

International Financial Markets and Transmission of the Crisis: Determinants of Exchange Market Pressure and Absorption by International Reserves

Joshua Aizenman and Michael Hutchison

University of California, Santa Cruz

Abstract. This paper evaluates how the global financial crisis emanating from the U.S. was transmitted globally. Our focus is on the extent that the crisis caused external pressures (exchange market pressure), measured by a combination of exchange rate depreciation and loss of international reserves, across different regions of the world, across countries with different income levels, and differing levels of restrictions on international capital flows. We investigate in greater detail how emerging markets responded to the crisis, both in terms of total exchange market pressure and whether the response or absorb of the shock was mainly through exchange rate depreciation or the loss of international reserves. We correlate exchange market pressure with various real and financial indicators and find that higher-income emerging markets that were more integrated in the world financial system, and countries with higher total foreign liabilities/GDP, were more vulnerable to the financial crisis. Countries with large balance sheet exposure — high external portfolio liabilities exceeding international reserves — responded to the global shock by allowing greater exchange rate depreciation and comparatively less reserve loss. Despite the remarkable buildup of international reserves by emerging markets during the period prior to the financial crisis, countries relied primarily on exchange rate depreciation rather than reserve loss to absorb most of the exchange market pressure shock. This could reflect a deliberate choice, possibly to gain competitiveness at times of collapsing export demand, or market actions that moved quickly and strongly to adjust to changing circumstances, especially in emerging markets with open capital markets. The financial market crisis was followed by a global recession, suggesting that exchange rate depreciations attempting to improve international competitiveness can be part of the adjustment of small economies but can't resolve global collapsing demands.

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1. Introduction

International financial markets were at the heart of the world-wide financial crisis that emerged in late 2007 and reaching a climax between August 2008 and February 2009. Although the crisis started with mortgage-related (sub-prime) crisis in the United States, and was closely linked to banks in Western Europe holding mortgage-backed securities and derivative products, it quickly led to global liquidity crisis that greatly adversely affected the rest of the world.

We focus in this paper on the extent to which the global financial shock adversely affected the external position of countries throughout the world, but especially in emerging market economies. We measure external position by looking at changes in exchange market pressure—a combination of exchange market depreciation and loss of international reserves—as well as considering these two components separately. We are interesting in two basic questions: Firstly, how has the transmission of the global shock been affected by the extent of their international balance sheet exposure, financial development and financial openness?¹ Secondly, given the degree of exchange market pressure, what determines the tradeoff or choice between exchange rate depreciation and loss of international reserves in absorbing the shock? We sidestep in this paper questions regarding the root causes of the crisis. These issues are covered by growing literature dealing with the pre-crisis trends and policies that led to the buildup of financial vulnerabilities, and ultimately to the crisis in the US and its rapid transition to the global economy [see Obstfeld (2010), Obstfeld and Rogoff (2010), and the references therein].

Our results highlight the importance of total external liabilities/GDP ratio in accounting for exchange market pressures, and the short term external debt/international reserves ratio in accounting for the higher relative importance of exchange rate depreciation in accommodating the adjustment to a given degree of exchange market pressure. Our findings also corroborate the notion that the 2008-9 was the first global crisis in the era of modern financial globalization, affecting practically all countries. Yet, there was a systematic variation in countries' exposure to exchange market pressures, where countries with higher total foreign liabilities/GDP and higher GDP per capita were more exposed.

¹ See Eichengreen and Hausmann (2005) for studies on the impact of balance sheet exposure on Financial Instability.

Section 2 overviews the response of emerging and developing economies to the global financial shock with the help of summary statistics and simple correlations. Section 3 explains external vulnerability to financial shocks, and Section 4 concludes.

2. Response of Emerging and Developing Economies to the Global Financial Shock

Global External Responses to the Financial Crisis

Appendix Table A1 presents the change in Exchange Market Pressure (EMP),² exchange rate depreciation and percentage change in international reserves during the height of the financial crisis, August 2008 – February 2009. The table ranks countries from the highest to the lowest EMP. The EMP measure is the sum of the percentage change in the exchange rate (positive values denote percentage depreciation) and percentage loss of reserves. High values denote greater external pressure.³ The two components of EMP, percentage change in the exchange rate (depreciation relative to the USD) and percentage in international reserves.

It is remarkable how extreme and widespread across groups of countries and regions were external pressures during the height of the financial crisis, August 2008 – February 2009, ranging from highs experienced in Zambia (97%) and Russia (89%) to negative values (a combination of appreciation and/or gain in international reserves) for countries such as Hong Kong (SAR), China, Lebanon and Saudi Arabia. Nonetheless, the vast majority of countries experienced intense EMP—75 countries (85% of the sample) experienced positive EMP and only 13 countries experienced the opposite (negative EMP values). Most of the countries with positive EMP experienced substantial depreciation of their currencies against the USD (71 countries), although several maintained their currencies stable (4 countries) whereby EMP manifested only in international reserve loss.

² See Girton and Roper (1977) and Frankel (2009) for further discussion of exchange market pressure.

³ A second EMP measure is the sum of the percentage change in the exchange rate and loss of international reserves as a percentage of the monetary base. This measure focuses on the potential monetary effects of reserve losses during the financial crisis. This measure gave an almost identical ranking of external market pressure and is not reported for brevity.

Table 1: Subsample Averages

<i>Groups</i>	<i>Exchange Market Pressure</i>	<i>% Chng. Exchange Rate</i>	<i>% Chng. Foreign Exchange Reserves</i>
Full Sample (94 countries)	31.82%	20.80%	-10.90%
Emerging Markets (MSCI index)	35.31%	26.72%	-8.58%
<i>Income</i>			
High	33.92%	21.15%	-12.15%
Low	33.66%	20.11%	-14.47%
Middle	28.55%	19.32%	-9.24%
Middle & Low	29.69%	19.51%	-10.40%
<i>Region</i>			
N. America and W. Europe	39.31%	25.55%	-13.76%
E. Europe and Central Asia	54.80%	34.01%	-20.24%
East Asia	25.65%	18.58%	-7.07%
South Asia	30.87%	9.49%	-21.37%
Latin America	23.02%	15.75%	-7.27%
Africa & Middle East	21.11%	15.36%	-5.51%
<i>High Level Capital Restrictions</i>			
Bond	29.45%	17.82%	-12.25%
Bond Inflow	25.97%	14.48%	-12.30%
Equity	29.36%	19.07%	-12.69%
Equity Inflow	27.28%	19.38%	-8.94%

Notes: Exchange market pressure (EMP) defined as $(\% \Delta \text{ Exchange Rate}) - (\% \Delta \text{ Foreign Exchange Reserves})$. Percent changes calculated over the most severe period of global financial crisis from July 2008 through Feb. 2009. Emerging markets defined according to Morgan Stanley Capital International (MSCI) Emerging Market Index. Only countries which experience positive EMP included in the sample (except Hungary, see footnote 4), 20 total. Income group classification following IMF definitions, while the following IMF regional groups have been combined: N. America and W. Europe, and Middle East, North Africa, and Sub-Saharan Africa. High level of financial restrictions defined as 0.75 or 1.0 for Bond and Equity and 1.0 for Bond Inflow and Equity Inflow according to Schindler capital controls index.

Table 1 presents summary statistics. The sample is divided into income groups, regions and the extent of capital market restrictions. The average EMP for the full sample was over 31%, and was roughly evenly distributed amongst high and middle income countries (34% EMP) and somewhat lower for low income countries (28% EMP). EMP for the emerging markets as a group was virtually identical to the high and middle income groups, with the main difference being in the composition of exchange rate/reserve loss—emerging markets absorbed much less of the EMP by losing reserves (and experienced corresponding greater exchange rate depreciation). Low income countries presumably fared better than others because their financial

and banking systems are generally only weakly linked to the global financial system, thereby muting the transmission of the financial crisis from major financial centers to their economies.

The financial crisis also hit all regions of the world, though the greatest effect was felt in Eastern Europe/Central Asia (55% EMP) and Western Europe (39%). This is not surprising given that the sub-prime crisis emanated from the U.S. was directly linked to financial institutions in Western Europe, and Western Europe in turn was tightly linked through banking ties with Eastern Europe. By contrast, Africa/Middle East fared best as a region with the lowest EMP, with an average of only 21%, followed closely by Latin America with 23% EMP.

The EMP for the group of countries with high levels of capital restrictions of various types are also shown in Table 1. The countries with high levels of capital controls experienced EMP to a similar extent as the low income countries, i.e. somewhat below the sample average, perhaps not surprising since the countries with the most stringent restrictions on capital flows are generally low income countries.

Panel studies of EMP frequently normalize the exchange rate depreciation rate and reserve loss rate, focusing on the deviations from their means, normalized by the standard deviation of the relevant series (see Levy-Yeyati and Sturzenegger (2005)). As our focus is on a cross country comparison during an unprecedented global crisis, we refrain from such normalizations. As a sensitivity analysis, we compare in Appendix A2 our EMP measure and the Weighted EMP used at the IMF's World Economic Outlook (2009). The correlation between the two measures is highly significant, and equals 0.63.

In summary, the global financial crisis affected countries across the globe in all regions, income levels and whether or not they had tight restrictions on capital flows. Exchange market pressure was intense in most countries, mainly absorbed by exchange rate depreciation but also through substantial losses of international reserves. The widespread nature and intensity of the crisis marks this financial crisis episode the most global in nature since the Great Depression.

Emerging Market Responses to the Financial Crisis

Our main focus is on how the global financial crisis affected emerging market economies. To this end, Table 2 presents simple correlations of EMP with economic indicators (GDP per capita and trade openness) and financial indicators. The financial indicators cover financial development (stock market capitalization), financial openness (capital account openness), total

financial account liabilities (total external liabilities as a percent of GDP), and balance sheet exposure (short term foreign debt exceeding international reserves, as a percent of international reserves). The correlations are calculated for the full sample of emerging markets as well as regional groupings of emerging markets (Eastern Europe and Central Asia, East Asia, Latin America and Other Emerging Markets). In addition, the sample is segmented into those countries with a high degree of restrictions on international bond flows (outflows and inflows), bond inflows, equity flows (outflows and inflows) and equity inflows. The MSCI index is used to classify emerging markets and only emerging markets that experienced positive EMP are included in the sample.⁴

Table 2: Correlations with Exchange Market Pressure (EM): Emerging Markets

	<i>All Emerging</i>	<i>Regional Group</i>				<i>High Level Fin. Restrictions</i>			
		<i>E. Europe C. Asia</i>	<i>E. Asia</i>	<i>Latin America</i>	<i>Other Emerging</i>	<i>Bond Inflow</i>	<i>Bond Equity</i>	<i>Equity Inflow</i>	
<i>Trade and GDP</i>									
GDP per capita	0.575***	-0.296	0.776	0.004	0.521	0.817**	0.947**	0.914***	0.938***
Trade Openness	-0.038	0.774	-0.009	-0.535	0.587	-0.076	-0.710	-0.182	-0.663
<i>Financial Factors</i>									
Financial Account Liabilities	0.699***	0.388	0.864	0.784**	0.541	0.661**	0.601	0.630*	0.557
Balance Sheet Exposure	0.361	0.598	-0.620	0.425	0.270	0.363	0.310	0.423	0.306
Stock Market Capitalization	0.011	0.986	0.217	-0.268	0.416	0.202	0.647	0.124	0.588
Capital Account Openness	-0.136	-0.187	0.200	0.022	-0.816*	0.391	0.227	0.354	0.177

Notes: *, **, and *** indicate significant correlations at 10%, 5%, and 1% level respectively. Emerging markets defined according to Morgan Stanley Capital International (MSCI) Emerging Market Index. Only countries which experience positive EMP included in the sample (except Hungary, see footnote 4), 20 total. Table A1 details variable descriptions. High level financial restrictions defined as 0.75 or above for Bond and Equity and 1.0 for Bond Inflow and Equity Inflow according to Schindler capital controls index.

⁴ The Morgan Stanley Capital International (MSCI) Emerging Markets Index includes 26 countries, five of which experienced positive EMP during August 2008 – February 2009: China, Israel, Jordan, Taiwan and Thailand. We exclude Hungary from the group of 21 emerging markets which experienced negative EMP because Hungary received a substantial IMF disbursement during our sample period, \$6.4 billion out of a \$15.7 billion IMF stand-by agreement. This stand-by agreement significantly affected Hungary's foreign exchange reserve position, and potentially the exchange rate depreciation rate. Our sample is composed of the remaining 20 emerging markets: Argentina, Brazil, Chile, Colombia, Czech Republic, Egypt, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Turkey and Venezuela.

The focus on emerging markets (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 the OECD countries, relative to the more limited integration of developing, non emerging market countries. Finally, the OECD countries have had elastic access to large dollar swap lines extended by the US FED (either directly or via FED's large swap line with the ECB). Thereby, the OECD countries were able to meet excess demand for dollar liquidity by borrowing dollar reserves from the FED, facilitating the adjustment deleveraging pressures. In contrast, most emerging markets were not able to rely on borrowed reserves via swap lines, thereby they were more exposed to the need to adjust abruptly to the global crisis.

Only two of the variables for the full sample of emerging markets correlate significantly with EMP — GDP per capita (0.57) and total financial account liabilities (0.70) are positively correlated with EMP and are significant at the 1% level. Emerging market countries with higher per capita income, generally more integrated in the global financial system, experienced more intense EMP. Emerging markets that were more burdened with total foreign debt also experienced higher levels of EMP, partly because the global liquidity shortage associated with the financial crisis made financing debt more difficult or, in some cases, impossible for several months. In addition, external balance sheet exposure is positively (weakly) correlated with EMP (0.36). Countries not able to cover their short-term portfolio debt with reserves experienced somewhat greater external vulnerability as measured by higher values of exchange market pressure.

3. The Tradeoff between Reserve Loss and Exchange Rate Depreciation

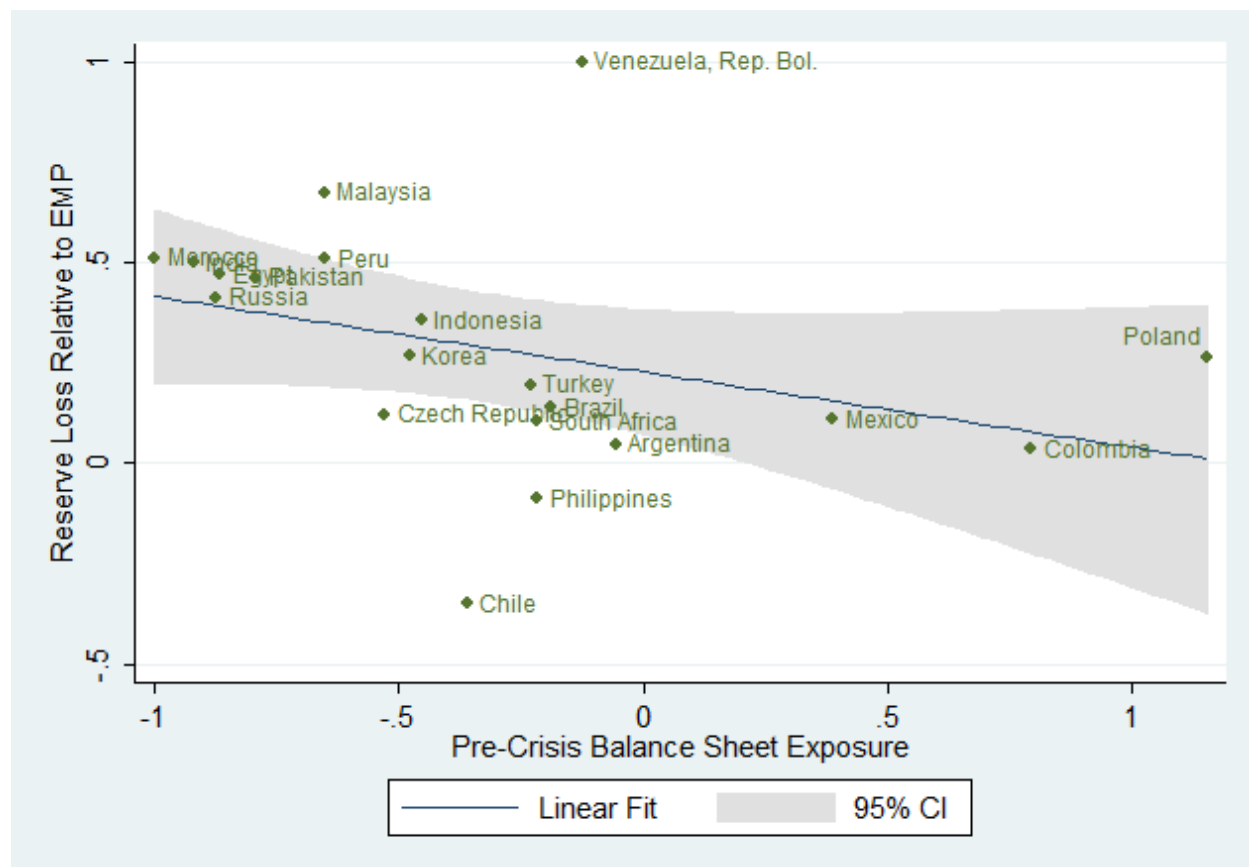
We observed that countries differ markedly in their response to the financial crisis in terms of whether exchange rate depreciation or losses of reserves absorb EMP. Are there discernable patterns in the loss of international reserves relative to exchange rate depreciation in emerging markets for a given degree of exchange rate pressure during the global financial crisis? This is measured as the loss of international reserves as a percentage of total exchange market pressure. Large values indicate that countries are absorbing a high percentage of the total shock by selling international reserves.

It is not clear a priori how emerging markets would respond, in terms of using exchange rates or reserves, in absorbing an EMP shock. It would seem to be related to balance sheet exposure. If emerging markets have a high degree of short-term external debt exposure, often denominated in foreign currency, then they may want to limit exchange rate depreciation that increases the real value of the foreign debt. This would suggest a positive value between balance sheet exposure and IR/EMP. On the other hand, balance sheet exposure by definition means that short-term external liabilities are not covered by holdings of international reserves. This makes countries more vulnerable to the global financial shock and less able to stem the external crisis by using international reserves that are in relatively short supply. This argues for a negative link between balance sheet exposure and IR/EMP.

Figure 1 shows the link between balance sheet exposure and EMP for the sample of emerging markets. There is a negative correlation of -0.36 — countries with fewer reserves relative to short-term external portfolio debt rely more on exchange rate depreciation to absorb the EMP shock. Limited reserves constrain countries in how they respond to the crisis, as is consistent with the second hypothesis discussed above.

Table 3 reports the correlation between the fraction of EMP due to loss of Reserves ($-\Delta\text{IR}/\text{EMP}$) with Balance Sheet Exposure in 2007, where the sample of emerging markets has been segmented by the extent of lost reserves (percentage of EMP) during the financial crisis. This analysis reveals significant heterogeneity. While for the full sample of 20 emerging markets, the correlation between balance sheet exposure and the fraction of EMP accommodated by reserves loss is negative during the crisis, this correlation is positive and significant for nine countries that accommodated their EMP by reserves loss above 30%. Moreover, this correlation is highly significant within the group of eight emerging markets that accommodated their EMP by reserves loss above 40%, illustrated in Figure 2. All of these countries had reserves covering more than their short term external debt, inducing them to absorb a significant portion of their exchange market pressure by selling reserves. This was the case in Korea, Russia and others during the 2008-9 crisis, reflecting the use of reserves to meet balance sheet exposure of systemic banks or politically powerful agents in the first phase of the crisis.

Figure 1: IR Losses Relative to EMP and Pre-Crisis Balance Sheet Exposure, Emerging Mkts. (MSCI def.)



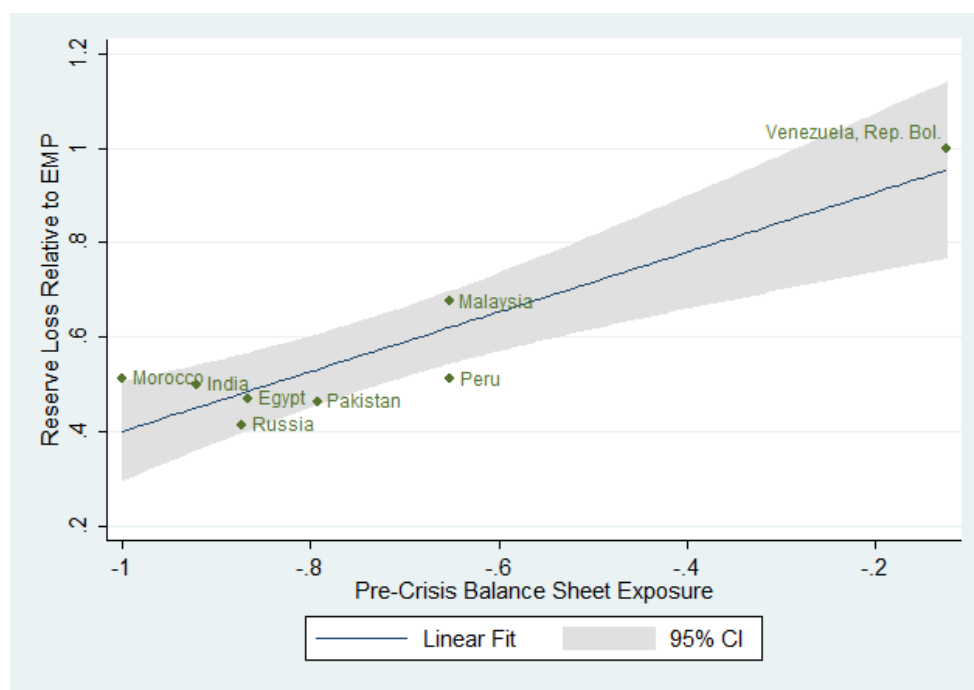
Notes: The correlation between loss of international reserves as a fraction of EMP and pre-crisis balance sheet exposure is -0.36 (p-value=0.12).

Table 3 : Correlations - Fraction of EMP due to Loss of Reserves with Balance Sheet Exposure (2007)

(%ΔIR)/EMP Cutoff:	Corr. w/ Balance Sheet Exposure	Number of Countries
None	-0.3557	20
10%	-0.3252	16
20%	-0.1565	11
30%	0.6718**	9
40%	0.9142***	8

Notes: *, **, and *** indicate significant correlations at 10%, 5%, and 1% level respectively. Emerging markets defined according to Morgan Stanley Capital International (MSCI) Emerging Market Index. Only countries which experience positive EMP included in the sample (except Hungary, see footnote 4), 20 total.

Figure 2: Fraction of EMP due to Loss of Reserves with Balance Sheet Exposure (2007), Emerging markets with significant loss of reserves relative to EMP (40% or higher)



Notes: The correlation between loss of international reserves as a fraction of EMP and pre-crisis balance sheet exposure is 0.93 significant at 1% level.

On the other hand, countries with few reserves relative to portfolio debt are much more likely to rely on exchange rate depreciation than use scarce reserves to absorb the global financial shock. This finding is an interesting contrast to the results in Table 2 and suggests that the financial determinants of total vulnerability (EMP) — total financial account external liabilities — are distinct from the factors that determine the tradeoff between relying on reserves rather than exchange rate depreciation ($-\% \Delta IR / EMP$) — balance sheet exposure — when countries face external financial shocks.

4. Conclusions

The global financial crisis affected countries across the globe in all regions, income levels and whether or not they had tight restrictions on capital flows. The financial crisis also hit all regions of the world, though the greatest effect was felt in Eastern Europe/Central Asia and Western Europe. This is consistent with the notion that the sub-prime crisis emanating from the

U.S. was directly linked to financial institutions in Western Europe, and Western Europe in turn was tightly linked through banking ties with Eastern Europe.

Higher-income emerging markets that were more integrated in the world financial system, and countries with higher ratio of the total foreign liabilities/GDP, were more vulnerable to the financial crisis. We found clear evidence that higher balance sheet exposure (higher short term foreign debt relative to international reserves) is significantly associated with greater weight attached to currency depreciation and lower weight attached to losing international reserves as means of dealing with exchange market pressure during the crisis. While larger total external liabilities/GDP are clearly associated with larger EMP, higher ratio of external short term debt/international reserves is associated with higher weight on price adjustment (exchange rate depreciation) and lower weight on quantity adjustment (losing reserves) as a way to accommodate a given EMP. Despite the remarkable buildup of international reserves by emerging markets during the period prior to the financial crisis, emerging markets relied primarily on exchange rate depreciation rather than reserve loss to absorb most of the exchange market pressure shock.

These findings are consistent with the observations in Aizenman and Yi (2010) regarding emerging markets' switch during the crisis from the fear of floating [Calvo and Reinhart (2001)] to the fear of losing reserves during the crisis. While international reserves/GDP ratios were high in most emerging markets before the crisis relative to their levels in previous crises, they rarely were high enough to cover the entire external portfolio liabilities of the affected countries. Thus, countries opted to rely on exchange rate adjustment, refraining from fast depletion of their international reserves. The reluctance to rely more on reserves depletion may reflect several concerns: fear that losing reserves too fast may propagate a run on the remaining reserves, and uncertainty about crisis duration may suggest keeping reserves to deal with future market pressure. Furthermore, at times of collapsing global demand, countries are more willing to engage in competitive depreciation, as the downside of higher inflation is sharply mitigated by the global recession. Our results are also in line with Frankel and Saravelos (2010), finding that central bank reserves/GDP in 2007 explains significantly the 2008-09 crisis incidence, where higher pre-crisis reserves/GDP were associated with lower exchange market pressure during the crisis. Yet, our results suggest also a key importance for the ratio total external liabilities/GDP in accounting for higher exchange market pressure during the crisis.

Our results corroborate the notion that globally linked national financial markets, intermediated via foreign currency markets, transmitted globally the 2008-9 financial crisis. In turbulent times, when the duration of depth of the global crisis remains unknown, emerging markets behavior has been characterized more by the fear of losing reserves, and less by the fear of floating. Despite the remarkable buildup of international reserves by emerging markets during the period prior to the financial crisis, countries relied primarily on exchange rate depreciation rather than reserve loss to absorb most of the exchange market pressure shock. This could reflect a deliberate choice, possibly to gain competitiveness at times of collapsing export demand. It may also reflect market actions that moved quickly and strongly to adjust to changing circumstances, especially in emerging markets with open capital markets. The financial market crisis was followed by a global recession, suggesting that exchange rate depreciations attempting to improve international competitiveness can be part of the adjustment of small economies but can't resolve global collapsing demands. Our findings also confirm the key importance of balance sheet effects in explaining vulnerabilities and adjustments. Countries with higher total foreign liabilities/GDP were more vulnerable to the financial crisis. Countries with large balance sheet exposure — high external portfolio liabilities exceeding international reserves — responded to the global shock by allowing greater exchange rate depreciation and comparatively less reserve loss.

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Appendix Tables

Table A1: Averages by Country (continued to next page)

<i>Country</i>	<i>Exchange Market Pressure % Chng.</i>	<i>Exchange Rate % Chng.</i>	<i>Foreign Exchange Reserves</i>
Poland	107.98%	79.51%	-28.47%
Zambia	96.59%	60.00%	-36.59%
Russia	89.27%	52.32%	-36.95%
Malta	86.00%	23.44%	-62.56%
France	77.86%	23.44%	-54.42%
Korea	70.25%	51.55%	-18.70%
Sweden	69.74%	49.50%	-20.24%
Romania	66.67%	50.00%	-16.67%
Greece	66.18%	23.44%	-42.75%
Portugal	64.24%	23.44%	-40.80%
New Zealand	63.99%	44.85%	-19.14%
Sri Lanka	63.24%	6.31%	-56.93%
Slovenia	61.08%	23.44%	-37.65%
Austria	59.88%	23.44%	-36.44%
Brazil	59.84%	51.59%	-8.25%
Australia	59.82%	46.23%	-13.59%
United Kingdom	56.88%	40.00%	-16.88%
Turkey	56.78%	45.69%	-11.10%
Cyprus	56.39%	23.44%	-32.95%
Jamaica	55.26%	22.55%	-32.72%
Bulgaria	54.61%	24.00%	-30.61%
Swaziland	54.38%	37.11%	-17.27%
Mexico	54.34%	48.41%	-5.93%
Czech Republic	51.30%	45.05%	-6.26%
Mauritius	49.70%	28.79%	-20.91%
Indonesia	48.68%	31.39%	-17.29%
United Arab Emirates	45.88%	0.00%	-45.88%
Colombia	44.11%	42.56%	-1.55%
Kyrgyz Republic	41.59%	17.13%	-24.46%
South Africa	41.42%	37.11%	-4.31%
Cote d'Ivoire	41.18%	23.47%	-17.71%
Ecuador	41.05%	0.00%	-41.05%
Malaysia	40.65%	13.19%	-27.46%
Morocco	40.33%	19.67%	-20.65%
Hungary	40.28%	58.09%	17.82%
Germany	39.42%	23.44%	-15.98%
Paraguay	39.37%	27.68%	-11.69%
Belgium	38.96%	23.44%	-15.52%
India	38.72%	19.39%	-19.33%
Kenya	38.62%	18.37%	-20.25%
Ireland	38.62%	23.44%	-15.18%
Norway	37.08%	36.77%	-0.31%
Iceland	36.85%	42.43%	5.58%
Burkina Faso	36.46%	23.47%	-12.99%

Table A1: Averaged by Country (continued from previous page)

<i>Country</i>	<i>Exchange Market Pressure % Chng.</i>	<i>Exchange Rate % Chng.</i>	<i>Foreign Exchange Reserves</i>
Latvia	35.85%	22.22%	-13.62%
Uganda	34.52%	20.68%	-13.84%
Kazakhstan	32.54%	25.02%	-7.52%
Togo	32.04%	23.47%	-8.58%
Georgia	31.96%	19.15%	-12.81%
Peru	31.95%	15.66%	-16.29%
Tunisia	30.37%	23.93%	-6.44%
Moldova	29.45%	9.78%	-19.67%
Finland	27.99%	23.44%	-4.55%
Netherlands	27.09%	23.44%	-3.66%
Canada	23.06%	23.30%	0.25%
Venezuela, Rep. Bol.	22.89%	0.00%	-22.89%
Pakistan	21.81%	11.72%	-10.09%
Spain	21.29%	23.44%	2.15%
Singapore	18.98%	12.41%	-6.57%
Argentina	18.41%	17.55%	-0.86%
Switzerland	16.81%	12.38%	-4.43%
Dominican Republic	15.55%	3.32%	-12.23%
Uruguay	15.12%	23.70%	8.58%
Italy	14.40%	23.44%	9.04%
Chile	13.69%	18.49%	4.80%
Brunei Darussalam	11.41%	12.41%	1.00%
Yemen, Republic of	11.34%	0.19%	-11.16%
Tanzania	11.34%	11.89%	0.55%
Qatar	11.10%	0.00%	-11.10%
Egypt	10.31%	5.47%	-4.84%
Nicaragua	8.44%	2.88%	-5.56%
Guatemala	7.80%	7.67%	-0.13%
United States	7.05%	0.00%	-7.05%
Philippines	6.97%	7.59%	0.62%
Denmark	3.65%	23.22%	19.57%
Angola	3.17%	0.93%	-2.24%
Costa Rica	3.12%	2.48%	-0.64%
Bangladesh	-0.30%	0.55%	0.86%
Thailand	-0.58%	7.53%	8.10%
China, P.R.: Mainland	-3.63%	0.00%	3.63%
Bolivia	-4.21%	-0.99%	3.23%
Israel	-5.10%	19.88%	24.98%
Saudi Arabia	-5.31%	0.00%	5.31%
Panama	-5.42%	0.00%	5.42%
El Salvador	-6.92%	0.00%	6.92%
Japan	-9.99%	-9.67%	0.33%
Hong Kong S.A.R. of China	-12.97%	-0.64%	12.32%
Jordan	-13.09%	0.00%	13.09%
Oman	-18.41%	0.00%	18.41%
Kuwait	-25.33%	7.41%	32.74%
Lebanon	-26.39%	0.00%	26.39%

Table A2: Correlations of author's EMP Measure with the monthly weighted EMP measure of IMF and the Emerging Markets Financial Stress Index (EM-FSI)

	Weighted EMP (IMF)	EM-FSI
EMP, July 2008 - Feb. 2009	0.6254***	0.3300*

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

The EMP(IMF) captures exchange rate depreciations and declines in international reserves, and is defined for country i in month t as:

$$EMPI_{i,t} = \frac{(\Delta e_{i,t} - \mu_{i,\Delta e})}{\sigma_{i,\Delta e}} - \frac{(\Delta RES_{i,t} - \mu_{i,\Delta RES})}{\sigma_{i,\Delta RES}}$$

where Δe and ΔRES denote the month-over-month percent changes in the exchange rate and total reserves minus gold, respectively. The exchange rate is taken vis-à-vis an anchor country, as discussed in Levy-Yeyati and Sturzenegger (2005). The symbols μ and σ denote the mean and the standard deviation, respectively, of the relevant series. The index accommodates episodes of hyperinflation, defined as annual inflation rates exceeding 150 percent, by adjusting means and standard deviations for periods with and without the prevalence of hyperinflation. For each time period we aggregate the IMF EMP measure over the number of corresponding months to make it comparable to our measure. The EM-FSI comprises five components: the “banking-sector beta,” stock market returns, time-varying stock market return volatility, sovereign debt spreads, and an exchange market pressure. For more information see: Balakrishnan et al. (2009).

Table A3: Description of Variables

	Description	Time Period	Source	Notes
<i>Trade and GDP</i>				
GDP per capita	GDP (Millions \$ U.S.)/Population	2007	National Accounts Data, International Financial Statistics, IMF	GDP in domestic currency pre-per-\$ U.S. exchange rate
Trade Openness	(Import + Exports)/GDP	2007	International Financial Statistics, IMF	
Commodity Exports	Commodity Exports (Millions \$ U.S.)/Total Exports (Millions \$ U.S.)	2007	Commodity Trade Statistics Database, UNSD	
<i>Financial Factors</i>				
Stock Market Capitalization	Stock Market Capitalization / GDP	2005	Financial Structure Dataset, World Bank	For detail see: http://econ.worldbank.org/st
Capital Account Openness	Chinn-Ito Capital Account Openness Index	2007	http://web.pdx.edu/~ito/Chinn-Ito_website.htm	For details see: http://web.pdx.edu/~ito/Reaction2007.pdf
Balance Sheet Exposure	[Short-Term Debt (Millions \$ U.S.) - International Reserves (Millions \$ U.S.)] / International Reserves (Millions \$ U.S.)	2007	International Investment Position Data, International Financial Statistics, IMF	Short-term debt proxied with investment debt liability
Financial Account Liabilities	Total financial account liabilities including direct investment, portfolio debt and equity liabilities, and financial derivatives (Stock, % GDP)	2007	International Investment Position Data, International Financial Statistics, IMF	
<i>Crisis Measures</i>				
Exchange Market Pressure (EMP)	(% ? Exchange Rate) - (% ? Foreign Exchange Reserves)	July 2008 - Feb. 2009	International Financial Statistics, IMF	Exchange Rate: Local Currency
Reserve Loss Relative to EMP	(- % ? Foreign Exchange Reserves)/EMP	July 2008 - Feb. 2009	International Financial Statistics, IMF	