanced panel. The most significant limitation arises from the inclusion of gross short-term external debt from QEDS database, with quarterly data unavailable for a number of countries that did not subscribe to the IMF's Special Data Dissemination Standard (SDDS) during the earlier part of the Great Moderation period. However, gross short-term external debt is an instrumental measurement of “hot money,” therefore in the subsequent section we report results keeping gross short-term external debt in the regressions. Table 2 reports simple pair-wise correlations of explanatory variables separately for the Great Moderation and crisis periods. The correlation between change in gross short-term external debt (% GDP) and net portfolio debt inflows (% GDP) is 0.10 (significant at 5% level) before the crisis and 0.11 (not statistically significant) during the crisis, indicating that these two variable proxy for different types of “hot money” flows. Overall, Table 2 shows that during the Great Moderation period a number financial variables are correlated with macro variables such as growth in GDP per capita, CPI inflation, trade balance (% GDP). These correlations, even when significant, rarely exceeds 0.2 in absolute value, indicating that multicollinearity poses little concern in the regression analysis.

4. Regressions and results

We quantify the statistical and economic importance of financial and trade factors in accounting for exchange market pressure patterns, and the hoarding and use of IR during the Great Moderation and the global crisis period via a series of fixed effects panel regressions. In addition to macro controls we include the variables associated with excess demand for currency stemming from net capital outflows (both debt and equity) and with changes in net imports. Macro controls include growth of GDP per capita,[9] CPI inflation, and the level of domestic credit (% GDP).[10] The main variables of interest are trade and financial factors associated with exchange market pressure and IR hoarding, where we control separately for quantity and price impact in each category. Trade factors are trade balance (% GDP) and percentage change in CTOT, where CTOT controls for the impact of change in commodity prices. Financial factors are change in gross short-term external debt (% GDP), net portfolio debt inflows (% GDP), net FDI inflows (% GDP), stock market returns, and percentage change in the VIX, where the last two control for price changes in financial markets as well as for global versus local disturbances.[11]

Table 3 reports results of regressing EMP on the vector of trade and financial factors and controls. Table 3 indicates that during the Great Moderation period lower income growth, higher inflation, higher domestic credit, a deteriorating trade account and commodities' terms of trade, net outflows of portfolio investment debt, and a fall in gross short-term external debt were all associated with higher EMP. Positive coefficients on CPI inflation and Change in Domestic Credit (% GDP) are consistent with Tanner (2002) who finds that episodes of higher EMP in emerging markets are associated with real depreciation and looser monetary policy (as proxied by the expansion of domestic credit). Income and domestic credit remain significant determinants of EMP during the crisis period as

---

[9] We include income as a control in the EMP regressions following Frankel and Saravelos (2010).

[10] Inflation and domestic credit are included as controls following Tanner (2002) who finds that higher EMP is associated with real depreciation and loose monetary policy (as proxied by the expansion of domestic credit).

[11] Country spreads (EMBI) were excluded from the main regressions because of the lack of statistical significance. If we exclude Change in Gross Short-Term External Debt (% GDP) from the regressions, then the EMP regression coefficients on EMBI during the 2008:Q1-2009:Q2 and 2008:Q1-2009:Q1 periods are positive and significant. We interpret this as further evidence that EMs absorbed the financial stress through quantity (not price) adjustments in the debt markets.

do the measures associated with cross-border deleveraging (reduction in gross short-term external debt and net portfolio debt outflows). Moreover, the coefficient of gross short-term external debt rises in absolute value from approximately 0.19 to 1.00 during the onset of the crisis, though subsequently declining to approximately 0.74 as we allow the crisis window to roll forward.

The association between cross-border financial deleveraging and EMP is highly significant economically, especially during the crisis period. During the Great Moderation, 2000:Q1-2007:Q1, a 10 percentage points decline in gross short-term external debt to GDP ratio is associated with an approximately 1.8 percentage points higher EMP. During the onset of the crisis, 2008:Q1-2008:Q3, the impact of the same 10 percentage points deleveraging is a 10 percentage points higher EMP.[12] Figure 6 shows the negative correlation between EMP and the change in gross short-term external debt (% GDP) through a scatter plot with best linear fit. To illustrate the relative position of emerging markets on the EMP / deleveraging scale, the scatter plot has been coded for each quarter.[13] As the financial crisis unravels from 2008:Q1 through 2008:Q4, the mass of emerging markets shifts towards the top left quadrant, indicating deleveraging combined with positive EMP. The mass then shifts back after 2009:Q1, indicating a reduction in deleveraging pressure and in EMP. Despite the significant reduction in EMP by 2009:Q2, a large fraction of emerging markets continued to experience deleveraging pressure, as indicated by their migration to the bottom left quadrant. The coefficient of net portfolio debt inflows also rises in absolute value during the onset of the crisis from 0.39 to 0.44. Unlike the coefficient of gross short-term debt, the coefficient of net portfolio debt inflows continues to increase as the crisis window is rolled forward to 2009:Q2.

As was the case with gross short-term external debt, the coefficients on net portfolio debt inflows are economically significant – over the period from 2008:Q1 through 2009:Q2, a 10 percentage points decline (rise) in portfolio debt inflows (outflows) is associated with a 6.3 percentage points higher EMP. Figure 7 depicts this association visually. Similarly to Figure 6, we observe the shift in the mass of

---

[12] These results are consistent with the view that during "flight to quality," in less liquid markets, elasticities get smaller in absolute terms, forcing a greater ER adjustment.

[13] Figure 6b supplements this analysis of EMP and gross short-term external debt deleveraging with a pre-crisis and crisis period scatter plot (2007:Q4 and 2008:Q4 data). This year over year comparison eliminates any potential seasonal effects. Table A3 lists the emerging markets in our sample along with the three letter country codes.

emerging markets to the upper left quadrant of deleveraging combined with positive EMP during 2008:Q4, followed by a gradual shift back in early 2009.[14]

Contrary to cross-border deleveraging, which was closely correlated with the rising EMP of emerging markets during the crisis, emerging markets' stock markets played only a secondary role. Negative stock market returns are significantly associated with EMP only when 2009:Q1 and 2009:Q2 are included in the crisis window, and not before.

In addition to financial deleveraging, emerging markets were greatly affected by the fall in commodity prices during the initial crisis phase, as indicated by the negative coefficient of the commodities' terms of trade. As the crisis window rolls forward into 2008:Q4 and 2009:Q1 and Q2, commodities' terms of trade are replaced by a deteriorating trade balance as a significant determinant of EMP. Apparently, as the crisis progressed, the initial trade losses from adverse commodities' terms of trade shock spread into the broader trade in goods and services.[15]

Table 4 provides a robustness check of these findings, with EMP replaced by EMP (IR/M-Base). During the Great Moderation period, the coefficients on CPI inflation, trade balance, and commodity terms of trade do not show up as significant, while growth of GDP per capita, domestic credit, short-term external debt and net portfolio debt inflows remain highly significant, indicating that the pre-crisis association between EMP and deleveraging is robust to the normalization of IR by M1. During the crisis period, all of the variables that are significant in the simple EMP regression remain significant and exhibit similar patterns as the crisis window is rolled forward. The negative and significant coefficients on gross short-term external debt and net portfolio debt inflows during the crisis window confirm the tight link between debt deleveraging and the excess demand for U.S. dollars, which was met by nominal depreciation and IR losses. The coefficient of Commodity Terms of Trade (CTT) is large and highly significant (0.67 in Table 4 compared to 0.27 in Table 3 in absolute value). As the crisis window rolls forward, the coefficient of CTT is replaced with the significant coefficient of Trade Balance (% GDP),

---

[14] Figure 7b supplements this analysis of EMP and portfolio debt deleveraging with a pre-crisis and crisis period scatter plot (2007:Q4 and 2008:Q4 data). This year over year comparison also eliminates seasonal effects.

[15] By construction, a percentage increase (decrease) in the commodity terms of trade measure is approximately equal to the aggregate net trade gain (loss) relative to GDP from changes in real individual commodity prices (see Spatafora and Tytell (2005)).

indicating that the finding that the adverse trade shock in EMs was initially concentrated in commodities is robust to normalizing IR by M1.

Table 5 reports the association between EM's change in international reserves (% GDP) and the same set of financial and trade flows. International reserves is one component of the EMP, but has commanded an independent interest in the external adjustment of emerging markets (e.g. Aizenman and Lee, 2007, and Aizenman and Hutchison, 2010). During the Great Moderation period there is a positive association between international reserves and trade balance, gross short-term debt, and net portfolio debt inflows. Consistent with both residual hoarding and precautionary hoarding of international reserves, Table 5 indicates that a rise in international reserves is associated with improvements in trade account as well as with inflows of "hot money." The coefficient of gross short-term external debt remains positive and highly statistically significant throughout the crisis period, indicating a tight link between international reserves decumulation and deleveraging. This link, however, is not borne out as tightly in portfolio investment flows, where equity replaces debt during the initial phase of the crisis, then changes signs during the latter phases. Finally, the significant and positive association between the commodities' terms of trade and international reserves holdings throughout the crisis period, indicates that some emerging markets also used their reserves in response to the burst of the commodity bubble that accompanied the global financial crisis. The coefficients on commodities' terms of trade are robust to the exclusion of the trade balance (results omitted for brevity). The negative coefficient of the trade balance during the crisis window specifications (2) and (4) may reflect different reserve management policy between commodity exporters and the rest of emerging markets, and the importance of the commodity price shock, in particular during the 2008-9 crisis.

The regression coefficients on trade balance, on commodities' terms of trade and on the variables associated with "hot money" (gross short-term external debt and portfolio debt) allow us to evaluate the relative impact of the trade balance residual versus precautionary hoarding considerations on international reserves. We estimate the relative impact of trade versus financial flows/hot money variables on international reserves by multiplying the regression coefficient of each explanatory variable, β, by its standard deviation, σ.[16] Under the assumption of normality, 68% of the changes in variable k

[16] Specifically, we calculate the product $\beta_k^T \sigma_k^T$, where T denotes either 2000:Q1-2007:Q1 or 2008:Q1-2008:Q4 time window, and k denotes the variable of interest.

are within the σ_k^T range. During the 2000:Q1-2007:Q1 period, a one standard deviation of the Trade Balance (% GDP) was 0.09. Multiplying it by the 0.18 regression coefficient of trade balance from Table 3 we obtain 0.016 (or 1.6%). This indicates that a one standard deviation improvement in the trade balance during the Great Moderation period translated on average into a 1.6% increase in international reserves. Analogously, a one standard deviation increase in the gross short-term external debt (0.04) was associated with 1.2% higher reserve holdings, and a one standard deviation increase in net portfolio debt inflows (also 0.04) was associated with 2.5% higher reserve holdings. Overall, during the Great Moderation period the combined impact of a one standard deviation increase in significant hot money variables on reserves is more than two times greater than that of significant trade variables (3.7% versus 1.6%).

During the financial crisis window, commodities' terms of trade replaced trade balance as the significant and robust trade variable associated with changes in international reserve holdings. Focusing on the 2008:Q1-2008:Q4 crisis window, we find that a one standard deviation decline in the commodity terms of trade (0.07) was associated with a 1.2% decline in international reserve holdings relative to GDP, while a one standard deviation decrease in gross short-term external debt (deleveraging, also 0.07) was associated with a 6.3% decline in international reserve holdings relative to GDP. Hence, the relative impact of trade considerations on international reserves has shifted to the commodities sector and slightly declined in magnitude during the financial crisis compared to the Great Moderation period. In contrast, the relative impact of "hot money" flows almost doubled during the height of the global financial crisis (2008:Q1-2008:Q4) compared to the Great Moderation period.

Table 6 reports the determinants of the absorption of EMP via international reserve depletion, with and without interaction dummies for positive EMP. Specifically, the dependent variable is $\frac{-\Delta IR_{i,t} / IR_{i,t-1}}{EMP_{i,t}}$, so that a negative coefficient indicates that an increase in the value of an explanatory variable is associated with lower a loss of reserves relative to the exchange rate depreciation in the composition of EMP.

A negative coefficient of CPI inflation during the Great Moderation period and the crisis windows, (2) and (3), may be interpreted in terms of the "Trilemma" nexus [Aizenman, Chinn and Ito (2010)] – countries with the ability to inflate rely relatively less on international reserves and more on

exchange rate depreciation. The coefficient triples in absolute value, from 0.042 in the 2000:Q1-20007:Q1 period to 0.134 (0.137) during the 2008:Q1-2008Q3 (2008:Q2-2008:Q4) periods, indicating the greater importance of an independent monetary policy within the framework of the "Trilemma" during the crisis.

The coefficient of gross short-term external debt conditional on positive EMP is negative, indicating that a greater deleveraging pressure (a lower gross short-term external debt to GDP ratio) was accommodated by increasing the weight of international reserves relative to exchange rate depreciation. The coefficient of gross short-term external debt is significant during both the Great Moderation and the 2008-9 crisis period, and is slightly higher in magnitude during the crisis period (5.9 in absolute value during 2008:Q1-2008:Q1 compared to 5.0 during 2000:Q1-2007:Q1). Furthermore, during the crisis period net portfolio debt inflows emerges as an additional significant determinant of the tradeoff between loss of reserves and exchange rate depreciation. A negative coefficient of net portfolio debt inflows (conditional on positive EMP) indicates that emerging markets with higher debt outflows relied relatively more on reserves than on exchange rate depreciation to absorb the deleveraging process. To summarize, the negative and significant coefficient of gross short-term external debt and net portfolio debt inflow indicates that when excess demand for foreign currency stems from capital flight, emerging markets accommodated it with a greater foreign exchange reserves adjustment relative to nominal depreciation, possibly due to balance sheet concerns.

A positive coefficient of stock market returns (conditional on positive EMP), net portfolio equity inflows (conditional on positive EMP) and a negative coefficient of VIX indicate that countries with higher losses in equity markets relied relatively less on reserves and more on exchange rate depreciation to absorb the crisis. Overall, a larger number of financial flows is significantly associated with the tradeoff between reserve loss and nominal depreciation during the crisis compared to the Great Moderation period. The coefficients of the variables that are significant throughout the two periods tend to increase in magnitude during the crisis. Most notably, price adjustment in equity markets has been met with a greater reliance on nominal depreciation, while debt deleveraging pressure was accommodated by greater reliance on foreign exchange reserves.

Having examined the contemporaneous relationship between EMP, and its components with other variables, we now ask a slightly different question. How did the developments before the crisis, during the 2000s part of the Great Moderation period, contribute to the depth of the crisis? We first

explore how the situations right before the crisis was related to the EMP during the crisis. Table 7 reports cross sectional regression results of country-level leading indicators as of 2007 on several EMP measures during the height of the crisis in 2008:Q4.[17] Specifically, we regress the three quarter rise in EMP from 2008:Q2 through 2008:Q4, EMP(IR/M-Base), and EMP(Standardized) on GDP per capita, deposit rates, trade balance, CPI inflation, net annual FDI inflows, net annual portfolio debt inflows, and international reserve holdings as of 2007.[18] The coefficient of pre-crisis GDP per capita is positive and significant in all but one specification, indicating that richer emerging markets, presumably more financially integrated, experienced greater EMP during the crisis. CPI inflation is also a significant predictor of EMP during the crisis in three of the four EMP dependent variables used, indicating that emerging markets with higher inflation rates prior to the crisis experienced greater EMP during the crisis. Trade balance has a negative coefficient and is statistically significant in six out of eight specifications, indicating that net exporters of goods and services experienced lower EMP during the crisis.

Turning to the decomposition of financial linkages, greater FDI inflows prior to the crisis is associated with lower crisis EMP, while greater portfolio debt investment with a higher crisis EMP. The coefficients on FDI and portfolio debt inflows are robust to different specifications and indicate that the nature of financial integration matters greatly for emerging markets in weathering through a global crisis. The positive association between pre-crisis portfolio debt inflows and crisis EMP supports our earlier finding that deleveraging played a dominant role in the spread of the 2008 financial crisis to emerging markets. The coefficient of net portfolio debt inflows in specifications (1) and (5) indicates that a 1% higher inflow of portfolio debt relative to the GDP in 2007 is associated with a 1.7% higher EMP in 2008:Q4. The coefficient in specification (3) indicates that emerging markets with 1% higher net portfolio debt inflows in 2007 experienced a 1.3% greater rise in EMP between 2008:Q2 and 2008:Q4.

---

[17] The variable choice follows Frankel and Saravelos (2010), with minor modifications. Values for all stock variables were taken at 2007:Q4, and the quarterly flow variables were aggregated from 2007:Q1through Q4. Additional variables for cross-sectional regressions are described in Table A2.

[18] We also considered EM pre-crisis sovereign debt spreads as an additional explanatory variable. If emerging economies that undertook fiscal improvement measures that resulted in the drop of EMBI during the Great Moderation where less vulnerable to the crisis, we would expect a negative coefficient on pre-crisis EMBI in the regression on the crisis EMP. It turned out that EMBI was insignificant under all specifications (results omitted for brevity), indicating once again that fiscal consolidation measures had little if any effect of reducing the vulnerability of EMs to a global deleveraging crisis.

By comparison, the coefficients on FDI inflows, although offsetting, are an order of magnitude smaller, indicating that "hot money" flows where the dominant financial determinant of the emerging markets' exposure to the crisis.

Specifications (2), (4), (6), and (8) include an interaction term between the pre-crisis financial openness (as measured by the Chinn-Ito index), KAOPEN, and net portfolio debt inflows. We find partial evidence that greater financial openness exacerbated the link between portfolio debt deleveraging and EMP during the crisis, as indicated by positive and significant interaction terms in regressions (4) and (6). The positive and significant coefficients on deposit rate in the regression with EMP and EMP (IR/M-Base) as dependent variables indicate that higher pre-crisis yields are associated with a greater crisis period EMP, apparently by attracting "hot money" in the run-up to the crisis. Finally, a significant and positive coefficient of international reserves in some specifications, especially with the 3-quarter rise in EMP as the dependent variable, indicates that emerging markets relied on international reserves to absorb the crisis.

The preceding analysis shows that the global 2008-09 crisis was propagated to the emerging markets through both trade and financial shocks, with the financial shocks (namely deleveraging of external debt) playing a dominant role. In the remainder of the section we analyze the determinants of the vulnerability of emerging markets to both types of shocks, specifically the roles played by trade and financial openness in increasing the vulnerability of emerging markets. Figure 8 shows the relative severity of the trade versus financial shock in each emerging market by the end of 2008. We proxy for the trade shock with a deterioration of trade balance relative to the GDP between 2007 and 2008, and proxy the financial shock with the reduction in net stock of portfolio investment liabilities relative to the GDP between 2007 and 2008. The mass of the "cloud" resides in the upper right quadrant, indicating that the majority of emerging markets suffered from both trade and financial shocks. Some emerging markets, such as China and Chile, experienced only a trade shock, with the trade balance to GDP ratio of Chile deteriorating by close to 10 percentage points. Other countries, such as Russia and Malaysia, were primarily exposed to the financial shock, with net portfolio investment to GDP ratio falling by over 20 percentage points in 2008 compared to 2007. Only one emerging market in our sample, the Slovak Republic, resides in the bottom left quadrant indicating relative insulation from both types of shocks during 2008.

Given the global nature of the crisis, the efficiency of the estimates can be increased by applying the seemingly unrelated regressions (SUR) approach, thereby accounting for the correlation in the disturbance terms across financial and trade shocks. The explanatory variables consist of major financial and trade indicators of a country, as of the end of 2007. Specifically, the explanatory variables for financial shock include: de-facto financial openness (sum of the total external financial assets and liabilities over GDP), financial exposure to the U.S. banking sector (sum of claims and liabilities by the U.S. banks on the representative economy over the sum of its total external financial assets and liabilities), and EMBI (as a proxy for a pre-crisis sovereign risk factor). The explanatory variables for the trade shock include: trade openness (imports plus exports over GDP), trade exposure to the U.S. (sum of exports and imports vis-a-vis the U.S. over the total exports plus imports), and the commodities' share in exports.[19] In addition, we consider the possible nonlinear relations between financial and trade openness and EM exposure to the shocks, including adding interactions and squared terms of financial and trade openness. Table 8 reports the results; for each specification the financial shock regression coefficients are shown in the top panel, and trade shock regression coefficients in the bottom panel.

Both pre-crisis financial and trade openness are significant predictors of the financial and trade shock during the crisis. The coefficients indicate that a 10 percentage points higher pre-crisis financial (trade) openness is associated with a 0.8 (0.3) percentage points decline in net portfolio liabilities (deterioration of trade balance) relative to the GDP during the crisis period. In addition, the significance of the interaction terms (about 10% significance in the trade shock/GDP equation) indicates a divergence between financially and trade integrated emerging markets in their exposure to financial and trade shock during the crisis. Hints of this divergence are also evident in the spread of the "cloud" among the three adverse shock quadrants in Figure 8.

Specifications (2) and (3) address the possible nonlinear association between the EM's pre-crisis financial and trade openness and the severity of the subsequent trade and financial shocks. A negative and significant coefficient of squared trade openness indicates that the association between the size of the trade shock and the pre-crisis level of openness turns from positive to negative for countries with a

---

[19] Since the U.S. was the epicenter of the 2008-09 crisis, the consequences of tight economic links to the U.S. may have different implications for the vulnerability of emerging markets to the shocks than their overall economic integration into the world economy. Thus, we consider the financial and trade exposure to the U.S. separately.

higher level of openness. Specification (3) shows that a higher commodities' share in exports exacerbates an emerging market's exposure to a trade shock with the coefficient approximately the same in magnitude as the coefficient of the total trade openness. The nonlinear association between trade openness and exposure to the trade shock is robust to controlling for the commodities' share in exports, and can be seen in a simple scatter plot of the best quadratic fit, Figure 9. A possible interpretation is that larger trade openness is, on average, associated with greater sectoral diversification, and for a large enough openness reduced the net trade shock during the crisis. In line with this interpretation, Latin American countries (mostly concentrated in commodity exports) are on the upward sloping portion of the curve, whereas Central and Eastern European countries (with greater sectoral diversification in trade), are on the downward sloping portion.

As has been documented by Hummels et al. (2001), the sectoral diversification of some of these countries has been associated with deepening network trade. Trade network has been associated with a large two-way trade of components as part of a complex vertical trade in manufacturing, where a large volume of trade may be associated with relatively small domestic values added. Consistent with the role of network trade, the two remaining countries on the downward sloping portion of the graph are Malaysia and Thailand, countries which form an integral part of the East Asian components trade network (see Kimura et al. (2007)). The contrast between exporters of commodities, the prices of which dropped substantially during the crisis, and network trade in component, whose prices adjusted downwards at a lower rate, may account for the non linear patterns depicted in Figure 9. The coefficient of the squared financial openness term in the financial shock equation is negative and insignificant, indicating that the relationship between financial openness and exposure to financial shocks is positive irrespective of an emerging markets' degree of financial integration.

Specifications (4) and (5) focus on financial and trade exposure to the U.S. Due to data limitations on the U.S. banks' external claims and liabilities at the country level, the sample is reduced from 27 to 18 emerging markets. The coefficient of financial exposure to the U.S. banking sector in regression (4) is approximately 0.6. Thus, a 10 percentage points higher sum of assets and liabilities of an EM in U.S. banks relative to its total external financial assets and liabilities, is associated with a 6 percentage points of greater deleveraging during the crisis (measured by the reduction in the stock of net portfolio investment liabilities relative to GDP). The coefficient of trade exposure to the U.S. is 0.07, indicating that a 10 percentage points higher share of trade with the U.S. is associated with a 0.7

percentage points greater deterioration of trade balance relative to the GDP during the crisis period. Including commodities' share in exports, however, makes the coefficients on the U.S. trade and financial links insignificant. While low degrees of freedom are of some concern, the reliance on commodities exports (and by extension a heavy degree of concentration in trade) serves as a more robust predictor of the severity of crisis-period trade shock than the direct exposure to the U.S. The negative coefficients on EMBI in the financial shock regression are consistent with the deleveraging hypothesis, as a higher pre-crisis EMBI would have reduced "hot money" inflows to the extent that it would have signaled greater sovereign risk and worse fiscal health of an emerging market. This finding illustrates the difficult choices facing the emerging markets. On the one hand, a number of emerging markets earned the drop in their risk premium during the Great Moderation period by improving their balance sheet, solidifying their tax base, and rationalizing their public expenditure. On the other hand, lower risk premiums, by attracting more "hot money" inflows, exposed them to the global deleveraging crisis of 2008-09.

Overall, the SUR analysis of the determinants of financial and trade shocks indicates that greater EM integration into the world economy was associated with severer deleveraging and a negative trade balance shock during the crisis. Economic ties to the U.S. are particularly important, especially as predictors of the financial shock, while greater reliance on commodity exports shows a robust association with higher trade shock. Finally, a negative association between the pre-crisis sovereign risk premium and the financial shock points at the tradeoff between achieving lower risk premiums to attract foreign investment and exposing one's economy to a deleveraging crisis.

5. Concluding remarks

In this paper we looked at the economic and statistical importance of financial and trade factors in accounting for Exchange Market Pressure patterns, and the hoarding and use of IR during the Great Moderation period and the global crisis of 2008-9. To recall, the fast financial integration of emerging markets during the 1990s exposed them to significant debt deleveraging propagated by the US during the crisis of 2008-9. In addition, the rapid increase in EMs trade openness exposed them to the adverse effects of the collapsing international trade. We trace the impact of the financial and the trade factors in a panel regression using quarterly data. We found that both factors are important, yet the economic size of the financial factors dominates that of trade factors, especially during the crisis.

References

Aizenman J. and J. Lee (2007). "International Reserves: Precautionary versus Mercantilist Views, Theory and Evidence," *Open Economies Review*, 18 (2), pp. 191-214.

Aizenman J., M.D.Chinn, H. Ito (2010) "The emerging global financial architecture: Tracing and evaluating new patterns of the trilemma configuration," *Journal of International Money and Finance*, 29 (4), pp. 615-641.

Aizenman J. and M. Hutchison (2010). "Exchange Market Pressure and Absorption by International Reserves: Emerging Markets and Fear of Reserve Loss During the 2008-09 Crisis". NBER WP 16260.

Balakrishnan R., S. Danninger, S. Elekdag, and I. Tytell (2009) "The Transmission of Financial Stress from Advanced to Emerging Economies" IMF Working Paper # 09-133.

Chinn M. and H. Ito H (2006). "What matters for financial development? Capital controls, institutions, and interactions", *Journal of Financial Development*, 81 (1), pp.163-192.

Clemente, J., A. Montanes, and M. Reyes (1998) "Testing for a unit root in variables with a double change in the mean" *Economics Letters*, 59 (2), pp. 175-182.

Girton, L. and D. Roper. (1977) "A Monetary Model of Exchange Market Pressure Applied to the Postwar Canadian Experience", *American Economic Review* 67: 537–48.

Hummels, D., J. Ishii, and K-M. Yi (2001) "The nature and growth of vertical specialization in world trade" *Journal of International Economics*, 54(1), pp. 75-96.

Frankel, J. (2009) "New estimation of China's exchange rate regime." *Pacific Economic Review* , 14: 3.

Frankel J. and G. Saravelos. (2010) "Are Leading Indicators of Financial Crises Useful for Assessing Country Vulnerability? Evidence from the 2008-09 Global Crisis" NBER working paper 16047.

Kimura F., Y. Takahashi, and K. Hayakawa (2007) "Fragmentation and parts and components trade: Comparison between East Asia and Europe" *The North American Journal of Economics and Finance,* 18(1), pp.23-40

Lane, P. R. and G. M. Milesi-Ferretti (2007), "The External Wealth of Nations Mark II", *Journal of International Economics* 73, 223-250.

Ricci, L. A., G.M. Milesi-Ferretti, and J. Lee (2008) "Real Exchange Rates and Fundamentals: A Cross-Country Perspective" IMF Working Papers, January 2008 Vol., pp. 1-25.

Rose. K. A. and M. M. Spiegel (2009) "Cross-Country Causes and Consequences of the 2008 Crisis: International Linkages and American Exposure" NBER working paper 15358.

Spatafora, N. and I. Tytell (2009) "Commodity Terms of Trade: The History of Booms and Busts," IMF Working Papers # 09-205.

Stock J. H. and M. W. Watson (2002). "Has the Business Cycle Changed and Why?" *NBER Macroeconomics Annual* Vol. 17, pp. 159-218.

Tanner, E. C. (2002) "Exchange Market Pressure, Currency Crises, and Monetary Policy: Additional Evidence from Emerging Markets" IMF Working Paper # 02-14.

Table 1: Summary Statistics for Panel Regression Variables

	Great Moderation Period (2000:Q1-2007:Q1)					Crisis Period (2008:Q1-2009:Q2)				
Explanatory Variables:	Obs.	Mean	St. Dev.	Min.	Max.	Obs.	Mean	St. Dev.	Min.	Max.
Growth in GDP per capita	764	$74.68	$257.28	-$3,689.51	$1,353.96	163	-$65.92	$821.31	-$7,248.60	$2,462.66
CPI Inflation	812	6.60%	8.38%	-2.49%	70.33%	168	7.56%	5.11%	-2.79%	26.49%
Trade Balance (% GDP)	773	0.01	0.09	-0.29	0.41	155	0.00	0.11	-0.30	0.36
Commodity Terms of Trade (% Chng.)	784	0.00	0.04	-0.14	0.15	168	0.00	0.07	-0.21	0.24
Change in Domestic Credit (% GDP)	760	0.00	0.10	-0.79	1.09	147	0.05	0.12	-0.25	0.78
Change in Gross Short-Term External Debt (% GDP)	374	0.00	0.04	-0.22	0.33	128	0.01	0.07	-0.24	0.40
Stock Market Returns	753	0.04	0.11	-0.44	0.54	156	-0.08	0.21	-0.85	0.47
Net Portfolio Debt Inflows (% GDP)	691	0.01	0.04	-0.16	0.29	150	0.00	0.05	-0.23	0.17
Net Portfolio Equity Inflows (% GDP)	732	0.01	0.02	-0.05	0.26	155	0.00	0.02	-0.06	0.15
Net FDI Inflows (% GDP)	771	0.04	0.06	-0.09	0.59	155	0.07	0.16	-0.10	1.74
Change in Reserves (%GDP)	763	0.01	0.05	-0.31	0.43	161	0.01	0.08	-0.26	0.43
Crisis Intensity Measures:										
EMP (Standardized)	812	-0.11	0.46	-2.67	4.94	168	0.10	0.77	-2.22	2.70
EMP (Reserves/M-Base)	644	-0.05	0.16	-0.71	1.05	137	0.02	0.21	-1.01	0.72
EMP	784	-0.04	0.12	-0.76	1.03	168	0.02	0.16	-0.31	0.53

Table 2: Pair-wise Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Great Moderation Period (2000:Q1-2007:Q1)									
(1) Growth in GDP per capita	1									
(2) CPI Inflation	0.024	1								
(3) Trade Balance (% GDP)	0.112 **	-0.124 **	1							
(4) Commodity Terms of Trade (% Chng.)	0.013	-0.033	0.082	1						
(5) Change in Domestic Credit (% GDP)	-0.067	0.030	-0.238 ***	0.074	1					
(6) Change in Gross Short-Term External Debt (% GDP)	-0.102 **	-0.099 *	-0.156 ***	0.027	0.375 ***	1				
(7) Stock Market Returns	0.145 ***	-0.113 **	0.105 **	0.104 **	0.036	0.110 **	1			
(8) Net Portfolio Debt Inflows (% GDP)	-0.125 **	-0.097 *	-0.082	0.069	0.031	0.100 *	0.112 **	1		
(9) Net Portfolio Equity Inflows (% GDP)	-0.098 *	-0.154 ***	0.134 *	0.024	-0.048	0.005	0.057	0.151 ***	1	
(10) Net FDI Inflows (% GDP)	-0.172 ***	-0.138 ***	-0.143 ***	0.008	-0.001	0.033	-0.008	0.204 ***	0.257 ***	1
	Crisis Period (2008:Q1-2009:Q2)									
(1) Growth in GDP per capita	1									
(2) CPI Inflation	-0.022	1								
(3) Trade Balance (% GDP)	0.128	-0.182 **	1							
(4) Commodity Terms of Trade (% Chng.)	0.140 *	-0.009	0.011	1						
(5) Change in Domestic Credit (% GDP)	-0.167 **	-0.162 **	-0.162 *	0.096	1					
(6) Change in Gross Short-Term External Debt (% GDP)	-0.037	0.056	-0.143	0.056	0.492 ***	1				
(7) Stock Market Returns	0.236 ***	-0.152 *	0.119	-0.135 *	-0.211 ***	-0.156	1			
(8) Net Portfolio Debt Inflows (% GDP)	0.094	-0.023	-0.103	-0.248 ***	-0.202 **	0.113	0.267	1		
(9) Net Portfolio Equity Inflows (% GDP)	0.146	-0.175 *	0.087	-0.075	-0.225 ***	-0.078	0.297 ***	0.240 ***	1	
(10) Net FDI Inflows (% GDP)	0.048	-0.038	0.031	0.023	0.164 *	0.099	-0.102	0.022	0.193 **	1

Notes: Standard errors in parentheses. *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively; balanced sample (list-wise missing value deletion). Panel explanatory variables for regressions reported in Tables 3, 4, 5, and 7.

Table 3: Absorption of Exchange Market Pressure, Great Moderation vs. Global Financial Crisis

Dependent Variable:	Exchange Market Pressure				
	Moderation Period	Crisis Period Windows			
Time Sample:	2000Q2-2007Q1	2008Q1-2008Q3	2008Q1-2008Q4	2008Q1-2009Q1	2008Q1-2009Q2
	(1)	(2)	(3)	(4)	(5)
Growth in GDP per capita	**-1.55E-04**	**-9.96E-05**	**-5.03E-05**	**-7.83E-05**	**-9.14E-05**
	(.00001)* **	**(.00004)** **	**(.00001)*** **	**(.00001)*** **	**(.00001)*** **
CPI Inflation	**0.002**	0.005	0.002	-0.004	-0.001
	(0.001) **	(0.007)	(0.006)	(0.004)	(0.004)
Trade Balance (% GDP)	**-0.116**	-0.515	**-1.195**	**-0.901**	**-0.864**
	(0.173) **	(0.484)	**(0.585)** **	**(0.406)** **	**(0.383)** **
Commodity Terms of Trade (% Chng.)	**-0.181**	**-0.268**	-0.038	0.034	0.024
	**(0.104)* **	**(0.116)** **	(0.081)	(0.132)	(0.107)
Change in Domestic Credit (% GDP)	**0.177**	0.274	**0.466**	**0.504**	**0.397**
	(0.051)* **	(0.179)	**(0.133)*** **	**(0.103)*** **	**(0.097)*** **
Change in Gross Short-Term External Debt (% GDP)	**-0.186**	**-0.998**	**-0.869**	**-0.824**	**-0.739**
	**(0.111)* **	**(0.219)*** **	**(0.176)*** **	**(0.124)*** **	**(0.117)*** **
Stock Market Returns	-0.052	-0.062	-0.193	**-0.295**	**-0.149**
	(0.044)	(0.132)	(0.119)	**(0.089)*** **	**(0.063)** **
VIX (% Chng.)	-0.010	-0.053	0.055	-0.050	-0.012
	(0.026)	(0.054)	(0.055)	(0.037)	(0.032)
Net Portfolio Debt Inflows (% GDP)	**-0.386**	**-0.442**	**-0.466**	**-0.522**	**-0.630**
	(0.131)* **	**(0.242)* **	**(0.261)* **	**(0.182)*** **	**(0.168)*** **
Net Portfolio Equity Inflows (% GDP)	0.073	0.076	1.039	0.474	0.413
	(0.132)	(0.691)	(0.685)	(0.512)	(0.472)
Net FDI Inflows (% GDP)	0.007	0.028	-0.024	-0.036	-0.027
	(0.077)	(0.044)	(0.066)	(0.061)	(0.058)
Constant	**-0.036**	-0.067	-0.058	-0.003	-0.006
	(0.009)* **	(0.050)	(0.050)	(0.033)	(0.027)
Cross-section fixed (dummy variables)	Yes	Yes	Yes	Yes	Yes
EGLS (Cross-section weights)	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	24.90%	80.47%	91.49%	84.20%	80.44%
Durbin-Watson stat	1.846	3.047	2.365	2.482	2.139
Periods included:	28	3	4	5	6
Cross-sections included:	21	21	21	21	21
Total panel (unbalanced) observations:	361	62	81	98	115

Notes: Standard errors in parentheses. *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively. Country spreads (EMBI) were excluded from the main regressions because of the lack of statistical significance. If we exclude Change in Gross Short-Term External Debt (%GDP) from the regressions then positive and significant coefficient of EMBI observed during the 2008:Q1-2009:Q2 period only. We interpret this as further evidence that EMs absorbed the financial stress through quantity (not price) adjustments in the debt markets.

Table 4: Absorption of Exchange Market Pressure, Great Moderation vs. Global Financial Crisis

(Alternative Measure)

Dependent Variable:	EMP (IR/M-Base)				
	Moderation Period	Crisis Period Windows			
Time Sample:	2000Q2-2007Q1	2008Q1-2008Q3	2008Q1-2008Q4	2008Q1-2009Q1	2008Q1-2009Q2
	(1)	(2)	(3)	(4)	(5)
Growth in GDP per capita	**-1.84E-04**	**-1.69E-04**	**-4.37E-05**	**-8.15E-05**	**-1.12E-04**
	(.00002)* **	**(.0001)*** **	**(.00001)*** **	**(.00002)*** **	**(.00002)*** **
CPI Inflation	0.000	**0.018**	-0.008	-0.007	0.000
	(0.001)	**(0.009)** **	(0.009)	(0.007)	(0.005)
Trade Balance (% GDP)	-0.246	0.730	**-1.581**	**-1.091**	**-1.074**
	(0.269)	(0.727)	**(0.773)** **	**(0.625)* **	**(0.592)* **
Commodity Terms of Trade (% Chng.)	-0.099	**-0.674**	0.098	0.061	0.133
	(0.182)	**(0.166)*** **	(0.205)	(0.230)	(0.155)
Change in Domestic Credit (% GDP)	**0.228**	-0.233	**0.469**	**0.496**	**0.281**
	(0.068)* **	(0.189)	**(0.181)*** **	**(0.178)*** **	**(0.153)* **
Change in Gross Short-Term External Debt (% GDP)	**-0.413**	**-0.892**	**-1.191**	**-1.176**	**-0.892**
	(0.137)* **	**(0.242)*** **	**(0.257)*** **	**(0.251)*** **	**(0.232)*** **
Stock Market Returns	-0.002	-0.080	**-0.247**	**-0.370**	**-0.147**
	(0.056)	(0.155)	**(0.141)* **	**(0.133)*** **	**(0.081)* **
VIX (% Chng.)	-0.004	-0.034	**0.126**	-0.014	0.027
	(0.033)	(0.065)	**(0.070)* **	(0.057)	(0.045)
Net Portfolio Debt Inflows (% GDP)	**-0.534**	**-1.018**	**-1.065**	**-0.961**	**-1.093**
	(0.172)* **	**(0.341)*** **	**(0.405)*** **	**(0.349)*** **	**(0.307)*** **
Net Portfolio Equity Inflows (% GDP)	-0.032	-0.283	**2.829**	1.115	0.342
	(0.338)	(1.261)	**(1.343)** **	(1.088)	(0.767)
Net FDI Inflows (% GDP)	-0.018	**0.171**	-0.048	-0.024	0.007
	(0.117)	**(0.080)** **	(0.115)	(0.097)	(0.091)
Constant	**-0.033**	**-0.190**	-0.001	0.006	-0.027
	(0.014) **	**(0.067)*** **	(0.077)	(0.057)	(0.034)
Cross-section fixed (dummy variables)	Yes	Yes	Yes	Yes	Yes
EGLS (Cross-section weights)	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	29.38%	88.50%	78.19%	63.23%	63.00%
Durbin-Watson stat	1.882	2.819	2.132	2.014	2.004
Periods included:	28	3	4	5	6
Cross-sections included:	19	19	19	19	19
Total panel (unbalanced) observations:	317	56	74	90	106

Notes: Standard errors in parentheses; *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively. Country spreads (EMBI) were excluded from the main regressions because of the lack of statistical significance. If we exclude Change in Gross Short-Term External Debt (%GDP) from the regressions then positive and significant coefficient of EMBI observed during the 2008:Q1-2009:Q1 and 2008:Q1-2009:Q2 period only. We interpret this as further evidence that EMs absorbed the financial stress through quantity (not price) adjustments in the debt markets.

Table 5: International Reserves and Changes in Emerging Markets' Trade and Financial Characteristics, Great Moderation vs. Global Financial Crisis

Dependent Variable:	Change in Reserves (% GDP)				
	Moderation Period	Crisis Period Windows			
Time Sample:	2000Q2-2007Q1	2008Q1-2008Q3	2008Q1-2008Q4	2008Q1-2009Q1	2008Q1-2009Q2
	(1)	(2)	(3)	(4)	(5)
Growth in GDP per capita	-5.98E-06	-3.09E-06	-4.99E-06	**-1.29E-05**	**-8.19E-06**
	(0.000)	(0.000)	(0.000)	**(.000003)*** **	**(.000002)*** **
CPI Inflation	0.000	-0.005	-0.003	**-0.011**	**-0.005**
	(0.000)	(0.004)	(0.004)	**(0.003)*** **	**(0.002)*** **
Trade Balance (% GDP)	**0.180**	**-1.268**	-0.200	**-0.295**	-0.112
	(0.097)*	**(0.328)*** **	(0.239)	**(0.124)** **	(0.123)
Commodity Terms of Trade (% Chng.)	-0.029	**0.311**	**0.163**	**0.182**	**0.176**
	(0.035)	**(0.059)*** **	**(0.055)*** **	**(0.051)*** **	**(0.039)*** **
Change in Domestic Credit (% GDP)	-0.031	-0.021	0.069	**0.113**	**0.087**
	(0.028)	(0.091)	(0.073)	**(0.056)** **	**(0.044)** **
Change in Gross Short-Term External Debt (% GDP)	**0.478**	**0.348**	**0.918**	**0.885**	**0.813**
	(0.060)* **	**(0.119)*** **	**(0.106)*** **	**(0.091)*** **	**(0.090)*** **
Stock Market Returns	-0.011	0.009	**0.134**	**0.083**	-0.014
	(0.016)	(0.039)	**(0.051)*** **	**(0.041)** **	(0.019)
VIX (% Chng.)	0.012	**0.074**	**0.064**	0.017	-0.002
	(0.010)	**(0.025)*** **	**(0.026)** **	(0.016)	(0.010)
Net Portfolio Debt Inflows (% GDP)	**0.292**	0.082	-0.090	-0.233	-0.209
	(0.069)* **	(0.197)	(0.177)	(0.164)	(0.141)
Net Portfolio Equity Inflows (% GDP)	-0.031	**1.161**	-0.637	**-0.723**	**-0.801**
	(0.087)	**(0.412)*** **	(0.410)	**(0.270)*** **	**(0.223)*** **
Net FDI Inflows (% GDP)	-0.027	**-0.066**	0.017	-0.009	0.019
	(0.038)	**(0.019)*** **	(0.074)	(0.060)	(0.062)
Constant	-0.004	**0.052**	0.021	**0.086**	**0.036**
	(0.003)	**(0.030)***	(0.032)	**(0.023)*** **	**(0.013)*** **
Cross-section fixed (dummy variables)	Yes	Yes	Yes	Yes	Yes
EGLS (Cross-section weights)	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	20.11%	85.13%	67.81%	74.07%	73.33%
Durbin-Watson stat	2.056	2.877	2.539	2.278	2.345
Periods included:	28	3	4	5	6
Cross-sections included:	21	21	21	21	21
Total panel (unbalanced) observations:	361	62	81	98	115

Notes: Standard errors in parentheses. *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively.

Table 6: Absorption of Exchange Market Pressure via International Reserve Depletion, Great Moderation vs. Global Financial Crisis

Dependent Variable:	Fraction of EMP due to Loss of Reserves				
	Moderation Period	Crisis Period Windows			
Time Sample:	2000Q1-2007Q1	2008Q1-2008Q3	2008Q1-2008Q4	2008Q1-2009Q1	2008Q1-2009Q2
	(1)	(2)	(3)	(4)	(5)
Growth in GDP per capita	3.25E-04	-1.40E-04	**7.45E-04**	7.61E-05	-2.70E-04
	(0.001)	(0.000)	**(.0004)****	(0.000)	(0.000)
DUMx(Growth in GDP per capita_	-0.001	-0.001	-0.001	0.000	0.000
	(0.001)	(0.001)	(.0004)*	(0.000)	(0.000)
CPI Inflation	**-0.042**	**-0.134**	**-0.137**	-0.060	-0.023
	(0.014)***	**(0.060)****	**(0.051)*****	(0.050)	(0.041)
DUMx(CPI Inflation)	**0.025**	**0.074**	0.022	-0.025	**-0.048**
	(0.014)*	**(0.039)***	(0.025)	(0.020)	**(0.021)****
Trade Balance (% GDP)	0.351	-3.453	3.789	1.818	2.354
	(2.285)	(3.019)	(2.491)	(1.958)	(2.050)
DUMx(Trade Balance (% GDP))	-0.606	0.582	0.331	-1.882	-0.346
	(1.566)	(2.196)	(1.413)	(1.165)	(1.299)
Commodity Terms of Trade (% Chng.)	1.265	1.717	-0.932	-0.736	-0.444
	(1.450)	(0.964)*	(1.424)	(0.972)	(1.013)
DUMx(Commodity Terms of Trade (% Chng.))	1.971	-10.122	-1.030	-1.192	-0.552
	(4.410)	(4.606)**	(1.763)	(1.430)	(1.533)
Change in Domestic Credit (% GDP)	-0.237	**5.687**	**5.908**	**4.190**	1.698
	(0.840)	**(1.308)*****	**(1.156)*****	**(1.163)*****	(1.093)
DUMx(Change in Domestic Credit (% GDP))	0.673	-2.963	**-3.021**	**-2.526**	-1.172
	(1.278)	(1.885)	**(1.363)****	**(1.289)***	(1.398)
Change in Gross Short-Term External Debt (% GDP)	**4.994**	-1.515	0.552	1.286	0.809
	(1.642)***	(2.761)	(1.982)	(1.788)	(2.072)
DUMx(Change in Gross Short-Term External Debt (% GDP))	**-4.958**	-1.265	**-5.446**	**-5.933**	-3.484
	(2.728)*	(3.741)	**(2.906)***	**(2.219)*****	(2.719)
Stock Market Returns	-1.055	**-4.017**	**-2.901**	**-1.849**	**-1.397**
	(0.811)	**(1.196)*****	**(0.868)*****	**(0.994)***	**(0.702)****
DUMx(Stock Market Returns)	1.191	**5.842**	**2.107**	**2.549**	1.348
	(1.515)	**(2.130)*****	**(1.054)****	**(1.177)****	(0.964)
VIX (% Chng.)	**-0.952**	**-1.238**	**-1.300**	**-1.061**	**-0.700**
	(0.305)***	**(0.403)*****	**(0.406)*****	**(0.368)*****	**(0.413)***
DUMx(VIX (% Chng.))	0.278	**1.396**	0.377	**1.240**	**0.931**
	(1.012)	**(0.751)****	(0.551)	**(0.501)****	**(0.534)***
Net Portfolio Debt Inflows (% GDP)	-2.364	**2.702**	**3.529**	**2.744**	1.629
	(2.230)	**(1.185)****	**(1.424)****	**(1.448)***	(1.455)
DUMx(Net Portfolio Debt Inflows (% GDP))	3.205	**-11.033**	**-10.796**	**-6.670**	-0.344
	(3.945)	**(5.994)***	**(3.197)*****	**(3.513)***	(3.687)
Net Portfolio Equity Inflows (% GDP)	0.091	-6.522	**-18.941**	**-13.109**	-5.146
	(2.290)	(4.392)	**(4.734)*****	**(4.009)*****	(3.508)
DUMx(Net Portfolio Equity Inflows (% GDP))	-8.359	**23.663**	**15.366**	-0.444	-4.486
	(6.261)	**(6.006)*****	**(6.563)****	(5.912)	(5.537)
Net FDI Inflows (% GDP)	1.199	0.274	-1.053	0.411	0.025
	(1.482)	(1.569)	(1.647)	(1.504)	(1.735)
DUMx(Net FDI Inflows (% GDP))	-1.528	-0.728	1.159	0.970	1.202
	(2.038)	(1.548)	(1.614)	(1.508)	(1.809)
Constant	**0.721**	**1.274**	**1.269**	**0.824**	**0.722**
	(0.132)***	**(0.393)*****	**(0.323)*****	**(0.363)*****	**(0.270)*****
Cross-section fixed (dummy variables)	Yes	Yes	Yes	Yes	Yes
EGLS (Cross-section weights)	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	16.06%	73.34%	57.33%	44.24%	30.79%
Durbin-Watson stat	2.205	2.830	2.667	2.588	2.638
Periods included:	28	3	4	5	6
Cross-sections included:	21	21	21	21	21
Total panel (unbalanced) observations:	361	62	81	98	115

Notes: *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively.

Table 7: Country Level Predictors of Crisis Exchange Market Pressure

Dependent Variable (2008:Q4 Value):	EMP		3 Quarter Rise in EMP		EMP (IR/M-Base)		EMP (Standardized)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independet Variables as of 2007								
GDP per Capita	**9.76E-06**	**7.46E-06**	4.27E-06	**7.62E-06**	**7.63E-06**	**7.75E-06**	**2.33E-05**	**2.23E-05**
	(.000003)* **	**(.000002)*** **	(0.000)	**(.000002)*** **	**(.000004)** **	**(.000002)*** **	**(.00001)* **	**(.00001)*** **
Deposit Rate	**0.012**	**0.007**	0.006	0.005	**0.010**	**0.008**	0.019	0.015
	(0.005) **	**(0.004)* **	(0.005)	(0.004)	**(0.005)* **	**(0.004)** **	(0.018)	(0.014)
Trade Balance (% GDP)	**-0.213**	**-0.176**	-0.125	**-0.202**	**-0.140**	**-0.150**	-0.327	**-0.315**
	(0.052)* **	**(0.042)*** **	(0.079)	**(0.040)*** **	**(0.059)** **	**(0.053)*** **	(0.224)	**(0.166)* **
CPI Inflation	**0.019**	**0.013**	**0.015**	**0.016**	0.008	0.005	**0.063**	**0.057**
	(0.007) **	**(0.006)** **	**(0.007)** **	**(0.005)*** **	(0.011)	(0.008)	**(0.033)* **	**(0.028)* **
Net FDI Inflows (% GDP)	**-0.127**	**-0.129**	**-0.113**	**-0.155**	**-0.038**	**-0.058**	**-0.267**	**-0.293**
	(0.014)* **	**(0.016)*** **	**(0.022)*** **	**(0.013)*** **	**(0.021)* **	**(0.019)*** **	**(0.055)*** **	**(0.099)*** **
Net Portfolio Debt Inflows (% GDP)	**1.672**	0.487	**1.308**	**0.967**	**1.172**	-0.042	**7.478**	4.238
	(0.331)* **	(1.088)	**(0.624)** **	**(0.553)* **	**(0.534)** **	(0.878)	**(1.111)*** **	(4.660)
KAOPEN x Net Portfolio Debt Inflows (% GDP)		1.202		**1.704**		**1.883**		4.288
		(1.315)		**(0.709)** **		**(1.042)* **		(6.909)
Reserves (% GDP)	**0.082**	0.041	**0.109**	**0.138**	0.034	0.040	-0.060	-0.051
	**(0.045)* **	(0.036)	**(0.052)** **	**(0.032)*** **	(0.055)	(0.051)	(0.205)	(0.182)
Included observations:	24	22	24	22	23	21	24	22
R-squared	67.28%	63.06%	50.01%	67.19%	32.35%	39.99%	54.18%	45.20%
Durbin-Watson stat	1.994	1.744	1.881	1.914	2.085	2.114	1.731	1.735

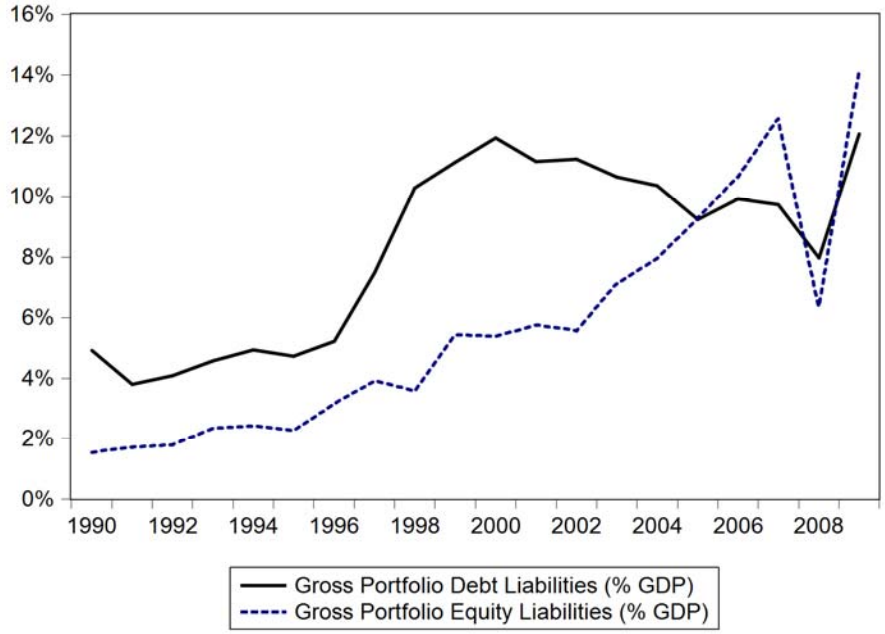
Notes: White heteroskedasticity-consistent standard errors in parentheses; *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively. Constant insignificant in all cases, omitted for brevity. Independent stock variable value as of 2007:Q4, independent flow variables aggregated from 2007:Q1 through 2007:Q4.

Table 8: Predictors of Financial and Trade Shock Severity; Seemingly Unrelated Regressions (SUR)

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable: Financial Shock/GDP				
Independent variables as of 2007:					
Financial Openness	**0.075**	**0.051**	**0.048**		
	(0.023)* **	**(0.024)** **	**(0.024)** **		
Fin. Openness x Trade Openness	**-0.038**				
	(0.020)*				
Financial Openness Squared		-0.009	-0.008		
		(0.010)	(0.010)		
Financial Exposure to U.S. Banks				**0.629**	0.490
				(0.336)*	(0.313)
EMBI				**-0.093**	**-0.104**
				(0.033)* **	**(0.028)*** **
R-squared:	26.70%	27.90%	27.90%	18.90%	16.20%
p-value:	0.000	0.005	0.008	0.000	0.000
	Dependent Variable: Trade Shock/GDP				
Trade Openness	**0.032**	**0.058**	**0.033**		
	(0.014) **	**(0.014)*** **	**(0.018)***		
Fin. Openness x Trade Openness	-0.010				
	(0.006)				
Trade Openness Squared		**-0.038**	**-0.023**		
		(0.011)* **	**(0.012)***		
Commodity Share in Exports			**0.036**		**0.053**
			(0.016) **		**(0.014)*** **
Trade Exposure to the U.S.				**0.074**	0.029
				(0.032) **	(0.028)
R-squared:	20.80%	39.60%	42.40%	15.90%	39.60%
p-value:	0.031	0.000	0.000	0.020	0.000
Observations:	27	27	27	18	18

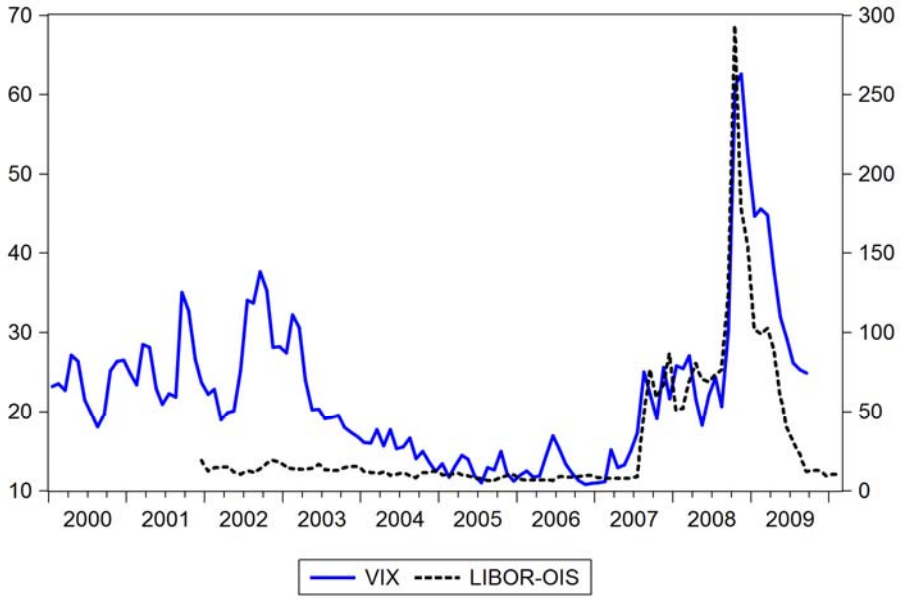
Notes: Standard errors in parentheses; *, **, and *** indicate correlations significant at 10%, 5%, and 1% respectively.

Figure 1: A Long-Run View of Portfolio Investment External Liabilities (EM Average)



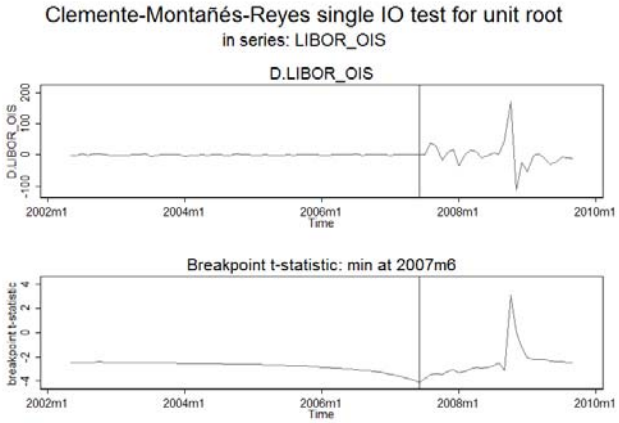
Source data: annual debt and equity portfolio investment data (stock) from IFS Country Tables, IMF.

Figure 2: Major Risk Indicators



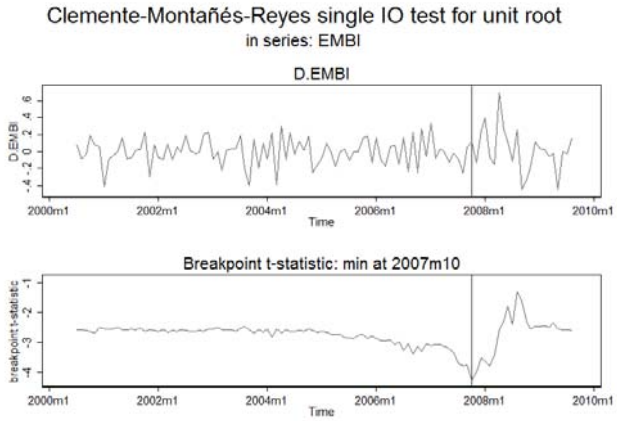
Notes: the figure plots VIX and the LIBOR-OIS spread. During the first three quarter of 2007 the VIX adjusted to a higher stationary level from approximately 10 to 25 percentage points while the LIBOR-OIS spread jumped at the end of 2007:Q2 from less than 10 to approximately 75 basis points.

Figure 3: Unit-Root Based Test for Structural Break: LIBOR-OIS Spread



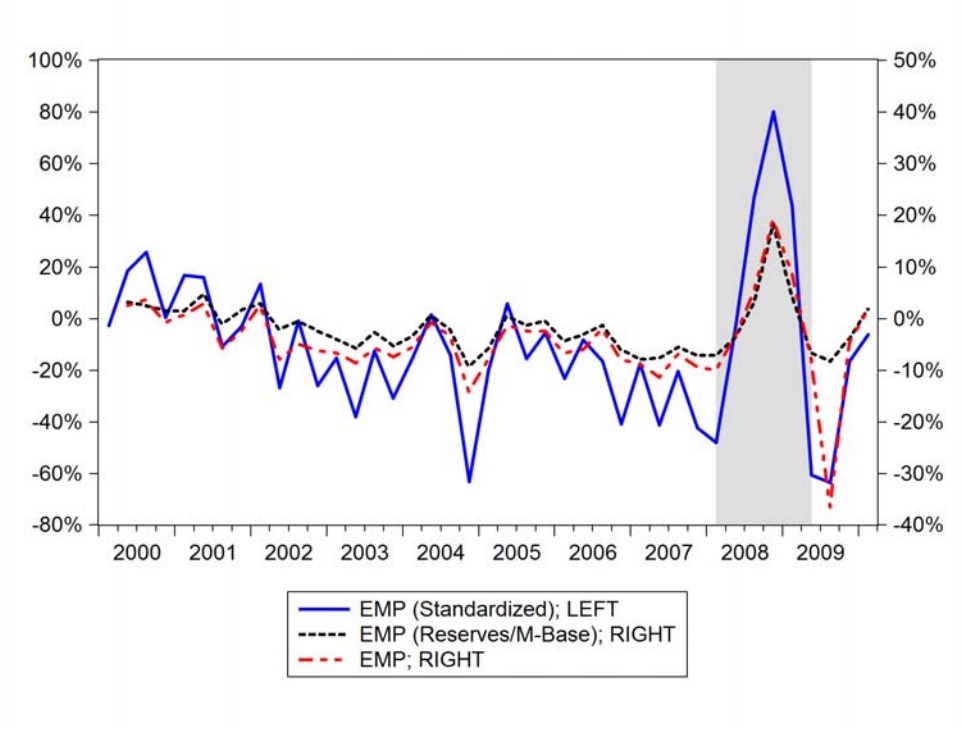
Notes: trend-break in the LIBOR-OIS spread identified via a unit-root test following Clemente et al. (1998). The June 2007 break is statistically significant at 1% level indicating a shift in the pricing of risk.

Figure 4: Unit-Root Based Test for Structural Break: Average EMBI



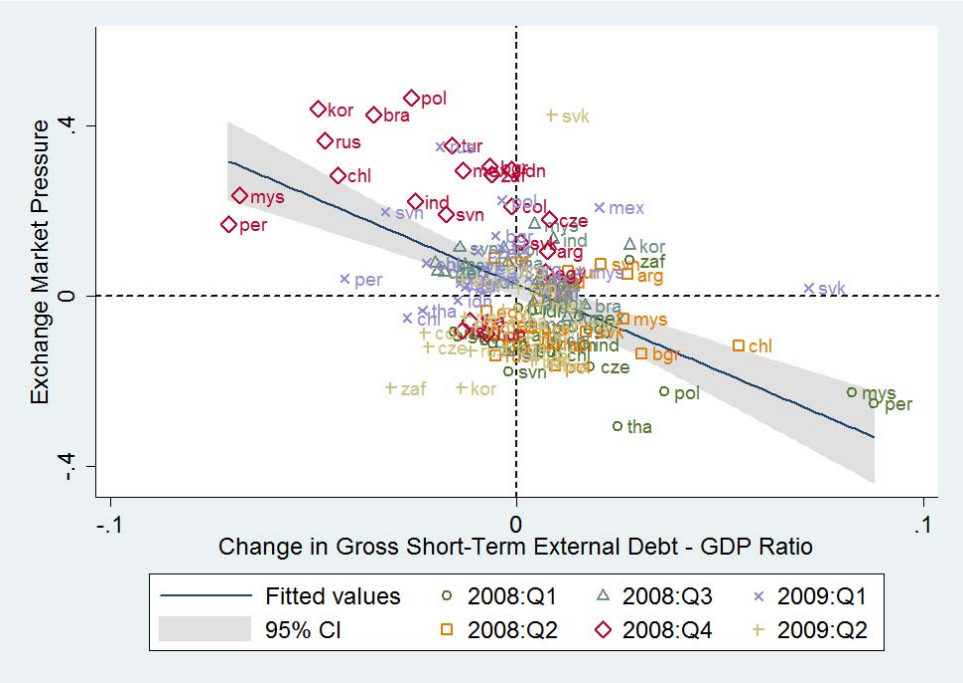
Notes: trend-break in the LIBOR-OIS spread identified via a unit-root test following Clemente et al. (1998). The October 2007 break is statistically significant at 1% level indicating a shift in the pricing of risk for emerging markets' sovereign debt.

Figure 5: Emerging Markets' Exchange Market Pressure Indices (Cross Section Averages)



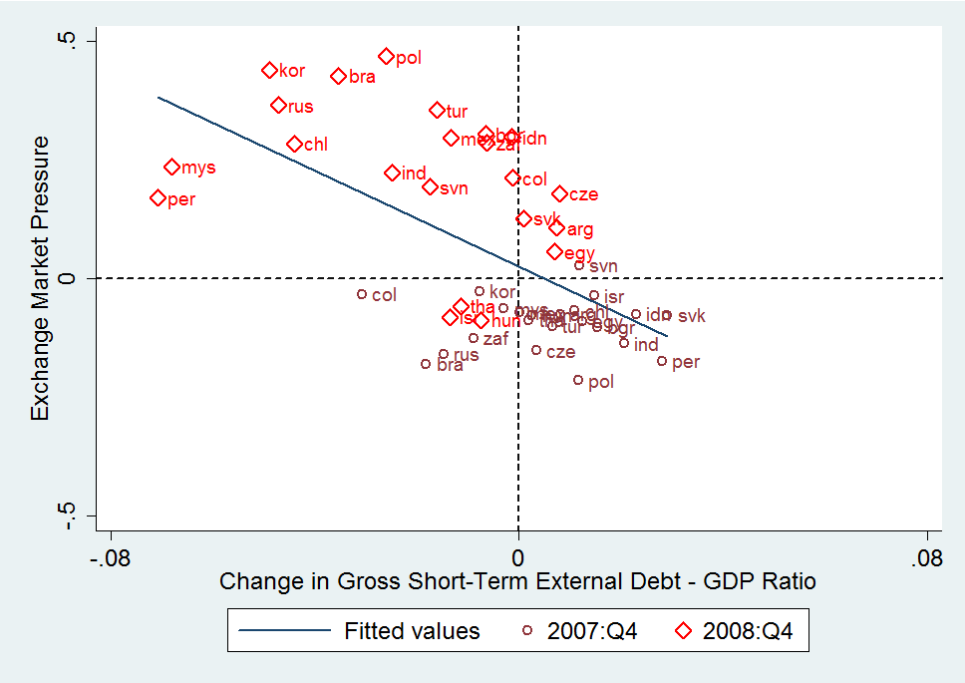
Notes: the figure shows the time-series of the three EMP indices, with EMP (Standardized) on the left axis and the un-weighted measure, EMP and EMP (IR/M-Base), on the right axis. We define the most intensive phase of the crisis facing the emerging economies based on the spike in average of all three measure of EMP (shaded in grey) as 2008:Q1 through 2009:Q2.

Figure 6a: Deleveraging in Short-Term External Debt and Emerging Markets' EMP



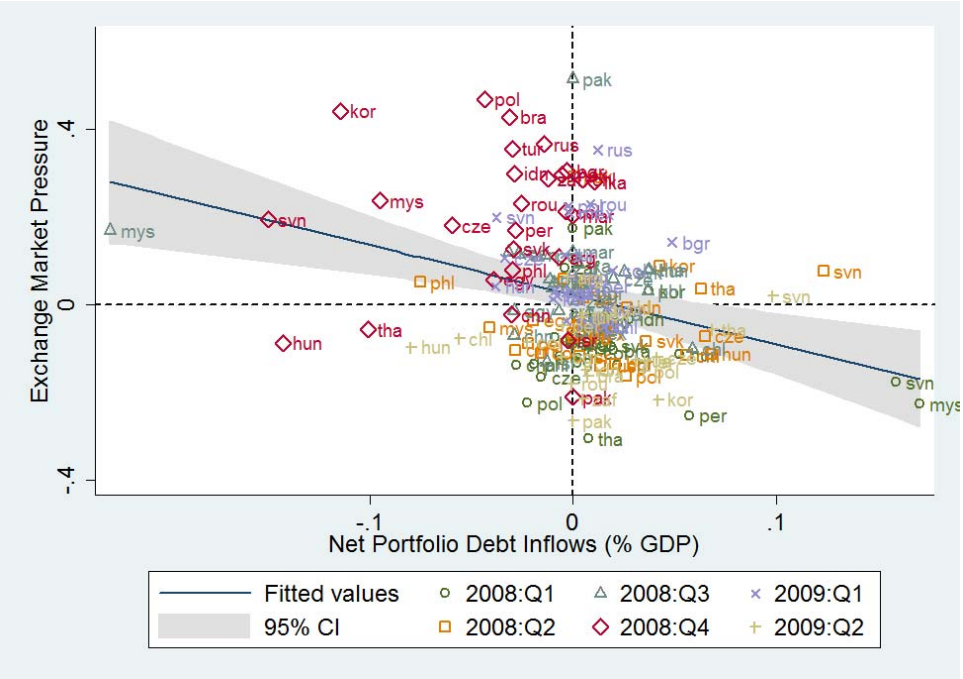
Notes: the figure depicts the shift in the mass of emerging markets to the upper left quadrant of positive EMP combined with short-term debt deleveraging (captured in panel regressions) during 2008:Q4 and 2009:Q1.

Figure 6b: Deleveraging and Emerging Markets' EMP, Contrast with Pre-Crisis



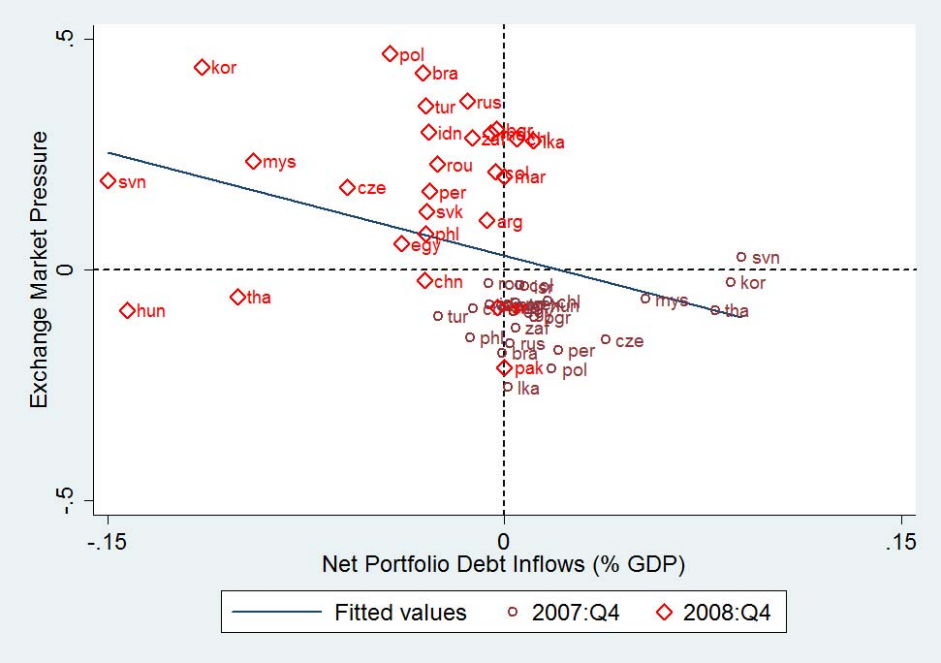
Note: the association between deleveraging in short-term external debt and EMP, sampled during the height of the crisis and one year prior; robust to seasonal effects.

Figure 7a: Deleveraging in Portfolio Debt Inflows and Emerging Markets' EMP



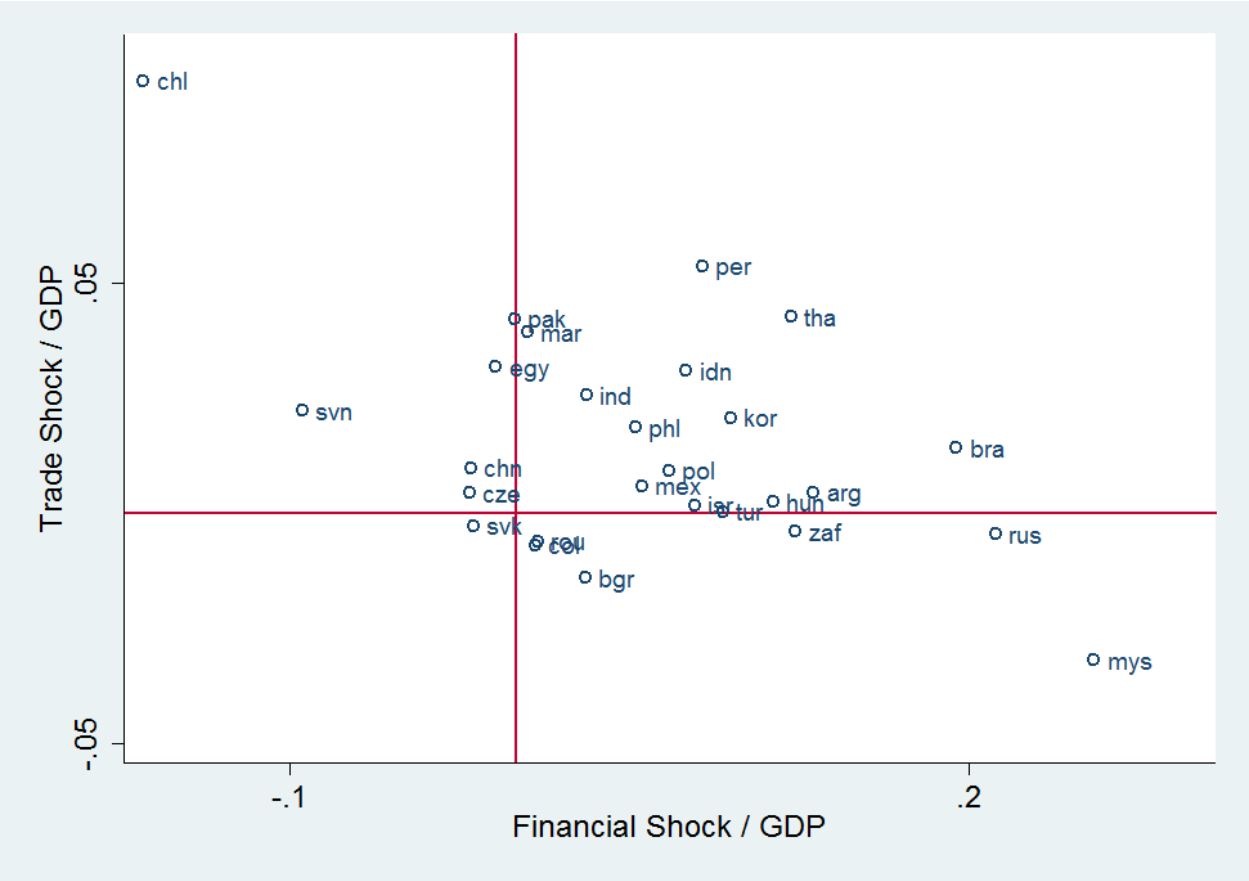
Notes: the figure depicts the shift in the mass of emerging markets to the upper left quadrant of positive EMP combined with portfolio debt deleveraging (captured in panel regressions).

Figure 7b: Portfolio Debt Deleveraging and EMP, Contrast with Pre-Crisis



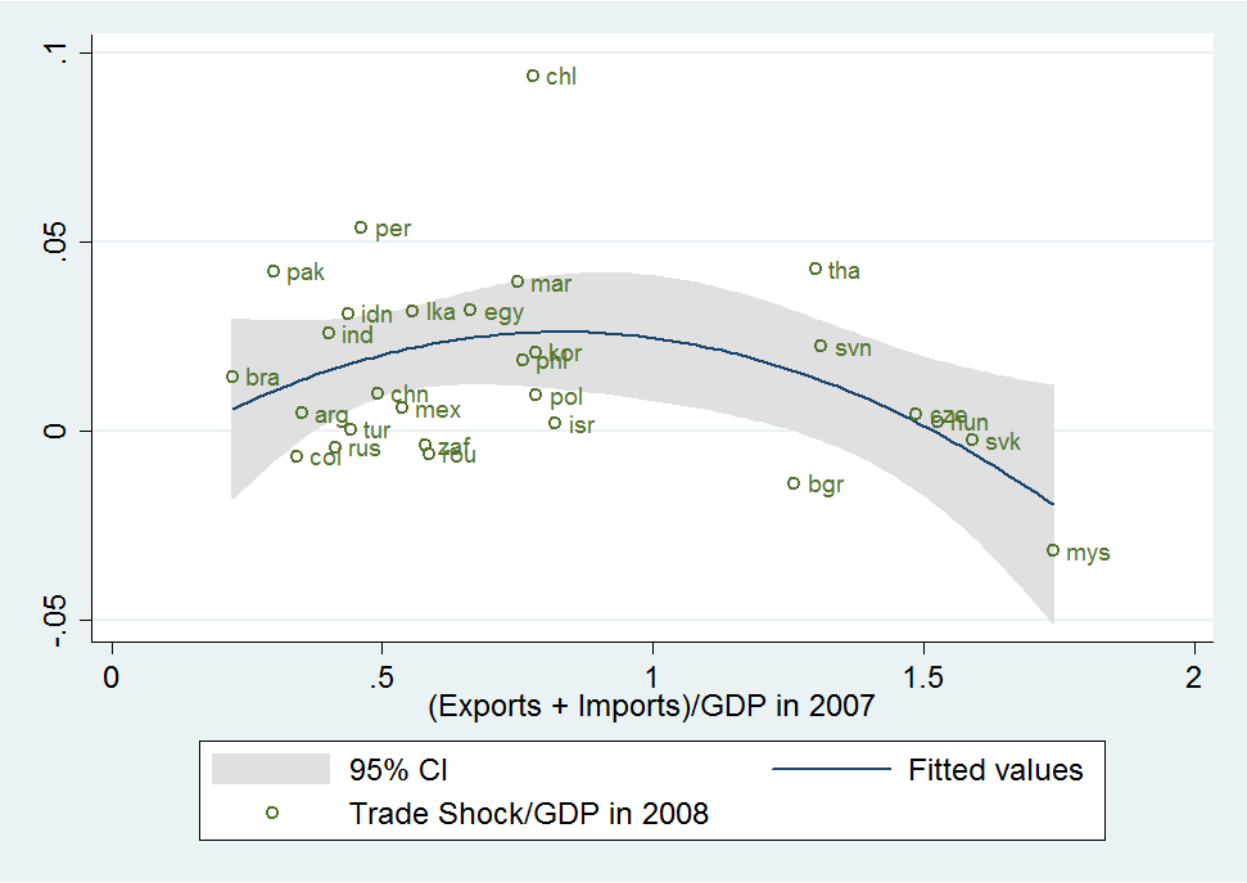
Note: the association between deleveraging in portfolio debt and EMP, sampled during the height of the crisis and one year prior; robust to seasonal effects.

Figure 8: Relative Exposure of Emerging Markets to Trade and Financial Shock during the 2008 Crisis.



Note: the figure shows the relative exposure of each emerging market to the trade versus financial shock by the end of 2008. The mass of the "cloud" resides in the upper right quadrant indicating that the majority of emerging markets suffered from both trade and financial shocks. 27 countries included because stock international investment position data for Sri Lanka not available.

Figure 9: Nonlinear Relationship between Trade Openness and Trade Shock Severity during the 2008-09 Crisis



Note: the least squares quadratic fit to the scatter plot confirms more formal regression results indicating that the association between the size of the trade shock and pre-crisis level of openness turns from positive to negative for countries with higher level of openness.

Table A1: Panel Regressions Variables Definitions and Sources

Variable Name:	Definition:	Source:
Exchange Market Pressure: EMP	$EMP_{i,t} = \frac{\Delta e_{i,t}}{e_{i,t-1}} - \frac{\Delta IR_{i,t}}{IR_{i,t-1}}$ $\Delta e_{i,t}$ and $\Delta IR_{i,t}$ stand for level changes in nominal exchange rate and international reserve holdings respectively between quarter *t* and *t-1*.	Authors' calculations
Exchange Market Pressure: EMP (ReservesIR/M-Base)	$EMP_{i,t}^{IR/M-Base} = \frac{\Delta e_{i,t}}{e_{i,t-1}} - \frac{\Delta IR_{i,t}}{M1_{i,t-1}/e_{i,t-1}}$ $M1_{i,t-1}$ stands for monetary base emerging market *t* in quarter *t-1*. The notation reflects the substitution of *M*1 for monetary base if the quarterly data on base money was not available.	Authors' calculations
Exchange Market Pressure: EMP (Standardized)	$EMP_{i,t}^{Standardized} = \frac{1}{\sigma_{i,\Delta e}}\left(\frac{\Delta e_{i,t}}{e_{i,t-1}} - \mu_{i,\Delta e}\right) - \frac{1}{\sigma_{i,\Delta RES}}\left(\frac{\Delta IR_{i,t}}{IR_{i,t-1}} - \mu_{i,\Delta RES}\right)$ $\mu_{i,\Delta e}$ and $\mu_{i,\Delta IR}$ denote historical means of percent nominal depreciation and international percent changes in the holdings of reserves and $\sigma_{i,\Delta e}$ and $\sigma_{i,\Delta IR}$ stand for historical standard deviations of these series for by emerging market i.	IMF data; see Ravi, Balakrishnan; Stephan Danninger, Selim Elekdag, Irina Tytell *IMF WP "The Transmission of Financial Stress from Advanced to Emerging Economies" http://www.imf.org/external/pubind.htm*
Growth in GDP per capita	Quarterly change in Gross Domestic Product per capita	International Financial Statistics, IMF
CPI Inflation	Consumer Price Index, % Change, Annual Basis	International Financial Statistics, IMF
Trade Balance (% GDP)	Trade Balance; % GDP	International Financial Statistics, IMF
Commodity Terms of Trade (CTOT)	$CTOT_i = \prod_j (P_j / MUV) X_j^i / \prod_j (P_j / MUV) M_j^i$ where *j* denotes one of the six commodity categories (food, fuels, agricultural raw materials, metals, gold, and beverages), P_j is the price index for each commodity, and X_{ij} and M_{ij} are the average shares of commodity *j* in country *i*'s exports and imports respectively over the period 1980 through 2001. Commodity prices are deflated by the manufacturing unit value index (*MUV*).	Commodity prices are obtained from Commodity Price Database, IMF (http://www.imf.org/external/np/res/commod/index.asp). MUV is obtained from Global Economic Monitor Database, World Bank; Commodity export shares come from IMF data, see Lee, Milesi-Ferretti and Ricci (2008).
Change in Domestic Credit (% GDP)	Quarterly change in total claims by monetary authorities and deposit money banks on central, state, and local governments, non-financial public enterprises, private sector, other banking institutions, and non-bank financial institutions; % GDP	Monetary Survey, International Financial Statistics, IMF
Change in Gross Short-Term External Debt (% GDP)	Quarterly change in Gross External Short-Term Debt of Central Gov't, Monetary Authorities, Banks, and Other Institutions; % GDP	Quarterly External Debt Statistics (QEDS) database, joint IMF and the World Bank. Available for countries that subscribe to the IMF's Special Data Dissemination Standard (SDDS)
Stock Market Returns	Quarterly change in the log of share price index of publicly traded companies of a given country.	International Financial Statistics, IMF
VIX (% Chng.)	Quarterly change in the log of CBOE S&P 500 Options Implied Volatility Index	Wharton Research Data Services, CBOE Indexes
Net Portfolio Debt Inflows (% GDP)	Debt security liabilities to nonresidents (market value, flow) minus debt security assets (market value, flow); %GDP	International Investment Position Data, International Financial Statistics, IMF
Net Portfolio Equity Inflows (% GDP)	Equity security liabilities to nonresidents (market value, flow) minus equity security assets (market value, flow); %GDP	International Investment Position Data, International Financial Statistics, IMF
Net FDI Inflows (% GDP)	Direct investment in reporting economy (flow) minus direct investment abroad (flow); % GDP	International Investment Position Data, International Financial Statistics, IMF
Population	Population, Millions	International Financial Statistics, IMF
GDP	Gross Domestic Product, Millions Nat'l Currency. Seasonal cyclicality of the series removed using non-linear smoothing procedure.	National Accounts Data, International Financial Statistics, IMF
Monetary Base	Base Money, Millions Nat'l Currency. M1 used in place of base money if data not available.	International Financial Statistics, IMF
Deposit Rates	Deposit rates, percent per annum.	International Financial Statistics, IMF
Reserves	Total Reserves Minus Gold, Millions U.S. Dollars	International Liquidity, International Financial Statistics, IMF

Notes: Several gaps in the IFS data had to be rectified with interpolation and smoothing: we interpolate annual population data to quarterly frequency using a cubic interpolation method in ("cipolate" command in STATA), in addition, since for most EMs seasonally adjusted GDP is not available, we use a non-linear time-series smoother ("tssmooth nl" command in STATA) with 4 quarter cycles to take out cyclical trends. In addition, international investment position for Egypt not available at annual frequency, used cubic interpolation on annual data ("cipolate" in STATA) to generate quarterly series, with endpoints augmented by linear interpolation ("ipolate" in STATA). Finally, deposit rates not available for India, replaced with bank rate (end of period).

Table A2: Cross-Sectional Regressions Additional Variables Definitions and Sources

Variable Name:	Definition:	Source:
KAOPEN	Chinn-Ito "de-jure" Index of fiancial openess, normalized to [0,1]	http://web.pdx.edu/~ito/trilemma_indexes.htm
Financial Openness	(Total Assets + Liabilities)/GDP; values in Millions USD, Lane and Milesi-Ferretti (LMF)data, "de-facto" measure	"updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007)"
Financial Exposure to U.S. Banks	(Claims + Liabilities to U.S. Banks)/(Total Assets + Liabilities)	Federal Reserves Statistical Releases: http://www.federalreserve.gov/econresdata/releases/statbanksus/ (data originally published in the Supplement to the Federal Reserve Bulletin)
Trade Openness	(Total Exports + Imports)/ GDP; values in Millions USD	International Financial Statistics, IMF
Trade Exposure to U.S.	(Exports + Imports to U.S)/(Total Exports + Imports); values in Millions USD	Directin of Trade Statistics (DOTS), IMF
Commodities Share in Exports	Average share of commodities (1980-2001) in country's exports	Commodity export shares come from IMF data, see Ricci et al. (2008)

Notes: Stock international financial position data from IFS not available for Sri Lanka. In addition, Federal Reserve data on U.S. banking sector claims and liabilities vis-à-vis individual countries only available for 18 of the 28 emerging markets in the sample.

Table A3: List of emerging markets and the associated codes

Country	Country Code
Emerging Europe, Middle East and Africa:	
Czech Republic	cze
Egypt	egy
Hungary	hun
Israel	isr
Morocco	mar
Poland	pol
Romania	rou
Russia	rus
Slovak Republic	svk
Slovenia	svn
South Africa	zaf
Turkey	tur
Emerging Asia:	
China	chn
India	ind
Indonesia	idn
Korea	kor
Malaysia	mys
Pakistan	pak
Philippines	phl
Sri Lanka	lka
Thailand	tha
Latin America:	
Argentina	arg
Brazil	bra
Chile	chl
Colombia	col
Mexico	mex
Peru	per

Notes: this selection of emerging markets follows Balakrishnan R., S. Danninger, S. Elekdag, and I. Tytell (2009), however due to data limitations on short-term external debt (especially during the early part of the sample period) the panel is unbalanced.