

**EXECUTIVE  
BOARD  
MEETING**

SM/20/101  
Correction 3

July 23, 2020

To: Members of the Executive Board  
From: The Secretary  
Subject: **2020 External Sector Report—Chapter 2**

Board Action: The attached corrections to SM/20/101 (7/2/20) have been provided by the staff:

**Factual Errors  
Affecting the  
Presentation of Staff's  
Analysis or Views**

**Pages 4, 5, 6, 8, 9, 10, 11, 13, 14, Online Annex Page 2**

Comments Regressions underlying the analyses were corrected to exclude precautionary and non-disbursing agreements.

Questions: Mr. Leigh, RES (ext. 34747)  
Mr. Adler, RES (ext. 35648)  
Mr. Rabanal, RES (ext. 36784)



external debt assets and liabilities, and (4) official and private foreign assets. The analysis goes beyond that of other studies by exploring the role of the aforementioned IIP components using a new data set on the currency composition of external assets and liabilities compiled by IMF staff in collaboration with authors at other institutions (Bénétrix and others 2019). To identify episodes of sovereign debt default or restructuring, the chapter uses updated versions of the data sets of Das, Papaioannou, and Trebesch (2011) and Asonuma and Trebesch (2016) as well as Paris Club reports.

The main findings of the chapter are as follows:

- Not all components of the IIP relate equally to the likelihood of external stress episodes. The net IIP declines in the run-up to an external stress episode and, the more negative it becomes, the greater is the likelihood of external stress materializing. However, within the IIP, the analysis can be usefully complemented by analyzing gross positions: in particular, gross external debt liabilities are stronger predictors of external stress than are equity liabilities or private external debt assets. Having a larger stock of foreign official reserves acts as a mitigating factor, lowering the likelihood of an external stress episode, although with diminishing effects.
- In addition, the type of gross external debt that matters most appears to differ across advanced and emerging market and developing economies. When the whole sample is considered, external debt liabilities are strong predictors of stress, irrespective of the currency denomination. But foreign-currency-denominated debt liabilities are particularly relevant for predicting external stress in emerging market and developing economies. Private sector holdings of external debt assets in foreign currency are also related to a lower risk of external stress, although only for emerging market and developing economies.
- Beyond the IIP structure, the analysis confirms the role of traditional external stress predictors, such as large current account deficits. Higher levels of global risk aversion increase external financing risks, suggesting an important role for global “push” factors in triggering external stress, especially in countries with preexisting external vulnerabilities.
- The chapter finds that the nature of external vulnerabilities for emerging market and developing economies have rotated over time. For example, while before the Asian financial crisis a central external vulnerability was a low level of international reserves, the central vulnerability ahead of the global financial crisis was more related to the size of current account deficits. In the years preceding the Great Lockdown, elevated gross external debt liabilities and their foreign-currency-denominated component were a central vulnerability for emerging market and developing economies, although relatively small current account deficits and relatively high levels of foreign exchange reserves helped mitigate these risks.
- Preexisting external vulnerabilities also amplify the macroeconomic costs of an external stress episode. For countries with large current account deficits, elevated foreign-currency-denominated debt, and low levels of reserves, real GDP falls by about ~~4.1~~<sup>3.7</sup> percent within two years of an external stress episode, while for countries with more limited external vulnerabilities, the decline in real GDP levels is typically ~~less than 0.5~~<sup>about 1</sup> percent.

Similarly, the real effective exchange rate depreciates by about 10 percent and the current account balance rises by more than 2 percent of GDP within the first year of an external stress episode in countries with high preexisting vulnerabilities, with far more limited effects in countries with smaller preexisting vulnerabilities.

- Finally, the chapter also finds that external stress episodes have implications for creditor economies through valuation effects. Although ascertaining the costs for creditors is difficult, the analysis finds that following large global crises, such as the global financial crisis of 2008 and the euro area sovereign debt crisis of 2010—which featured a number of external stress episodes—creditor economies experienced valuation losses that lowered their IIPs. On average, in the decade following the global financial crisis, a 1 percent of GDP rise in the current account surplus has been associated with a 0.5 percent of GDP valuation loss—a systematic relationship that did not necessarily hold before the crisis.

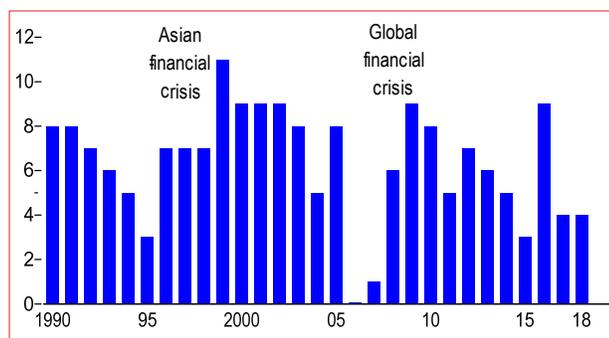
The remainder of the chapter is organized as follows. The first section presents empirical patterns of the main IIP components around external stress episodes. The second section discusses the main results from estimating an external stress probability model, focusing on the IIP and its main components, including how the combination of vulnerabilities increases the likelihood of external stress episodes. The third section computes costs for debtor and creditor economies after external stress episodes materialize, and the final section concludes by summarizing the chapter’s implications for the outlook and risks.

## International Investment Position Dynamics Before and After External Stress Episodes

To understand the factors that influence external financing risks, the chapter focuses on the determinants of *external* stress episodes. As in Catão and Milesi-Ferretti (2014), episodes of external stress are defined as years in which an economy experiences sovereign debt

Figure 2.2. External Stress Episodes in Selected Economies, 1990–2018 (Number per year)

External stress episodes are defined as sovereign debt defaults and restructurings, and/or access to IMF arrangements, for 73 advanced and emerging and developing economies.



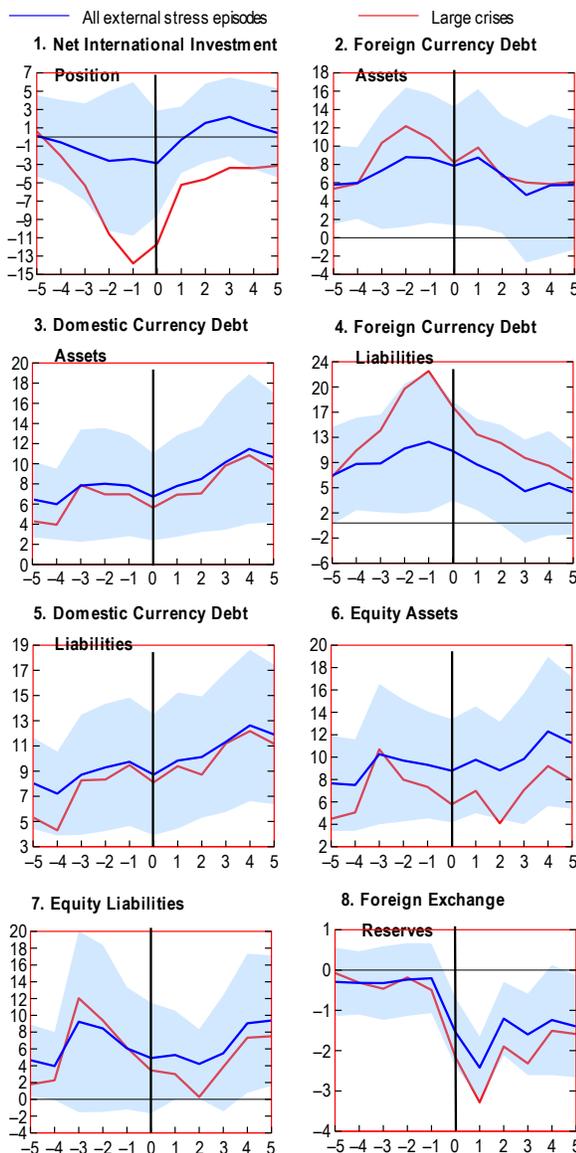
Sources: Das and others (2011); Asonuma and Trebesch (2016); Paris Club; and IMF staff calculations.

default or restructurings or the start of IMF-supported financial assistance. Sovereign debt defaults and restructuring episodes are identified based on an updated version of the data set in Das, Papaioannou, and Trebesch (2011) and Asonuma and Trebesch (2016), and recent Paris Club reports. Using the aforementioned criteria, the chapter identifies 176–128 cases of external stress (Figure 2.2), most of which involve emerging market and developing economies.<sup>4</sup> It is important to note that the chapter focuses on episodes of external stress, using the aforementioned definition, and not on fiscal stress or public debt crisis episodes. The latter would include, in addition to sovereign defaults and restructurings and recourse to IMF financing, additional events such as implicit default via high inflation and rising sovereign risk premiums (see Cerovic, Gerling, and Medas 2018).

The first part of the analysis studies the evolution of the main IIP components around external stress episodes. The sample comprises 73 advanced and emerging market economies during 1991–2018. This event-study analysis controls for country and time fixed effects to capture differences in countries’ average IIP levels as well as the influence of common shocks (as in Gourinchas and Obstfeld 2012 and Catão and Milesi-Ferretti 2014;

**Figure 2.3. Conditional Mean of the International Investment Position and Its Components around External Stress Episodes, 1990–2018 (Percent of GDP)**

External stress episodes are usually preceded by a deterioration of the net international investment position and a large buildup of foreign-currency-denominated debt liabilities.



Source: IMF staff calculations.

Note: The methodology for construction of conditional mean estimates is based on Catão and Milesi-Ferretti (2014) and is discussed in Online Annex 2.1. Shaded area corresponds to the 90 percent confidence interval for all external stress episodes.

<sup>4</sup>One difference with Catão and Milesi-Ferretti (2014) is that it focuses on IMF-supported arrangements exceeding 200 percent of quota, while this chapter considers all IMF-supported arrangements, excluding precautionary and nondispersing arrangements. Robustness to different definitions of external stress episodes is discussed in Online Annex 2.1. All annexes are available at [www.imf.org/en/Publications/ESR](http://www.imf.org/en/Publications/ESR).

indicates a stress episode in a given country and year, while a value of 0 indicates no stress).<sup>9</sup> The explanatory variables include the various IIP components and standard macroeconomic variables identified in the empirical literature, such as the current account balance, global risk aversion, the real effective exchange rate gap (measured as deviations of the real exchange rate from the average of the previous five years), a measure of income per capita relative to the United States, the credit gap (constructed in a way analogous to the real exchange rate gap), and the degree of financial development.<sup>10</sup> The financial development index includes measures of market depth, access, and efficiency for each country, and can help explain cross-country differences in the ability to respond to external shocks (see Svirydzenka 2016). The sample is the same as for the event study of stress episode dynamics already mentioned.<sup>11</sup>

### Estimation Results

In line with the event study analysis, a lower net IIP (a larger net debtor position) is associated with higher external stress (see Table 2.1, first column). When further disaggregating the IIP into its main components, the results suggest that both higher foreign and domestic currency external debt liabilities increase the probability of external stress events (see Table 2.1, second column). These results highlight the potential risks and costs of excessive external debt, either public or private. The estimated coefficients for the same external debt category in the IIP are different for assets and liabilities, denoting that gross positions, rather than net positions, provide useful information to assess the likelihood of external stress episodes. In addition, higher levels of foreign exchange reserves lower the occurrence of stress episodes. Private external debt assets do not appear to play a mitigating role. This result could reflect capital flight, which often rises in anticipation of external stress. Meanwhile, equity assets ~~and liabilities~~ are not statistically significant. Among other macroeconomic fundamentals, larger current account deficits are associated with higher external stress. The likelihood of external stress events also increases with global risk aversion, suggesting that global “push” factors also play a role.

There are important differences between the results for the entire sample, which includes both advanced and emerging market economies, and the sample that includes only emerging market and developing economies (Table 2.1, third and fourth columns). Foreign-currency-denominated debt liabilities have a statistically significant relationship with external stress risk for emerging market and developing economies, whereas domestic-currency-denominated debt liabilities do not. Another difference is the relation with private external debt assets denominated in foreign currency, which ~~significantly~~ reduce the probability of a stress episode in emerging market and developing economies. Taken together, these results highlight the importance of assessing currency mismatches in emerging market and developing economies. Equity assets and

<sup>9</sup>Gourinchas and Obstfeld (2012) compare the determinants of various crisis episodes, including sovereign defaults, systemic banking crises, and currency crises. See also Turrini and Zeugner (2019). Box 2.1 presents work by IMF staff on predicting external crises using alternative definitions, including sudden stop episodes with high growth impact and exchange rate market pressure episodes.

<sup>10</sup>Several studies have used the Chicago Board Options Exchange Volatility Index (VIX) as a proxy for global risk aversion, with lower values indicating greater tolerance for risk taking and increases in leverage (Rey 2015). Following Obstfeld, Ostry, and Qureshi (2017), the VXO—the precursor of the VIX—is used to maximize data coverage.

<sup>11</sup>Data limitations preclude the inclusion of additional countries in the sample.

assessing currency mismatches in emerging market and developing economies. Equity assets and liabilities and external debt assets denominated in domestic currency do not play a statistically significant role. Finally, as before, current account deficits and global risk aversion increase the likelihood of external stress, while higher levels of foreign exchange reserves play a mitigating role.<sup>12</sup>

**Table 2.1. Probit Estimates**  
(Estimation period: 1991–2018)

Probability of External Stress (0/1; probit)	Full Sample		EMDE Sample	
NIIP/GDP	-0.27*		-0.58**	
Debt assets: Foreign currency/GDP		0.40		-0.13
Debt assets: Domestic currency/GDP		-0.27		...
Debt liabilities: Foreign currency/GDP		0.44***		1.78***
Debt liabilities: Domestic currency/GDP		0.75**		1.32
Equity assets/GDP		0.34		-0.52
Equity liabilities/GDP		-0.66***		-0.56
FX reserves/GDP		-5.22***		-5.47***
Current account/GDP	-5.45***	-6.89***	-4.61***	-5.10***
Global Risk Aversion (VXO)	0.02**	0.02**	0.02***	0.02***
Constant	-0.11	-0.67**	-0.61**	-1.24***
Number of Observations	1,838	1,828	1,014	1,004

Source: IMF staff estimates.

Notes: Dependent variable is probability of external stress event. Probit coefficients are presented in the table. Country-specific variables are lagged by one year. The current account/GDP is included as a two-year moving average. Additional controls include the credit gap, the real effective exchange rate gap, income per capita relative to the United States, and a financial development index. EMDE = emerging market and developing economies; FX = foreign exchange; NIIP = net international investment position; VXO = Chicago Board Options Exchange Volatility Index. Significance levels are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

The central finding that external debt is a strong predictor of external stress episodes is robust to various definitions of external stress or crisis. Box 2.1 explores the correlates of two crisis types that differ from the external stress events already mentioned: (1) sudden stops with a high growth impact, and (2) exchange market pressure events. The analysis reported in Box 2.1 uses signal extraction and machine-learning techniques to predict these types of crises and compare their determinants. The results suggest that stock vulnerabilities, such as external debt measures, are reliable predictors of crises, although the ranking of candidate variables and the importance of interactions vary across crisis categories and country groups. The current account balance and the level of foreign exchange reserves are also relevant indicators for assessing other crises risks in advanced economies and emerging markets and developing economies.

<sup>12</sup> The main results in Table 2.1 are robust to incorporating additional control variables in the analysis, including global variables (interest rates and real GDP growth in the United States) and country-specific variables (the fiscal balance). The fiscal balance has significant explanatory power when other indicators that incorporate fiscal information, such as the current account balance and external debt, are excluded from the model. The relationship between short-term debt and external stress is found to be not robust, depending on data sources and the inclusion of other control variables. Moreover, a breakdown of the currency composition of short-term external debt is not broadly available.

## Predicted Probabilities

To clarify the economic significance of the estimation results reported thus far, this subsection discusses predicted probabilities. These are computed by keeping all the variables in the estimated model constant at their sample means but changing the variable of interest in specified increments (for other applications of this approach, see, for example, Gourinchas and Obstfeld 2012). The estimation of these predicted probabilities (or margins) can uncover important nonlinear effects of some variables on the likelihood of external stress episodes.<sup>13</sup> In general, the estimated effects are economically more meaningful for the model estimated for emerging market and developing economies:

- An increase in foreign-currency-denominated debt liabilities from 40 percent of GDP (near the emerging market and developing economy median) to 60 percent of GDP is associated with an increase in the predicted probability of external stress by 56 percentage points. In the full sample of countries, this rise in debt would result in a much smaller probability increase (only 0.23 percentage points).
- A decline in the current account balance from a surplus of 5 percent of GDP to a deficit of 5 percent of GDP is associated with an increase in the predicted probability of external stress by 8.65.3 percentage points for emerging market and developing economies. For the full sample, the probability rises by only 2.31.1 percentage points.
- The relationship between official foreign exchange reserves and external stress is markedly nonlinear. The predicted external stress probability is near zero when reserves are above 55–60.40 percent of GDP. As reserves decline, the predicted external stress probability increases. A decline in foreign exchange reserves from 20 percent to 10 percent of GDP is associated with an increase in predicted external stress probability by 7.26.5 percentage points, while a further decline from 10 percent to 0 percent of GDP increases the predicted external stress probability by an additional 40.312.6 percentage points in the emerging market and developing economy sample. The corresponding values for the entire sample are much lower (0.74.3 percent and 2.15 percent, respectively).

The finding that external vulnerabilities are more strongly related to risks of external stress for emerging market and developing economies has a number of potential explanations. This result reflects differences in the estimated coefficients and differences in the mean of some control variables between emerging market and developing economies and the full sample. For instance, the estimated coefficient on the effect of foreign-currency-denominated debt on the probability of an external stress event is about four times larger than for the full sample. In addition, the emerging market and developing economy sample has a lower average in the financial development index (see Svirydzenka 2016 for a detailed explanation). This index includes indicators that try to measure financial market depth, access, and efficiency, which are likely to help explain differences in countries' ability to weather external shocks.

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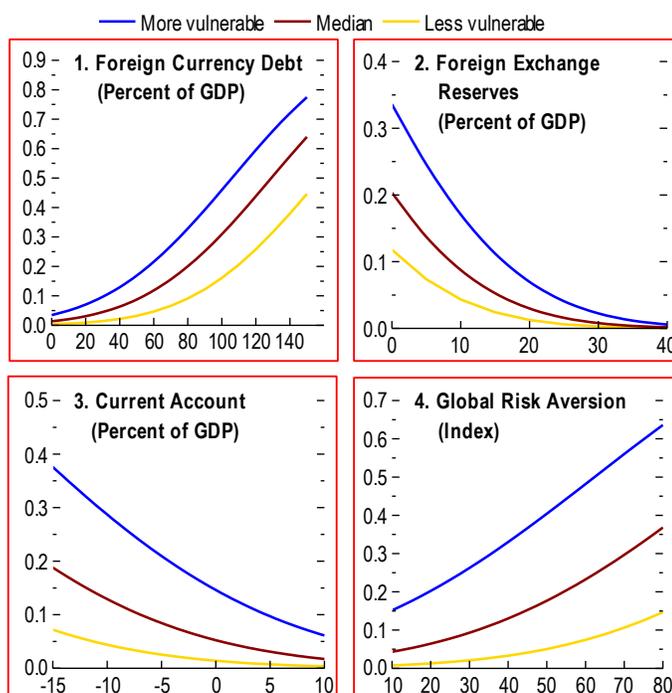
<sup>13</sup>The results in this section are illustrative and should not be interpreted as the IMF's crisis prediction framework.

The results also imply that a combination of two or more external vulnerabilities greatly increases the probability of external stress for emerging market and developing economies (Figure 2.4).<sup>14</sup> The same level for foreign-currency-denominated debt liabilities could signal very different risks of an external stress episode, depending on other vulnerabilities. When foreign currency debt is 40 percent of GDP, the predicted probability ranges from 26–129 percent, depending on whether foreign exchange reserves and the current account balance are at high levels (75th percentile of the sample) or at low levels (25th percentile). Similarly, the vulnerabilities associated with large current account deficits depend on the levels of foreign exchange reserves and foreign-currency-denominated debt. The vulnerabilities associated with a low level of reserves are more severe in economies with a lower current account balance and higher level of foreign-currency-denominated debt.

Finally, the estimated model has important implications for the risks facing emerging market and developing economies today. Global risk aversion increased sharply in the months following the outbreak of COVID-19, with negative implications for countries with preexisting external vulnerabilities. When global risk aversion reaches the peak values seen during the global financial crisis or the Great Lockdown, the predicted external stress episode probability for emerging market and developing economy with an average level of preexisting vulnerabilities rises to about 40 percent—more than double the estimated probability for less vulnerable emerging

**Figure 2.4. Selected Predictors of External Stress in the Emerging Market and Developing Economies Sample**  
(Model-predicted probabilities)

The combination of external vulnerabilities in multiple dimensions can amplify external financing risks.



Sources: External Wealth of Nations database (Lane and Milesi-Ferretti 2007); Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.

Note: All panels display the predicted probabilities of an external stress episode, keeping all covariates except foreign currency debt, foreign exchange reserves, the current account, and global risk aversion at their sample mean. More vulnerable countries are defined as those with foreign currency debt at the 75th percentile and foreign exchange reserves and current account balance at the 25th percentile of the sample. Less vulnerable countries are defined as those with foreign currency debt at the 25th percentile and foreign exchange reserves and current account balance at the 75th percentile. Median countries are defined as those with foreign currency debt, foreign exchange reserves, and current account balance at the median.

<sup>14</sup>The analysis in Figure 2.4 excludes domestic-currency-denominated debt liabilities given that the estimated coefficient is not statistically significant for emerging markets and developing economies.

## Consequences of External Stress Episodes for Debtor and Creditor Economies

Having discussed the factors associated with external stress events and how their configuration has evolved over time, this section focuses on their macroeconomic consequences and how these depend on preexisting conditions.

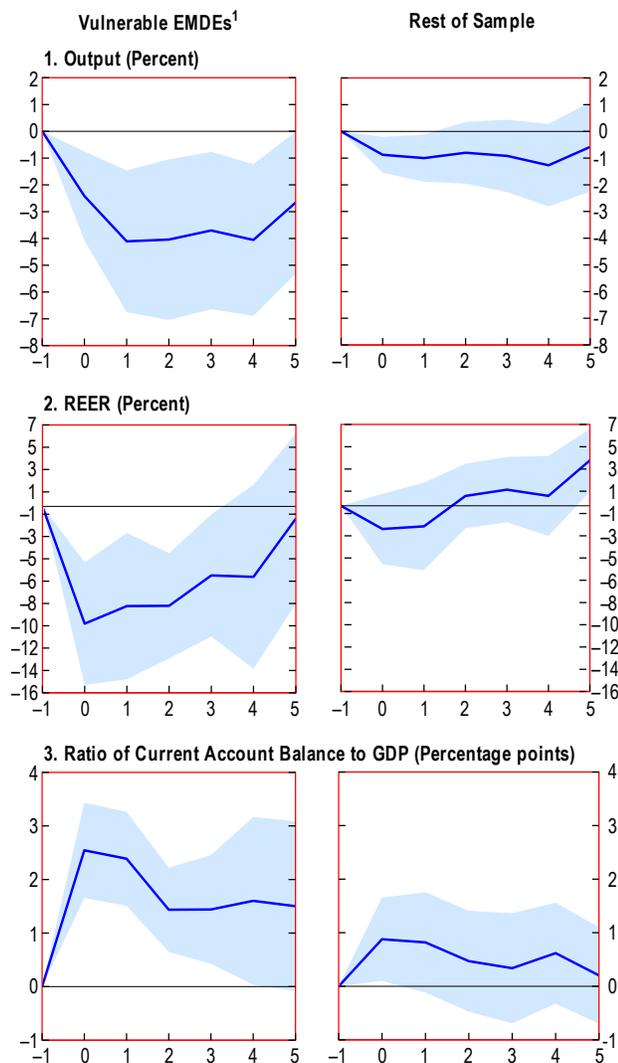
### Consequences for Debtor Economies

In addition to affecting the likelihood of external stress episodes, it is plausible that external vulnerabilities would have a strong bearing on the macroeconomic consequences of external stress when it materializes. To investigate this possibility, this subsection focuses on the consequences for emerging market and developing economies using local projections following Jordà (2005).<sup>15</sup> The estimates illustrate the dynamic responses of real GDP, the real effective exchange rate, and the current account balance. For the purposes of the analysis, countries are again classified as having higher or lower vulnerabilities based on the preexisting level of foreign-currency-denominated debt liabilities, current account deficits, and foreign exchange reserves (see the definition in the note to Figure 2.6).

The results suggest that emerging market and developing economies with greater preexisting vulnerabilities tend

Figure 2.6. Evolution of Output, Real Exchange Rates, and Current Account Balances Following External Stress Episodes

Countries with preexisting vulnerabilities experience higher output costs of an external stress episode, as well as large exchange rate depreciations and a current account adjustment.



Source: IMF staff calculations.

Note: Estimates are based on the local projection method of Jordà (2005) as explained in Online Annex 2.1. Shaded area corresponds to the 90 percent confidence interval. The horizontal axis denotes time in years, and 0 is the year of the external stress episode. EMDEs = emerging market and developing economies; REER = real effective exchange rate.

<sup>1</sup>Vulnerable EMDEs are defined as those with foreign currency debt above the EMDE median, and current account balance and foreign exchange reserves below the EMDE median.

<sup>15</sup>The local projection method for each variable includes controls for country and time fixed effects and two-year lags of output growth, exchange rates, and the current account (see Online Annex 2.1 for additional details). The asymmetry is captured by interacting the stress episodes with a dummy that takes a value of 1 for countries with a high level of foreign-currency-denominated debt, a large current account deficit, and a low level of foreign exchange reserves, and 0 otherwise. In line with Chapter 4 of October 2009 *World Economic Outlook*, for this

experience larger output losses during an external stress episode (Figure 2.6). The output loss within the first two years for vulnerable economies is about **3.74.1** percent, well above the **0.51** percent estimated loss for economies identified as “less vulnerable.” The recovery is also slower for vulnerable economies, with an output loss of about **2.6** percent five years after the external stress episode, while less vulnerable economies experience a recovery in their GDP levels within **four-five** years.

The effects on the real effective exchange rate and current account balance also relate to preexisting vulnerabilities. The real effective exchange rate depreciates by about 10 percent and the current account balance rises by more than **2.5** percent of GDP within the first year of an external stress episode for countries with high preexisting vulnerabilities. For less vulnerable economies, the real effective exchange rate and current account balance movements are much smaller.

### Consequences for Creditor Economies

When debtors suffer external stress or a crisis, their creditors experience losses in the form of adverse exchange rate movements, lower asset and bond prices, and other valuation changes, including from debt restructuring and write-offs. This consequence for creditors is particularly visible in the years following the global financial crisis. According to the Laeven and Valencia (2012) banking crisis data set, creditor advanced economies, such as Belgium, Denmark, Germany, Sweden, and Switzerland, suffered a banking crisis in 2008, in part due to these economies’ exposures to distressed assets in debtor economies.<sup>16</sup>

The analysis follows an aggregate approach, given data limitations, by studying the evolution of the valuation effects in the net IIP in the aftermath of large crises.<sup>17</sup> Valuation effects are estimated as the difference between the annual change in the net IIP and the financial account flows included in the balance of payments statistics for each country and year.<sup>18</sup>

The results indicate sustained valuation losses for countries with persistent current account surpluses in the aftermath of the global financial crisis that were not present in the precrisis period. Figure 2.7 (panels 1 and 2) presents the relationship between the accumulated current account balances of major economies and the estimated accumulated valuation effects,

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exercise, a country’s vulnerability is based on the level of these three indicators compared with the sample median. The analysis in this section assumes that the factors associated with external stress episodes are the same as the preexisting vulnerabilities that amplify their effect.

<sup>16</sup>For instance, Hellwig (2018) documents German banking sector losses during the global financial crisis and euro area sovereign debt crisis as a result of exposures to distressed assets in Greece, Portugal, Spain, and the United States. The study’s conclusion is that “the fiscal costs of support to German financial institutions were very large, even in comparison to countries that were epicenters of crises.” Thévenoz (2010) discusses the case of Switzerland during the global financial crisis, including the government rescue of the Union Bank of Switzerland.

<sup>17</sup>Ascertaining the costs of each external crisis on each creditor economy would require estimating valuation changes at the security level for bilateral country exposures following each crisis.

<sup>18</sup>See Bergant (2017) or Adler and Garcia-Macia (2018) for details on this approach, which is known as the “residual” approach. A few countries, such as the United States and some euro area countries, publish valuation changes related to exchange rate fluctuations and asset price changes as well as other valuation changes as part of the stock-flow reconciliation tables between the IIP and balance of payments statistics. To increase country and time coverage, the residual approach is applied. Financial centers with large IIP positions are excluded (Hong Kong SAR and Singapore). Saudi Arabia is excluded because of data limitations.

Annex Table 2.1.2 lists the source of the variables used in the analysis. The underlying data for the international investment position (IIP, including foreign official reserves), current account, and nominal GDP are taken from the updated version of the External Wealth of Nations database (EWN, Lane and Milesi-Ferretti 2007); the foreign currency shares of external debt are based on Bénétrix and others (2019). For countries not available in this database, foreign currency exposure is taken from Bénétrix, Lane, and Shambaugh (2015), assuming constant weights to extend the sample to 2017. “Net” is defined as asset minus liability positions, “equity” refers to the sum of foreign direct investment (FDI) equity and portfolio equity, and “debt” (either assets or liabilities) represents the sum of portfolio debt securities, other investment, and FDI debt. Since the EWN database does not break down debt and equity FDI, data from the IMF’s *International Financial Statistics* (where available) are used to estimate this breakdown.

Annex Table 2.1.2. Data Sources

Indicator	Source
International Investment Position and its Components	External Wealth of Nations database (Lane and Milesi-Ferretti, 2007)
Current account	External Wealth of Nations database (Lane and Milesi-Ferretti, 2007)
Nominal GDP	External Wealth of Nations database (Lane and Milesi-Ferretti, 2007)
Foreign currency share of external liabilities	Bénétrix and others (2019), Bénétrix, Lane, and Shambaugh (2015)
Private external debt defaults/restructurings	Asonuma and Trebesch (2016)
Official external debt restructurings	Das, Papaioannou, and Trebesch (2011), Paris Club ( <a href="http://www.clubdeparis.org/en/traitements">http://www.clubdeparis.org/en/traitements</a> )
Real effective exchange rate (2010=100)	IMF, Information Notice Systems
Income per capita	IMF World Economic Outlook
Fiscal balance	IMF WEO and national sources
Credit	Bank for International Settlements, World Development Indicators
Financial development index	Svirydzhenka (2016)
VXO	Haver Analytics

An external stress episode is an episode of sovereign debt default or restructuring or an IMF arrangement. External debt defaults and restructuring episodes with private creditors are taken from Asonuma and Trebesch (2016), while official external debt restructurings are based on Paris Club reports (<http://www.clubdeparis.org/en/traitements> and Das, Papaioannou, and Trebesch 2011). A total of 476-128 cases of external stress episodes are identified, most of which involve emerging market and developing economies. This includes 111+59 IMF arrangements, 6 defaults with private creditors and 35 sovereign debt restructurings (some episodes overlap).

### Event Study Analysis

The evolution of the IIP and its key components are tracked around episodes of external stress to help gauge what levels of exposure are riskier relative to each country’s historical mean. In line with the analysis in Gourinchas and Obstfeld (2012) and Catão and Milesi-Ferretti (2014), the following specification is used to perform a standard unconditional event analysis:

$$y_{it} = \alpha_i + \delta_t + \sum_{s=-5}^5 \beta_s D_{t+s} + \varepsilon_{it} ,$$

in which  $\alpha_i$  and  $\delta_t$  are country and time fixed effects, respectively capturing country-specific and global developments,  $D_{t+s}$  are dummy variables (11 in total) taking a value of 1 at year t (when the event occurs), and  $y_{it}$  is the IIP component being considered. The coefficients  $\beta_s$ , which are