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Portfolio Composition and Valuation Effects in Emerging Market Economies

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Abstract

The increase in cross-border assets and liabilities of nations with globalization, implies small asset price and currency movements create large wealth changes. The national net external position is increasingly driven by valuation effects, which the current account does not capture. We analyze valuation effects for a group of seven emerging economies, namely Brazil, Colombia, India, Republic of Korea, Mexico, Peru and Turkey for the time period 2005:Q1-2015:Q4 by scrutinizing their external asset portfolio while controlling for country fundamentals. Both asset and liability categories of Direct Investment equity are found to positively impact valuation. Equity liabilities and debt assets of Portfolio Investment positively influence valuation. Debt liabilities of all kinds of investment negatively impact valuation. Countries with stronger currency tend to gain through valuation effects. An appreciated real effective exchange rate is associated with higher valuation gains. We also found non-linear effects of the composition of external debt portfolio by interacting external portfolio and country characteristics. The external portfolio selection of emerging economies (with more in Direct Investment equity liabilities and Portfolio Investment debt assets) in the period has shielded them from foreign contagion, and enabled valuation gains.

Keywords: Valuation effects, Portfolio Composition, Emerging economies, Volatility index Real exchange rates, Exposure risk

JEL Code: F30, F40

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1. INTRODUCTION

Prior to the early nineties wave of globalization only a few nations held assets abroad and most others were indebted to them. With the major financial reforms of emerging economies they have experienced large cross-border capital flows. Most emerging economies now hold large financial assets abroad but also have huge foreign liabilities. These gross values dwarf net (external) assets or net (foreign) inflows.

Until recently, little was known about gross assets and gross liabilities of different countries, especially developing countries. It was only in the last decade that Lane and Milesi-Ferretti (2001, 2004, and 2007) made an important contribution by assembling a comprehensive data set for more than 100 countries from 1970 onwards. They found developed/industrial economies to be typically short debt, long equity and emerging/developing nations to be typically short equity with many having net liabilities in both debt and equity categories. For many of the industrial economies, they found the difference between the change in net foreign assets and the cumulative current account (CA) to be substantially positive due to large capital gains while most of the emerging economies had the difference between these two accounts as negative due to negative cumulative valuation effects. Historically, emerging/developing nations would have their foreign debt denominated in foreign currencies such that a depreciation of their own currency would lead to significant valuation losses. However, many of these nations, with time, have shifted to a more balanced foreign asset position with improvements in net currency exposure and an increase in the share of foreign liabilities that are in domestic currency (such as foreign portfolio (FPI) and foreign direct investment (FDI)). These facts make the study of valuation effects (VE) for emerging nations an interesting area.

The remainder of the paper is structured as follows: The next section defines and demonstrates valuation effects before setting out research objectives and results in relation to

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theoretical priors. Section 3 has a brief review of the literature; section 4 describes our data and variables. Section 5 provides the empirical strategy. The sixth section presents and analyzes results before the last section concludes.

2. VALUATION EFFECTS

In open economy macro-models the CA measures the change in net foreign asset of a country. In the inter-temporal approach to the current account the dynamics of external debt was due to forward-looking decisions by households and investment decisions by firms, set in market structure of varying degrees of complexity (Gourinchas, 2008). As per this approach, any country's CA at time t is given by

$$CA_t = -E_t\left[\sum_{s=t+1}^{\infty} R^{-(s-t)}\Delta NY_s\right] \quad (1)$$

Here, E_t is the expectation operator, NY is the net income and $\Delta NY_s = NY_s - NY_{s-1}$, R is the gross real return on a one-period risk-free international bond. The current account reflects the smoothing motive given expectations. For example, if a country expects its future net income NY to rise in the next period then it would run a current account deficit in the current period and vice-versa. This approach is useful in studying short-run dynamic responses to shocks.

Recent studies have shown the inter-temporal approach explains only a small portion of the dynamics of the current account because of its focus on the flow concept of fluctuations in net income. Although it leads to a change in the net foreign asset position, the current account need not capture all the changes in the net foreign asset position. This is because it does not capture capital gains arising out of the currency movements, changes in the local currency asset prices and other factors. The stock of international assets minus liabilities of a country is its net foreign asset position.

Following Gourinchas (2008), let NA_t be the net foreign asset position of a country at the end of time period t, then NA in two consecutive periods is given by

$$NA_{t+1} = R_t NA_t + NX_t \quad (2)$$

Here, NX is the net trade balance representing goods, services and net transfers. And R_t is the gross return on the net foreign portfolio between the end periods of $t-1$ land t. When we add and subtract the net investment income balance NI_t we get

$$NA_{t+1} - NA_t = R_t NA_t - NA_t + NX_t + NI_t - NI_t$$
$$= \left[(R_t - 1)NA_t - NI_t\right] + \left(NX_t + NI_t\right)$$
$$= VA_t + CA_t \quad (3)$$

Here, VA_t is the valuation adjustment term. The change in the net foreign asset position is represented by the sum of current account $\left[\left(CA_t = NX_t + NI_t\right)\right]$ and the valuation adjustment term. This valuation term represents the capital gains or losses on the foreign asset portfolio. The presence of valuation effects implies that the composition of external assets and liabilities matters in addition to the level of the net foreign asset position (Tille, 2013). 'Valuation effects' consist of three main components.

Overall valuation effect = Valuation effect from exchange rates + Valuation effect from asset prices + other valuation effects (4)

From (3) our measure of VA (see Appendix Ia for details) is:

$$VA_t = NA_{t+1} - NA_t - CA_t$$

There are two possible scenarios in this context. The first is when a country can borrow in its own currency and acquire external assets in foreign currencies. This kind of situation holds for developed nations. For example, a large fraction of US gross assets is in foreign currencies while majority of the gross liabilities are in dollars. A depreciation of the dollar would boost the price of US foreign assets giving it valuation gains while it would not affect liabilities. Movements in local currency asset prices for US assets abroad also have substantial valuation effects. The US tends to hold more risky foreign equity assets whose prices have a substantial upside.

The second scenario considers a nation that can borrow mostly in foreign currency. This situation holds for a majority of developing and emerging nations who have to contend with '*original sin*'—the inability to borrow in their own currencies. While unanticipated dollar depreciation tends to improve the value of the US net foreign asset position, in case of emerging economies who have issued substantial foreign currency debt, own currency depreciation creates adverse balance sheet effects (Lane and Shambaugh, 2010) although it may increase the value of their dollar assets held. Thus the valuation effects of a local

currency change can vary by type of asset or liability. 'Other valuation effects' simply reflect the statistical revisions that cannot be linked to financial flows or to specific valuation gains.

2.1 Stylized facts

Figure 1: International Financial Integration

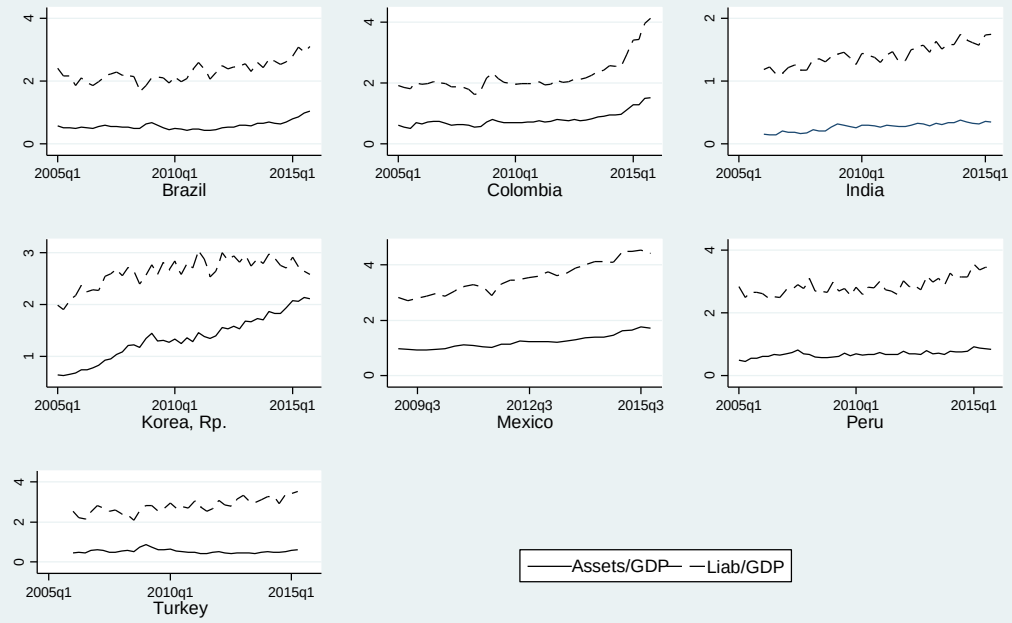
Source: Balance of Payments Statistics, International Financial Statistics

We consider seven emerging economies namely Brazil, Colombia, India, Republic of South Korea (Korea henceforth), Mexico, Peru and Turkey for the time period 2005:Q1 -2015:Q4[1] in order to capture a good regional mix at different levels of development, and asset accumulation, and get enough variation in the data for testing hypothesis. Figure 1 reports the pronounced increase in international financial integration since 2005 implying sizeable expansion in gross external portfolios. The measure of financial integration employed is the one most widely used in literature, i.e. the sum of gross assets and gross liabilities normalized by GDP (Gourinchas, 2008). Figure 2 reports gross assets and gross liabilities, both normalized by GDP. Except for Korea which shows a closing of imbalances, all the other sample countries, which are at lower levels of development, exhibit much greater gross liabilities as compared to gross assets. In this phase of development domestic investment is likely to exceed domestic savings leading to borrowing abroad. With greater access to global

[1] Data for disaggregated balance sheets of the countries are present from this period only in the IMF databases.

financial markets, the net borrowing of the emerging nations has grown over the years, increasing the gap between the two gross positions with time. While at times, valuation effects improve the net foreign asset position of these countries (by dwarfing adverse CA deficits), at other times they deteriorate the net foreign asset position.

Figure 2: Gross Positions



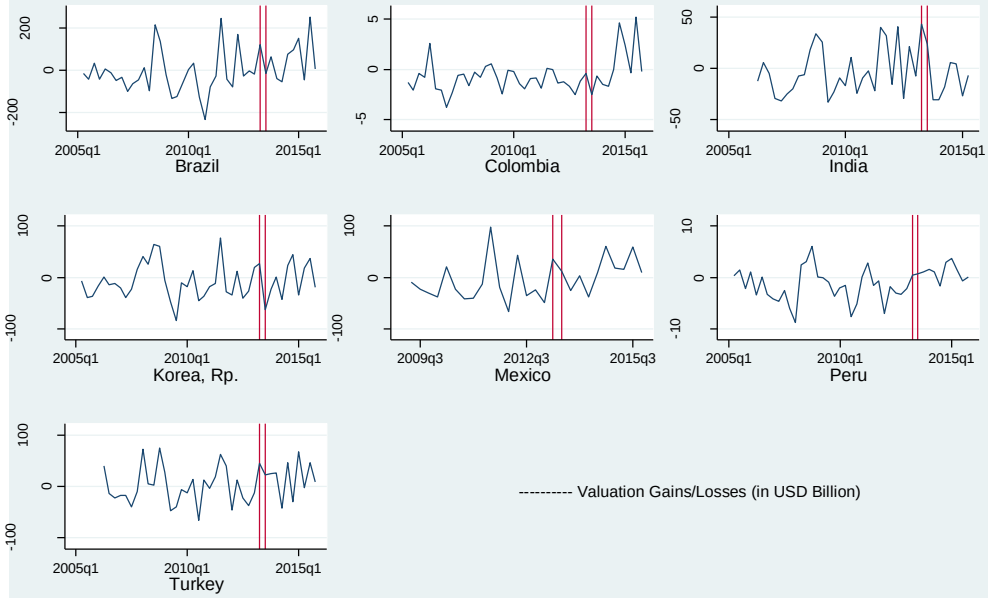
Source: Balance of Payments Statistics, International Financial Statistics

Figures 3A and 3B report the valuation gains/losses of these nations[2]. These have increased over the years. Of the countries, Brazil had maximum valuation gains (or, losses) for this period while Colombia had the least. The Euro debt crisis period is marked in Figure 3A while figure 3B shows valuation effects for the 2013 taper talk. There are valuation gains as well as losses during these two major international events. What are the variables that drive these?

[2] This is calculated using the method employed by Gourinchas et al (2011). Details are given in the methodology section.

Figure 3A: Valuation Gains/Losses (in USD Billion) Euro Debt Crisis

Figure 3B: Valuation Gains/Losses (in USD Billion), Tapering Talk



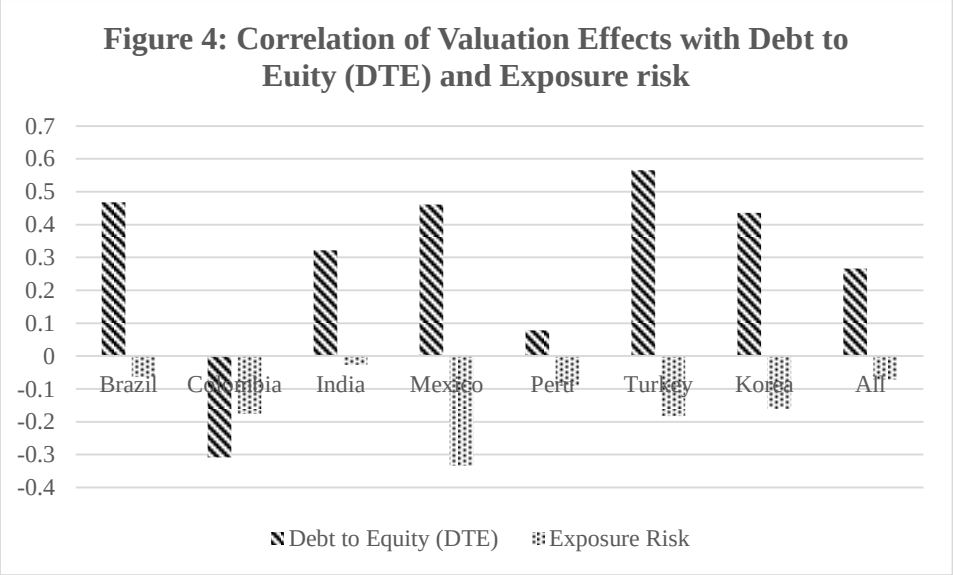


Figure 4 reports the correlation of valuation effects with the Debt to Equity ratio (DTE) (this is gross debt assets of a country as percent of its gross equity assets) and exposure risk[3] (first lag). As can be seen, while DTE is positively correlated with the VE, exposure risk is negatively correlated with it. And this is true for a majority of countries over the years[4]. These insights from the external portfolio of these emerging economies pose interesting questions with respect to valuation effects. Will these stylized facts survive robust econometric analysis with the use of careful controls?

2.2 Objectives, theoretical priors, and results

To understand factors creating valuation gains/losses for these nations and estimate their magnitudes is an important research question. The portfolio composition and the currencies it is held in, create valuation effects as we saw above. So do changes in exchange rates and asset prices. Domestic and international macroeconomic variables affect valuation as well as its determinants. So the effect of portfolios and exchange rates on the other can only be determined by controlling for these variables, thus removing sources of endogeneity. In a panel estimation of valuation effects on external asset portfolio variables and exchange rates with domestic GDP growth rates, money growth rates and forex reserves and an international volatility index as controls, we address the following issues:

[3] We define exposure risk as the ratio of external debt denominated in foreign currencies to that in domestic currency. So it is higher for countries whose foreign currency liabilities exceed domestic currency liabilities.

[4] Of the countries in the sample, it is only for Colombia that DTE is negatively correlated with valuation effects.

First, with a rise in the aggregate external position of emerging economies how does the aggregate and disaggregated debt to equity ratio (DTE) affect valuation? Second, how does currency exposure risk affect valuation? Third, how does global volatility and uncertainty affect the external balance sheet of these nations through their valuation channel? We use the volatility index (VIX) (Miranda-Agrippino and Rey, 2012 and Rey, 2015), a measure of risk aversion and uncertainty, to capture the effect of global business cycles. Fourth, we examine the impact of exchange rates on valuation gains/losses. Variables used to capture this are real exchange rate appreciation and the terms of trade, since the first removes the effect of relative inflation, and the second infers the effect of the exchange rate through relative trade value indices. Last, we estimate the interactive effects of DTE, exposure risk, and VIX with other country characteristics, to investigate whether these mitigate or amplify effects on valuation. Since EMs tend to be net debtors theoretical priors for EMs suggest borrowing through equity and lending through debt would reduce risk for them, thus increasing valuation even in times of high global volatility. Higher exposure risk and exchange rate depreciation and would create valuation losses. We next compare results obtained to these priors.

We find DTE positively impacts valuation implying that higher the gross DTE, higher would be valuation gains. Checking the impact of disaggregated external balance sheet components on the valuation gives further clarity. Both asset and liability categories of Direct Investment (DI) equity impact valuation positively. Portfolio Investment (PI) debt assets and equity liabilities also positively influence the valuation channel. But debt liabilities of all kinds of investment (DI, PI and other investment) lead to valuation losses. This is consistent with the prior of the risk reduction from borrowing through equity and lending through debt for EMs.

Exposure risk adversely impacts the valuation channel—greater the exposure larger is the valuation loss as expected. A more appreciated real effective exchange rate is associated with higher valuation gains, and there is a strong negative association between the terms of trade (exports as per cent of imports by value) and valuation effects of these countries, since better terms of trade imply a fall (depreciation) in currency value. Both these variables support the expected effect of currency value on valuation effects, suggesting they are strongly driven by local currency values.

Countries with higher foreign exchange reserves gain through valuation effects. This follows since they are a source of debt assets, and also act as cushion against currency depreciation.

Money supply growth rate in these emerging economies negatively impacts the valuation channel, since it could lead to a depreciation.

To find non-linear effects of the composition of the external debt portfolio, DTE, VIX and exposure risk are interacted with various country characteristics. Effects of GDP growth rate and VIX increase with increase in the DTE ratio, and the negative effect of the terms of trade diminishes, as both country and international risk matter more as debt rises. As global uncertainty increases, effect of TOT and exposure risk on the valuation channel diminishes—global risk dominates domestic sources of risk. We also find exposure risk to intensify the impact of TOT but diminish that of growth rate on valuation—impact of strengthening currency value is higher if there is more foreign currency debt, while more exposure risk reduces the positive impact of growth on valuation.

Emerging economies gained during the post GFC global uncertainty through their valuation channel since VIX coefficients are strongly and consistently positive. This finding is in line with Gourinchas et al. (2011) who observe that during the global financial crisis of 2008, there was extensive wealth transfer from the developed to the emerging nations (especially those who were short equity, long debt) through the valuation channel. Also, the crises periods intensify the impact of DTE, VIX and exposure risk on the valuation channel.

Overall, the results suggest that countries that invest more in equity (both assets and liabilities) tend to gain through their valuation channel. After the East Asian crisis of the late nineties emerging economies increased the equity component in their external portfolio (Lane and Milesi-Ferretti, 2007). Portfolio debt assets also have a positive and significant role. Debt liabilities, however, lead to valuation losses. Thus a strategy of investing more in DI equity and PI debt assets helped emerging nations shield themselves during times of global uncertainty. During the East Asian crisis large short-term debt liabilities led to large valuation losses.

3. LITERATURE REVIEW

Gourinchas (2008) analyzed how due to increase in cross-border asset holdings, a small change in exchange rates or local currency asset prices can lead to huge wealth transfers and valuation effects. For a developed economy, valuation effects can be stabilizing because the gross liabilities of the developed nation are in its own currency while gross assets are in

foreign denomination. Hence a depreciation of the exchange rate diminishes the nation's external debt proportionately to its gross asset holdings. In case of a developing country whose gross assets and gross liabilities are also in foreign currencies, depreciation of the domestic currency worsens the external position. Also, unlike in the developed nation case, foreign currency debt and nominal exchange rate move in inverse proportions. The exchange rate and the trade balance become more volatile since the initial depreciation makes the country poorer (unlike a developed country whose foreign debt position improves as a result of a depreciation). In case of emerging markets, given the currency composition of their external balance sheet, valuation effects can be very destabilizing.

Devereux and Sutherland (2009) also bring out the inaccurateness of current account in measuring the changes in the net external position of any country. They argue that for most countries net external assets are dominated by valuation gains and losses arising from the changes in the local currency asset prices and exchange rate movements, which the measured current account fails to capture. They analyze unanticipated valuation effects by developing a two-country DSGE model of risk sharing based on optimal portfolio choice. They find their model gives a reasonable explanation of qualitative and quantitative aspects of valuation effects. They also analyze anticipated valuation effects and find these higher order valuation effects play a quantitatively smaller role in the movements of net foreign assets.

In addition to valuation effects arising from asset prices and exchange rates, Tille (2013) considers other valuation effects, which primarily reflects statistical revisions that cannot be clearly linked to financial flows or specific valuation gains, to also be an important component of the overall valuation effect. He distinguishes between expected and unexpected valuation effects and unlike Devereux and Sutherland (2009), he argues that unexpected valuation gains play a large role in the change in a country's net foreign asset positions, though he explicitly mentions that this is at the time of shocks. Expected valuation effects play a more moderate role along the subsequent adjustment path.

Lane and Shambaugh (2010) analyze the financial impact of shifts in exchange rates on the valuation effects, i.e. they assess the impact of exchange rate movements on the capital gains (or losses) on foreign assets and liabilities. They study these effects for 111 countries (developed, developing and emerging). They construct four types of indices: asset index, liability index, trade index and net financial index. Asset and liability indices are constructed

by using the weights derived out of the external assets and liabilities attached to different currencies in a time period. Trade index is also constructed in a similar manner but by using weights that add exports and imports together. The net financial index takes the asset-weighted and liability weighted indices into consideration and captures the directional sensitivity of the external balance sheet to currency movements. They argue that trade index is not generally informative about the financial impact of currency movements. They find the liability index to be much more stable for developed nations since most of their liabilities are in domestic currencies. A depreciation in this case would improve the trade balance by increasing the net exports of a country while the valuation effect would depend on whether that country is long or short in a particular currency and that currency's relative importance in the aggregate external portfolio. Now, the financial impact of the depreciation would be ambiguous since the improvement in the trade balance would be accompanied by an increase in the value of its foreign currency liabilities. Hence, a country would experience double boost to its external balance only if both the trade balance and the financial index move simultaneously, not otherwise.

Gourinchas et al. (2011) study the geography of wealth transfer during the global financial crisis of 2008 by constructing valuation changes on disaggregated components of the foreign asset portfolio of countries. They term those countries as 'global insurers' who provided wealth transfers to other countries during the global financial crisis when the marginal utility of consumption was high. They find the US to be the main global insurer in addition to few other countries whom they call regional insurers. Developing countries during this period gained through their valuation channels.

Gourinchas and Rey (2013) question the belief that financial integration is the ultimate aspiration of all economies for better risk sharing. They find advanced economies financial systems suffered more from the global financial crisis, than those of emerging economies, and hence point towards the dangers of contagion inherent to large cross-border holdings.

Pistelli et al. (2008) find the composition of the net foreign asset portfolio to be the important determinant of current account reversals and sudden stops, also that a higher stock of net foreign assets reduces the likelihood of any financial crisis. They find cumulative valuation adjustments to significantly impact reversals and sudden stops. In the developing countries' context, they find the cumulative current account to be associated with real depreciation of

the currency in the long run while valuation effects to be associated with real currency appreciation. They assert that certain categories of assets and liabilities, namely portfolio equity assets and FDI liabilities, and the flows associated with them, trigger important valuation effects that play a vital role in the mechanism to adjust to external shocks.

To our knowledge there is no panel study of factors affecting emerging economy VE, a lacunae we attempt to fill.

4. DATA

We employ quarterly data for 2005:Q1-2015:Q4[5] for our sample of seven emerging economies.

4.1 Variables[6]:

We consider the following country specific macro-economic fundamentals: GDP growth rate, terms of trade (exports as per cent of imports, by value), money supply growth rate (growth rate of M2, except for India for which we take growth rate of M3). We also used inflation (based on consumer price index for all commodities) in regressions instead of money supply growth rate but it came out to be insignificant in almost all occasions.

Exposure Risk: For capturing the exposure to foreign currency risk, we construct this variable as ratio of external debt in foreign currency to external debt in domestic currency for each country. This is important for the emerging nations as a majority have their debt mainly in foreign currencies. It is expected to increase vulnerability to valuation losses.

Real effective exchange rate: Real appreciation (or, depreciation) of the local currency affects asset prices and capital flows through an international risk taking channel and therefore the valuation channel. For example, when the local currency appreciates, the borrower country's balance sheet strengthens and the credit risk on the domestic banks' loan books falls, increasing the access to foreign capital (Bruno and Shin, 2013). This in turn would raise asset prices and tend to create valuation gains. We choose REER over bilateral USD exchange rates since the countries we work with hold considerable non-USD assets. REER has the

[5] It differs for some countries of the sample. Data availability, time periods for each country and sources are given in Appendix Ib.

[6] Detailed construction of variables is explained in Appendix Ia.

advantage of measuring the effect on the exchange rate on valuation effects after correcting for inflation.

Foreign exchange reserves excluding gold, act as a cushion against global disturbances. But they also create foreign assets vulnerable to valuation effects. Emerging nations have accumulated significant foreign exchange reserves.

We take the first lag of all the above mentioned variables for our analysis.

Debt to Equity (DTE): For considering the effect of portfolio choices on the valuation channel, we construct a variable debt to equity (DTE) as gross debt assets of a country as percent of its gross equity assets.

Apart from these country-level macro variables, we consider VIX (volatility index), which is a measure of international investor sentiment and market volatility. The VIX measures market expectations of near-term volatility conveyed by S&P 500 stock index option prices. Global financial conditions play a key role in the investors' perception of risk and hence VIX is expected to impact the components of the external balance sheet of the emerging economies and therefore valuation (Rey, 2013). High frequency data of VIX is available which we average over the quarter and take logs.

Table 1 in Appendix Ia describes all the variables used in the empirical study and their sources.

Summary statistics of the variables are presented in Table 2 (Appendix Ib). Valuation effects show a wide range, from a valuation loss of 37 per cent of GDP to a gain of 60 per cent of GDP. DTE also shows a wide range from 40 per cent of total equity assets to 230 implying debt assets are 2.3 times equity assets. The mean value for exposure risk is 2.35, which implies external debt in foreign currency normally exceeds that in domestic currency. Other variables also show large variation.

Table 3 presents the correlation matrix of the variables. Valuation effect is significantly correlated with most of the variables. Figure 4 shows while DTE is positively correlated with valuation effects, lag of exposure risk is negatively related with valuation effects.

For robustness checks, we construct two other variables. The first one is 'net debt to equity', which is net debt assets as per cent of net equity assets for any country. The second one is 'equity liabilities to total liabilities', which is equity liabilities as percent of total liabilities.

5. METHODOLOGY

First, following Gourinchas et al. (2011), we calculate valuation effects (valuation gains/losses) for each country in the sample as:

$$VE_t^i = NFA_t^i - NFA_{t-1}^i - CA_t^i \quad (5)$$

Here NFA_t^i is the net foreign asset position at time t for country i[7]. CA_t^i is the current account balance of the country.

To analyze the impact of these macro-economic variables on the valuations gains/losses, we employ the following baseline (additive) specifications:

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma DTE_t^i + \theta_i + \varepsilon_t^i \quad (6)$$

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma DTE_t^i + \delta VIX_t + \theta_i + \varepsilon_t^i \quad (7)$$

Here, VE_t^i represents valuation effects (gains/losses) of country i at time t, expressed as percentage of GDP. X_j are country specific macro-economic fundamentals, DTE_t^i is debt as per cent of equity of country i at time t. *VIX* is the risk aversion measure and ε is the error term. α, β_j, γ and δ are parameters to be estimated.

We employ lagged values of the independent variables except for DTE (since we are interested in seeing the valuation gains (or, losses) of these emerging nations as per their external portfolio choices) and VIX (since VIX is derived from conditions mainly in the developed world and is hence exogenous to the emerging countries) in order to guard against the biases arising from simultaneity or reverse causality.

Regression results of both fixed effects (FE) and random effects (RE) are presented. Both have their own advantages. FE estimation takes into account the unobserved heterogeneity among nations (all time-invariant country specific factors) that may otherwise lead to biased

[7] It is constructed by taking the net of asset classes (Direct Investment, Portfolio Investment, Other Investment and Reserves excluding gold) and liability classes (Direct Investment, Portfolio Investment and Other Investment). We do not include financial derivatives as they are not available for all the countries of our sample.

coefficients of the regressors. The advantage of using RE estimation is that this heterogeneity is regarded random, (*i.e.* uncorrelated with the regressors) resulting in (potentially) biased estimates if the RE assumption is not satisfied but there is more efficient estimation of those variables, which do not move much through time but whose variation is mainly because of cross country differences (Ahmed and Zlate, 2013). The FE estimator demeans the data and is therefore only a *within* estimator, not utilizing between or cross-country variation. The RE estimator is a weighted average of the *within* estimator and the *between* estimator, and thus also utilizes cross-country variation in portfolios to estimate determinants of valuation.

We also employ interaction models to analyze the effect of the portfolio choices of these nations on their valuation gains/losses conditional on their country-specific characteristics or the global financial cycle. We consider interaction models with DTE, VIX and exposure risk. C_t^i is one of the country-specific variables. The following sets of specifications are used for this:

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma' DTE_t^i + \delta VIX_t + \beta_k' C_{t-1}^i + \sigma\{DTE_t^i \times C_{t-1}^i\} + \theta_i + \varepsilon_t^i$$

(8A)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma' DTE_t^i + \delta VIX_t + \beta_k' C_{t-1}^i + \sigma\{DTE_t^i \times VIX_t\} + \theta_i + \varepsilon_t^i$$

(8B)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma DTE_t^i + \delta' VIX_t + \beta_k' C_{t-1}^i + \tau\{VIX_t^i \times C_{t-1}^i\} + \theta_i + \varepsilon_t^i$$

(9A)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma' DTE_t^i + \delta' VIX_t + \beta_k' C_{t-1}^i + \sigma\{VIX_t^i \times DTE_t^i\} + \theta_i + \varepsilon_t^i$$

(9B)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma DTE_t^i + \delta VIX_t + \omega CR_{t-1}^i + \beta_k' C_{t-1}^i + \varphi\{CR_{t-1}^i \times C_{t-1}^i\} + \theta_i + \varepsilon_t^i$$

(10A)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma' DTE_t^i + \delta VIX_t + \omega CR_{t-1}^i + \beta_k' C_{t-1}^i + \varphi\{CR_{t-1}^i \times DTE_t^i\} + \theta_i + \varepsilon_t^i$$

(10B)

$$VE_t^i = \alpha + \sum_{j=1}^{n} \beta_j X_{j,t-1}^i + \gamma DTE_t^i + \delta' VIX_t + \omega CR_{t-1}^i + \beta_k' C_{t-1}^i + \varphi\{CR_{t-1}^i \times VIX_t\} + \theta_i + \varepsilon_t^i \quad (10C)$$

Here, CR is exposure risk in equations 10A-C. Interaction terms are successively estimated for DTE, VIX and exposure risk.

New parameters to be estimated are $\gamma, \delta, \sigma, \tau, \varphi, \gamma', \delta'$ and ω. Interpretation of coefficients from standard regression outputs including an interaction model differ from the usual one without an interaction model. For example, in equation 8A, the coefficient σ indicates whether there is a change in the relationship between an interaction variable (C) and the dependent variable (VE) with a one-unit change in the interaction variable (DTE). At the same time, the coefficient being symmetric also indicates if there is a change in the relationship between DTE and VE with a one-unit change in C. Another point to note is that the coefficients on the constitutive terms (both on C and DTE) are conditional marginal effects (Brambor et al., 2006; Nier et al., 2014). The new coefficient β_k' on C only captures the coefficient of C when DTE is zero. Similarly, the new coefficient γ' on the DTE only captures the effect of the DTE when C is zero.

In order to analyze the role of euro debt crisis and taper talk on balance sheets of emerging economies through the valuation channel, we add dummies for these events in the baseline regressions. To see their non-linear effects on the valuation channel, we also utilize interaction models of the dummies with DTE, VIX and exposure risk.

6. EMPIRICAL RESULTS

6.1 Baseline Regressions

Tables 4 and 5 present the FE and RE estimation results of baseline regressions respectively. We present results with both, in order to utilize variation within and across countries at different levels of development. That similar results are obtained with FE and RE adds to their robustness, and suggests they may hold on the path to higher levels of development.

The coefficients of exposure risk are significant and negative as expected, implying that countries with more of their external debt in foreign currencies tend to have greater valuation

losses. For most of the observations of the sample, exposure risk has values greater than one. The majority of emerging economies have their external debt denominated in foreign currencies.

The results also suggest that net valuation effects of emerging economies are strongly driven by their terms of trade. There is a strong negative association between the terms of trade and valuation effects of these countries. Net importing countries (imports greater than exports) tend to gain through their valuation channel. The coefficients of money supply growth rate are negative and significant. Money supply negatively influences valuation effects as it may be reducing the value of the currency.

A higher real effective exchange rate (real appreciation) is associated with higher valuation gains. The coefficients of the volatility index are positive and highly significant, implying that during periods of global uncertainty, these countries tend to gain through their valuation channel[8]. Reserves bear positive and significant coefficients implying changes in asset and currency values, on the whole, positively impact the value of reserves held in foreign currency.

The coefficients of DTE are highly significant and positive. This finding suggests that higher the DTE, greater is the gain through the valuation channel which means that as gross equity increases with respect to gross debt, valuation gains decrease (or, there are valuation losses). This result is puzzling in view of the large balance sheet losses of indebted emerging economies and observed improvements during 21st Century crises as they shifted towards equity liabilities.

6.2 Robustness checks

To check the robustness of the DTE result, we estimate two more regressions using alternative proxies for DTE (Tables 6 and 7).

In the first test (Table 6), we replace (gross) DTE with net DTE. But the coefficients of net DTE are also positive and significant which implies, as net equity increases with respect to net debt, valuation gains decrease (or, there are valuation losses).

[8] Gourinchas et al. (2013) found the developing economies to gain through their valuation channels during the global financial crisis of 2008 while the advanced economies mostly had valuation losses.

In the second test (Table 7), we employ equity liabilities as percent of total liabilities as an alternative to (gross) DTE. The coefficients associated with this variable are negative and significant indicating results on similar lines that increase in equity liabilities leads to valuation losses.

In view of continuing contradictory results we next employ disaggregated components of external balance sheet in order to see their individual impact on the valuation channel, i.e. the effect of assets and liabilities of different debt and equity variables.

6.3 Effect of disaggregated components of external balance sheet on the valuation channel

We conduct this exercise in three stages[9]. In the first step, we take the four components of direct investment (DI). These are: (i) DI debt assets; (ii) DI debt liabilities; (iii) DI equity assets and (iv) DI equity liabilities. In the second analysis, we utilize the four components of portfolio investment (PI) which are (i) PI debt assets; (ii) PI debt liabilities; (iii) PI equity assets and (iv) PI equity liabilities. In the final stage, we employ two major components of other short-term debt – other debt assets and other debt liabilities[10]. The results of these regression analyses are presented in table 8.

The results give deeper insights into the issue. We find that both assets and liabilities categories of DI equity influence the valuation channel positively. However, the coefficients of DI debt liabilities bear negative and significant values. This implies that while DI equity leads to valuation gains, DI debt liabilities lead to valuation losses. When it comes to PI debt, we find PI debt assets positively influence valuation effects while PI debt liabilities have negative influence on the valuation channel. PI equity assets come out to be insignificant but PI equity liabilities play a positive role in affecting the valuation channel. Other short-term debt assets do not play any significant role but other short-term debt liabilities negatively influence the valuation channel.

[9] We do this to avoid confusion and also because adding all these variables at one go in one regression would further add to endogeneity issues.

[10] We construct other debt as the sum of (i) loans, (ii) currency and deposits and (ii) trade credit and advances as is standard in the literature.

These results are consistent with the impact on emerging economies' balance sheets during crises events. Countries with higher DI equity assets had gained through their valuation channel while countries with higher PI debt liabilities (or other short-term debt liabilities) had suffered valuation losses. The baseline regressions and alternative robustness checks could not uncover these results due to the gross variables used. The large positive coefficients of PI debt assets perhaps accounted for the positive coefficient of DTE (both in case of gross and net variables).

6.4 Interaction Models

To study the non-linear effects of DTE, VIX and exposure risk on the valuation channel we use interaction models. Table 9 presents only the significant results.

I. *Non-linear effects of DTE*: The effect of the growth rate of the emerging economy on valuation effects is conditional on the level of DTE in its portfolio. The coefficient of their interaction term is positive and statistically significant. That is, DTE increases the effect of the growth rate of that country on its valuation channel. Second, the global uncertainty variable VIX is a strong determinant of valuation effects when the DTE ratio is high. This implies that for countries with higher DTE ratio, the effect of VIX increases. Third, the coefficient of the interaction of DTE and TOT is negative and statistically significant. That is, as DTE increases, the effects of TOT on VE diminishes.

II. *Non-linear effects of VIX*: The coefficient of the interaction term of VIX and exposure risk is negative and significant. Therefore as VIX increases, the effect of exposure risk on the valuation channel decreases. Interaction term of VIX and TOT also has negative and significant coefficient implying that with increase in VIX, effect of TOT diminishes. The results suggest that as global uncertainty increases, effect of TOT and exposure risk on the valuation channel diminish.

III. *Non-linear effects of exposure risk*: The coefficients of the interaction of exposure risk and TOT are positive and significant. Therefore greater exposure risk intensifies the impact of TOT on an emerging economy's valuation channel. The coefficients of the interaction term of exposure risk and GDP are negative and significant. Therefore as exposure risk increases, the effect of the growth rate of that country on its valuation channel diminishes.

6.5 Crises and their non-linear effects

We next examine the effect of sovereign debt and taper talk on valuation effects of these emerging nations.

We create crisis dummies for these two events and put them in the baseline regressions. Both the dummies have positive and significant coefficients, suggesting emerging economies tend to gain through their valuation channel during times of global uncertainty (Table 10).

To see their non-linear effects we interact these dummies with DTE, VIX and exposure risk. During times of crises (both sovereign debt crisis and taper talk) the effect of DTE, VIX and exposure risk on the valuation channel increases. That is, crises magnify the impact of these variables on the valuation channel (Table 10).

7. CONCLUSION

With increase in international financial integration nations have large gross assets as well as gross liabilities abroad. With small price and currency movements (due to changes in global/domestic financial conditions), therefore, there can be large wealth transfers. The current account of a nation alone fails to capture this evolution of its net external position. The short-term movements in the country's foreign asset portfolio increasingly seem to be driven by its valuation channel (Gourinchas, 2008).

In line with this we find that both assets and liabilities categories of DI equity positively impact the valuation channel. PI debt assets and PI equity liabilities also positively influence the valuation channel. Debt liabilities of all kinds of investment (DI, PI and other investment) negatively impact the valuation channel.

Currency composition of external debt matters as countries with higher exposure risk are more prone to suffer from valuation losses. Countries with stronger currency gain through their valuation channel. Supporting this is the strong negative association between the terms of trade and valuation. A higher real effective exchange rate (real appreciation) is associated with higher valuation gains. Money supply growth negatively influences the valuation channel since it tends to depreciate the exchange rate. Countries with higher foreign exchange reserves gain through valuation effects, as reserves act as cushion against currency depreciation. Net importing countries (imports greater than exports) tend to gain through their valuation channel.

We find non-linear effects of the composition of the external debt portfolio of these countries by employing interaction models of the DTE, VIX and exposure risk with various country characteristics. While on the one hand, with increase in the DTE ratio, the effect of the GDP growth rate and VIX increase, on the other hand the effect of the terms of trade diminishes. Another key finding is as global uncertainty increases, effect of TOT and exposure risk on the valuation channel diminish. Exposure risk of an economy intensifies the impact of TOT but diminishes the effect of growth rate on its valuation channel.

The results also suggest that during periods of global uncertainty the emerging economies tend to have valuation gains and these crises periods magnify the impact of DTE, VIX and exposure risk on the valuation channel.

Overall, the results suggest that emerging nations that invest more in equity (both assets and liabilities) tend to gain through their valuation channel. Portfolio debt assets also have a positive and significant effect. Debt liabilities lead to valuation losses. During times of global uncertainty, it was these choices of emerging nations (investing more in DI equity and PI debt assets) that enabled them to benefit despite global volatility.

Appendix I: Data

Appendix Ia: Construction of Variables

1. Valuation effects (VE) = Net foreign assets (t) - Net foreign assets (t-1) – Net current account (t)
   (i) Net foreign assets = Assets, Direct Investment + Assets, Portfolio Investment + Assets, Other Investment + Reserves (excluding gold) – Liabilities, Direct Investment - Liabilities, Portfolio Investment – Liabilities, Other Investment
2. Gross Debt to Equity (Gross DTE) = {Gross debt assets/Gross equity assets}×100
   (i) Gross debt assets= Assets, Direct Investment, Debt Instruments + Assets, Portfolio Investment, Debt Securities + Assets, Other Investment, Loans + Assets, Other Investment, Trade Credit and Advances + Assets, Other Investment, Currency and Deposits + Liabilities, Direct Investment, Debt Instruments + Liabilities, Portfolio Investment, Debt Securities + Liabilities, Other Investment, Loans + Liabilities, Other Investment, Trade Credit and Advances + Liabilities, Other Investment, Currency and Deposits

(ii) Gross equity assets = Assets, Direct Investment, Equity and investment fund shares + Assets, Portfolio Investment, Equity and investment fund shares + Assets, Other Investment, Other equity + Liabilities, Direct Investment, Equity and investment fund shares+ Liabilities, Portfolio Investment, Equity and investment fund shares + Liabilities, Other Investment, Other equity

3. Exposure Risk = External debt in foreign currency/External debt in domestic currency
4. Terms of Trade (TOT) = {Value of exports/Value of imports}×100
5. Net Debt to Equity (Net DTE) = {Net debt assets/Net equity assets}*100

(i) Net debt assets = Assets, Direct Investment, Debt Instruments + Assets, Portfolio Investment, Debt Securities + Assets, Other Investment, Loans + Assets, Other Investment, Trade Credit and Advances + Assets, Other Investment, Currency and Deposits - Liabilities, Direct Investment, Debt Instruments - Liabilities, Portfolio Investment, Debt Securities - Liabilities, Other Investment, Loans - Liabilities, Other Investment, Trade Credit and Advances - Liabilities, Other Investment, Currency and Deposits

(ii) Net equity assets = Assets, Direct Investment, Equity and investment fund shares + Assets, Portfolio Investment, Equity and investment fund shares + Assets, Other Investment, Other equity - Liabilities, Direct Investment, Equity and investment fund shares- Liabilities, Portfolio Investment, Equity and investment fund shares - Liabilities, Other Investment, Other equity

6. Equity liabilities to total liabilities = {Equity liabilities/Total liabilities}*100

(i) Equity liabilities= Liabilities, Direct Investment, Equity and investment fund shares + Liabilities, Portfolio Investment, Equity and investment fund shares + Liabilities, Other Investment, Other equity

(ii) Total liabilities = Liabilities, Direct Investment, Debt Instruments + Liabilities, Portfolio Investment, Debt Securities + Liabilities, Other Investment, Loans + Liabilities, Other Investment, Trade Credit and Advances + Liabilities, Other Investment, Currency and Deposits + Liabilities, Direct Investment, Equity and investment fund shares+ Liabilities, Portfolio Investment, Equity and investment fund shares + Liabilities, Other Investment, Other equity

Appendix Ib: Variables, sources and country-wise data availability

1. Brazil – 2005:Q1-2015:Q4
2. Colombia - 2005:Q1-2015:Q4
3. India - 2006:Q1-2015:Q2
4. Korea- 2005:Q1-2015:Q4
5. Mexico – 2009:Q1-2015:Q4
6. Peru - 2005:Q1-2015:Q4
7. Turkey - 2006:Q1-2015:Q4

Table 1: Variables

Variable	Unit	Description	Source(s)
VE	percent GDP	Valuation effects, calculated	BOP, IMF; IFS
GDPgr	Percent	Growth rate of GDP, q-q % change	IFS, FRED, CB of Colombia
TOT	Percent	Exports as % of imports	IFS, FRED, CB of Colombia
MSgr	Percent	Growth rate of M2 (M3 for India), q-q percent change	IFS, RBI
Exposure Risk	Logarithm	Ratio of external debt in foreign currency to that in domestic currency	QEDS, IMF
VIX	Logarithm	Log of CBOE volatility index	CBOE
REER	Percent	Real Broad Effective Exchange rate, q-q % change	FRED
Inflation	Percent	CPI index, q-q % change	IFS
DTE	Percent	Gross debt as % of gross equity	BOP, IMF
NetDTE	Percent	Net debt as % of net equity	BOP, IMF
Equitytoliab	Percent	Equity liabilities as % of total liabilities	BOP, IMF
Reserves	Percent	Reserves as % of GDP	BOP, IMF

Data for the external balance sheets of each nation is sourced from the IMF Balance of Payments statistics (BOP) except for Reserves (excluding gold) which is from International Financial Statistics (IFS). Other data sources are Federal Reserve Bank of St. Louis (FRED), Quarterly External Debt Statistics (QEDS) of the IMF, Reserve Bank of India (RBI), Central Bank (CB) of Colombia (Banco De La Republica), IFS and Chicago Board Options Exchange (CBOE).

Appendix II: Tables and Figures

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
VE	-1.33	14.05	-37.42	60.38
GDPgr	9.40	6.47	-8.00	28.00
TOT	97.45	15.46	60.00	160.00
MSgr	15.51	12.03	3.00	120.00
Exposure Risk	2.65	1.46	0.52	9.61
VIX	2.92	0.36	2.40	4.07
REER	0.81	9.56	-31.00	30.00
Inflation	5.12	2.82	0.41	15.32
Reserves	67.61	27.45	20.56	137.46
DTE	99.18	47.50	42.96	324.00

Table 3: Correlation Matrix

	VE	GDPgr	TOT	MSgr	Exp. Risk	VIX	REER	Inflation	Reserves	DTE
VE	1									
GDPgr	-0.06	1								
TOT	-0.203*	-0.073	1							
MSgr	0.1	0.392*	-0.095	1						
Exp.Risk	-0.018	0.175*	0.375*	0.223*	1					
VIX	0.196*	-0.073	-0.081	0.019	-0.129	1				
REER	-0.221*	0.202*	0.175*	-0.021	0.031	-0.229*	1			
Inflation	0.184*	0.311*	-0.625*	0.275*	-0.155*	0.186*	-0.074	1		
Reserves	0.004	-0.205*	0.243*	-0.187*	0.046	0.015	-0.182	-0.376	1	
DTE	0.2424*	0.0921	-0.3349*	0.357*	-0.046	0.028	-0.164	0.480*	-0.342	1

Note: * marks significance at 5%.

Table 4: Fixed Effects (FE) Estimation Results						
Val. Effects as % of GDP	1	2	3	4	5	6
			Fixed effects			
Variables			2005Q1-2015Q4			
L.GDPgr	0.052	0.138	0.109	0.099	0.025	
	(0.151)	(0.156)	(0.156)	(0.155)	(0.156)	
L.TOT	-0.407***	-0.410***	-0.369***	-0.361***	-0.402***	-0.419***
	(0.071)	(0.071)	(0.074)	(0.073)	(0.074)	(0.090)
L.M3gr		-0.144*	-0.137*	-0.140*	-0.129*	-0.128*
		(0.075)	(0.075)	(0.074)	(0.074)	(0.071)
L.Exp.Risk			-2.243*	-1.532	-1.339	
			(1.143)	(1.176)	(1.166)	
VIX				5.058*	5.807**	6.537**
				(2.211)	(2.208)	(2.123)
L.REER					0.215*	0.226**
					(0.085)	(0.085)
L.Reserves						0.006
						(0.081)
DTE	0.259***	0.282***	0.300***	0.289***	0.301***	0.289***
	(0.037)	(0.039)	(0.04)	(0.04)	(0.04)	(0.039)
Constant	12.506*	11.895	12.353*	-3.868	-3.534	-6.606
	(7.358)	(7.327)	(7.291)	(10.127)	(10.024)	(14.852)
R^2	0.082	0.084	0.079	0.09	0.095	0.101
Observations	268	268	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 5: Random Effects (RE) Estimation Results

Val. Effects as % of GDP	1	2	3	4	5	6
			Random effects			
Variables			2005Q1-2015Q4			
L.GDPgr	-0.063	-0.031	-0.047	-0.069	-0.122	
	(0.132)	(0.142)	(0.144)	(0.141)	(0.145)	
L.TOT	-0.180**	-0.177**	-0.198**	-0.192**	-0.208**	-0.187**
	(0.050)	(0.059)	(0.064)	(0.063)	(0.064)	(0.059)
L.M3gr		-0.048	-0.061	-0.071	-0.063	-0.053
		(0.078)	(0.080)	(0.079)	(0.079)	(0.071)
L.Exp.Risk			0.513	0.786	0.877	
			(0.650)	(0.645)	(0.646)	
VIX				7.230**	7.760**	7.149**
				(2.308)	(2.327)	(2.289)
L.REER					0.141	0.158*
					(0.090)	(0.090)
L.Reserves						0.060*
						(0.033)
DTE	0.050*	0.054**	0.054**	0.054**	0.055**	0.066**
	(0.019)	(0.021)	(0.021)	(0.020)	(0.020)	(0.021)
Constant	11.819*	11.554*	12.568*	-9.477	-9.668	-13.983
	(6.815)	(6.837)	(6.962)	(9.819)	(9.793)	(9.846)
R^2	0.090	0.091	0.093	0.126	0.134	0.138
Observations	268	268	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 6: Robustness Check I

Val. Effects as % of GDP	1	2	3	4
	Fixed effects		Random effects	
Variables	2005Q1-2015Q4			
L.GDPgr	-0.069		-0.264*	
	(0.153)		(0.141)	
L.TOT	-0.351***	-0.420***	-0.205***	-0.199**
	(0.072)	(0.088)	(0.059)	(0.061)
L.M3gr	0.039	0.020	-0.021	-0.060
	(0.070)	(0.066)	(0.071)	(0.069)
L.Exp. Risk	-0.945		0.776	0.594
	(1.132)		(0.622)	(0.618)
VIX	6.094**	6.435**	7.599**	7.267**
	(2.166)	(2.081)	(2.240)	(2.248)
L.REER	0.427***	0.410***	0.288**	0.245**
	(0.090)	(0.090)	(0.092)	(0.090)
L.Reserves		-0.073		0.008
		(0.080)		(0.031)
Net DTE	0.189***	0.188***	0.093***	0.087***
	(0.023)	(0.023)	(0.017)	(0.018)
Constant	-0.828	7.076	-11.983	-13.057
	(9.797)	(14.399)	(9.029)	(9.079)
R^2	0.169	0.164	0.197	0.187
Observations	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 7: Robustness Check II

Val. Effects as % of GDP	1	2	3	4
	Fixed effects		Random effects	
Variables	2005Q1-2015Q4			
L.GDPgr	-0.070		-0.209	
	(0.153)		(0.144)	
L.TOT	-0.394***	-0.457***	-0.194**	-0.204**
	(0.072)	(0.088)	(0.062)	(0.063)
L.M3gr	-0.020	-0.039	-0.053	-0.074
	(0.070)	(0.067)	(0.075)	(0.072)
L.Exp.Risk	-1.107		0.994	0.857
	(1.131)		(0.637)	(0.628)
VIX	7.877***	8.286***	8.406***	8.084***
	(2.152)	(2.080)	(2.298)	(2.291)
L.REER	0.350***	0.336***	0.203*	0.196*
	(0.087)	(0.086)	(0.091)	(0.090)
L.Reserves		-0.060		0.041
		(0.080)		(0.031)
Equitytoliab	-1.276***	-1.256***	-0.385***	-0.375***
	(0.152)	(0.149)	(0.098)	(0.097)
Constant	85.253***	89.895***	13.271	10.606
	(13.386)	(17.206)	(9.504)	(9.437)
R^2	0.124	0.121	0.160	0.158
Observations	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 8: Effect of disaggregated components of external balance sheet on valuation channel

Val. Effects as % of GDP	1	2	3	4	5	6
		Fixed effects			Random effects	
Variables			2005Q1-2015Q4			
L.GDPgr	-0.268	0.255	-0.054	-0.432	0.138	-0.139
	(0.309)	(0.174)	(0.168)	(0.285)	(0.183)	(0.153)
L.TOT	-0.405**	-0.253**	-0.352***	-0.406***	-0.242**	-0.248***
	(0.134)	(0.086)	(0.079)	(0.106)	(0.089)	(0.063)
L.M3gr	0.094	-0.011	0.078	0.264	-0.046	-0.002
	(0.245)	(0.075)	(0.077)	(0.238)	(0.077)	(0.076)
L.Exp.Risk	3.995	-3.664*	-0.465	0.801	0.085	0.709
	(2.589)	(1.557)	(1.276)	(1.416)	(0.933)	(0.677)
VIX	9.216**	6.608*	6.260**	7.645**	10.460***	7.639**
	(2.924)	(2.996)	(2.368)	(2.883)	(2.742)	(2.361)
L.REER	0.229*	0.378***	0.305**	0.237*	0.321**	0.147
	(0.117)	(0.104)	(0.098)	(0.113)	(0.109)	(0.093)
Asset DI Debt	1.911			-38.773		
	(54.396)			(46.564)		
Asset DI Equity	38.000*			24.557*		
	(15.939)			(12.324)		
Liab DI Debt	-56.085*			-12.291		
	(26.006)			(15.417)		
Liab DI Equity	34.391***			6.809*		
	(9.011)			(3.788)		
Asset PI Debt		181.855**			145.188***	
		(55.118)			(33.267)	
Asset PI Equity		0.443			0.388	
		(21.913)			(8.004)	
Liab PI Debt		-25.811*			-27.884***	
		(13.344)			(7.114)	
Liab PI Equity		78.766***			39.028***	
		(10.641)			(7.159)	
Asset Other Debt			2.565			0.563
			(9.801)			(3.348)
Liab Other Debt			-38.949***			-3.124
			(8.829)			(2.821)
Constant	14.266	35.405*	-12.563	12.217	-5.954	-2.609
	(20.231)	(16.664)	(11.539)	(13.349)	(11.276)	(9.580)
R^2	0.046	0.186	0.056	0.145	0.279	0.114
Observations	206	201	268	206	201	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 9: Interaction Models

Val. Effects as % of GDP	1	2	3	4	5	6	7	8
			Fixed effects				Random effects	
Variables			2005Q1-2015Q4				2005Q1-2015Q4	
L.GDPgr	-0.541*	-0.034	-0.026	-0.009	-0.123	0.015	-0.111	-0.134
	(0.319)	(0.157)	(0.157)	(0.155)	(0.163)	(0.154)	(0.145)	(0.144)
L.TOT	-0.359***	-0.016	-0.402***	0.836*	-0.887***	-0.409***	-0.219**	-0.218**
	(0.077)	(0.181)	(0.074)	(0.490)	(0.191)	(0.073)	(0.064)	(0.063)
L.MSgr	-0.163*	-0.161*	-0.128*	-0.103	-0.090	-0.120	-0.020	-0.051
	(0.075)	(0.074)	(0.073)	(0.074)	(0.074)	(0.073)	(0.083)	(0.079)
L.Exp.Risk	-1.662	-0.552	11.473*	-2.715*	-17.751**	-1.038	0.768	0.949
	(1.170)	(1.204)	(5.765)	(1.273)	(6.071)	(1.158)	(0.648)	(0.642)
VIX	6.618**	6.255**	18.718**	47.690**	5.616*	7.596**	0.989	9.204***
	(2.231)	(2.198)	(6.099)	(16.536)	(2.181)	(2.283)	(4.916)	(2.407)
L.REER	0.214*	0.193*	0.236**	0.178*	0.245**	0.586***	0.137	0.461**
	(0.085)	(0.085)	(0.085)	(0.086)	(0.085)	(0.163)	(0.090)	(0.174)
DTE	0.243***	0.728***	0.300***	0.300***	0.295***	0.300***	-0.136	0.049*
	(0.049)	(0.187)	(0.039)	(0.039)	(0.039)	(0.039)	(0.124)	(0.020)
DTE*GDP	0.006*							
	(0.003)							
DTE*TOT		-0.005*						
		(0.002)						
DTE*VIX							0.060*	
							(0.039)	
VIX*Exp.risk			-5.179*					
			(2.283)					
VIX*TOT				-0.440*				
				(0.172)				
Exp.risk*TOT					0.131**			
					(0.048)			
Exp.risk*GDP						-0.041**		-0.035*
						(0.015)		(0.016)
Constant	-3.398	-43.056*	-34.912*	-117.735*	54.244*	-8.250	12.094	-12.140
	(9.963)	(19.608)	(17.036)	(45.780)	(23.203)	(10.062)	(17.012)	(9.794)
R^2	0.098	0.096	0.094	0.095	0.088	0.103	0.142	0.149
Observations	268	268	268	268	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

Table 10: Crises and their non-linear effects, Estimation Results

Val. Effects as per cent of GDP	1	2	3	4	5	6	7
		Fixed effects			Random effects		
Variables				2005Q1-2015Q4			
L.GDPgr	-0.007	-0.026	-0.015	-0.128	-0.133	-0.133	-0.129
	(0.156)	(0.157)	(0.156)	(0.145)	(0.146)	(0.145)	(0.146)
L.TOT	-0.389***	-0.388***	-0.389***	-0.195**	-0.194**	-0.195**	-0.190**
	(0.074)	(0.073)	(0.073)	(0.064)	(0.064)	(0.063)	(0.064)
L.MSgr	-0.114	-0.101	-0.113	-0.051	-0.045	-0.050	-0.057
	(0.073)	(0.073)	(0.073)	(0.079)	(0.079)	(0.078)	(0.079)
L.Exp.Risk	-1.056	-1.105	-1.076	0.958	0.952	0.964	0.726
	(1.165)	(1.159)	(1.162)	(0.642)	(0.643)	(0.641)	(0.650)
VIX	5.889*	5.959**	5.667*	8.173**	8.261***	8.010**	7.998**
	(2.254)	(2.235)	(2.258)	(2.367)	(2.360)	(2.373)	(2.369)
L.REER	0.238**	0.245**	0.241**	0.152*	0.148	0.155*	0.149
	(0.086)	(0.086)	(0.085)	(0.091)	(0.091)	(0.091)	(0.091)
Taper	6.382*			7.970*			
	(3.449)			(3.709)			
Euro debt	4.809*			2.971			
	(2.308)			(2.479)			
DTE	0.308***	0.308***	0.309***	0.057**	0.051*	0.058**	0.059**
	(0.040)	(0.040)	0.040	(0.020)	(0.020)	(0.020)	(0.020)
DTE*Taper		0.072*			0.075*		
		(0.033)			(0.035)		
DTE*Eurodebt		0.053*			0.023		
		(0.023)			(0.025)		
VIX*Taper			2.402*			3.001*	
			(1.283)			(1.381)	
VIX*Eurodebt			1.751*			1.152	
			(0.743)			(0.798)	
Exp.Risk*Taper							2.421*
							(1.426)
Exp.Risk*Eurodebt							0.714
							(0.910)
Constant	-7.324	-7.656	-6.809	-13.513	-13.101	-13.148	-12.606
	(10.225)	(10.109)	(10.206)	(9.955)	(9.908)	(9.953)	(10.014)
R^2	0.103	0.103	0.104	0.153	0.151	0.155	0.145
Observations	268	268	268	268	268	268	268

Robust Standard Errors in parentheses; ***significant at 1%, **significant at 5%, *significant at 10%

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