

Fire-sale FDI? The Impact of Financial Crises on Foreign Direct Investment

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Abstract

We analyze the evolution of foreign direct investment (FDI) inflows to developing and emerging countries around financial crises. We empirically examine the Fire-Sale FDI hypothesis and describe the pattern of FDI inflows surrounding financial crises. We also add a more granular detail about the types of financial crises and their potentially differential effects on FDI. We distinguish between mergers and acquisitions (M&A) and greenfield investment, as well as between horizontal (tariff jumping) and vertical (integrating production stages) FDI. We find that financial crises have a strong negative effect on inward FDI in our sample. Crises are also shown to reduce the value of horizontal and vertical FDI. We do not find empirical evidence of fire-sale FDI; on the contrary, financial crises are shown to affect FDI flows and M&A activity negatively.

1. Introduction

What happens to foreign direct investment (FDI) in the aftermath of large depreciations and financial crises? Do foreign investors purchase domestic firms in a fire sale? Paul Krugman, in a much cited paper on the Asian 1997/1998 crisis, starts by arguing that: “hard statistical evidence of a surge in FDI into Asia was not yet available” but that anecdotal evidence strongly suggests an inflow of FDI in the post-crisis period (Krugman, 2000, p. 44). The idea that financial crises are sometimes also accompanied by “Fire-Sale FDI” (the title of Krugman’s paper) caught on. Krugman concludes his paper by noting that: “What we need—surprise—is more research.” We believe this is still the case. There is little empirical research that attempts to systematically document the evolution of foreign direct investment around financial crises. This is what we do here.

The importance of foreign direct investment (FDI) to the global economy since the late 1980’s is quite obvious, with increasing volumes of FDI flowing between, into and from the developing countries. In 2010, for the first time, developing and transition economies together attracted more than half of global FDI inflows (UNCTAD, 2011). Even though the theoretical literature in economics has identified several channels through which FDI inflows are predicted to benefit the receiving economy, the empirical literature has lagged behind and has had more trouble identifying these advantages in practice. Notwithstanding these observations, most countries continue to vigorously pursue policies aimed at encouraging more FDI inflows.

While much of the literature focuses on the impact of FDI on technological transfer, increasing productivity and production and export upgrading, one frequently

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identified advantage of FDI flows is its perceived relative stability. Empirical research shows that FDI flows tend to be much less volatile than equity flows or bank lending, for example. A related and intriguing hypothesis is that, unlike other types of capital flows, FDI tends to “lean against the wind” and inflows may rush in during a financial crisis, when all other types of capital are fleeing the scene.

In this paper, we analyze the pattern of FDI inflows to emerging and developing countries focusing on the impact of financial crises on these flows. We contribute in several ways. Our paper is the first to empirically and thoroughly examine the Fire-Sale FDI hypothesis and describe the pattern of FDI inflows surrounding financial crises. We also add more granular detail about the types of financial crises and their potentially differential effects on FDI—this was after all the subject of Krugman’s (2000) paper, in which he analyzed the predictions of various theoretical crisis models on the viability of FDI. We also expect differing types of FDI to react differently to financial turmoil, and we therefore distinguish between different types of FDI—i.e. mergers and acquisitions (M&A) and greenfield investments—and between different motivations for FDI—horizontal (tariff jumping) and vertical (integrating production stages).

2. Different Crises, Different FDI, and Different Impacts

A Typology of Financial Crises and Their Impacts

Since the re-emergence of financial turmoil during the 1970s, the economic literature on the topic has developed rapidly. The literature initially focused on currency crises, the mainstay of the 1970s turmoil, but later on also investigated banking crises, periods of high inflation or hyperinflation, and the debt crises of the 1980s, and finally in the 1990s, crises of capital flow reversals (sudden stops). FDI emerged on the international scene in significant amount only in the 1980s, so we use data for 1987–2009.

The two early generations of the theoretical currency crisis literature emphasized different fundamental reasons for a crisis. The first-generation models emphasized fiscal sustainability and the inevitability of crisis given fiscal policy choices (Krugman, 1979; Flood and Garber, 1984; Burnside et al., 2001). In these models, the exchange rate peg is dropped during the crisis and the exchange rate continues to depreciate so long as the government continues to monetize its deficit. There is no real exchange rate change and therefore incentives for embarking on FDI projects do not change. The second generation of this literature, however, emphasizes multiple equilibria, and implies that crisis equilibrium may entail new opportunities for FDI since the real exchange rate depreciation is not necessarily related to a cyclical deterioration of the economy but potentially to shifts in expectations (Obstfeld, 1994; Chamley, 2003).

The decade following the Asian crisis of 1997/1998 yielded a new crop of crisis modeling, with many models emphasizing the importance of moral hazard created by government guarantees (Corsetti et al., 1999). These models largely imply a collapse of an over-investment bubble, and therefore very weak incentives for FDI in the crisis aftermath. A separate group of crisis models emphasize banking runs and the breakdown in financial intermediation (Chang and Velasco, 2001; Uhlig, 2010); these, like the second generation crises, present opportunities for FDI.

A different crop of theory papers emphasize the reversals of capital flows and their impact on the domestic economy. Sudden stops have been found to lead to dramatic if temporary output contractions especially if they involve a Fisherian debt deflation cycle (e.g. Hutchison and Noy, 2006). In these cases, the deep recession will likely

weaken the incentives of foreign investors to enter the domestic market, and therefore these crises are predicted to reduce horizontal FDI. The possible impact of debt crises and the accompanying debt defaults are more difficult to characterize, since their impact is not well established (e.g. Rose, 2005).

In order to formulate a clear hypothesis on the impact of financial crises on FDI, one needs to understand the fundamental mechanisms that cause and shape the evolution of financial crises in the first place. In empirical terms, this means we need to control for the type of crisis a country experiences when evaluating the crisis impact on FDI. We are the first to have attempted to do that.

Types of FDI and Their Vulnerability to Financial Crises

As we have already observed, financial crises that are caused by different phenomena are predicted to have different consequences for the domestic economy. In particular, some will lead to domestic contractions, while others may lead to an expansionary depreciation. Equally, a financial/monetary crisis may not have much impact on the real economy and therefore fail to affect the incentives faced by international investors. These different outcomes will potentially also impact distinctively the different forms of direct investment; with the relative attractiveness of investing in existing infrastructure, through M&A, relative to constructing new production facilities (greenfield investment) may be shifting as well.

These distinctions also relate to the different time horizons that M&A and greenfield investment entail. M&A can typically be implemented much more quickly, since it does not entail a time-consuming permitting stage that typically accompanies new projects (especially in emerging markets). If a crisis is predicted to be short-lived, and especially if a real depreciation is perceived to be temporary, an M&A boom, as compared with an increase in greenfield investment, is likely to be observed.

Following the literature, we also distinguish between horizontal and vertical FDI. We examine the hypothesis that the differences between the motivations for FDI also matter for their vulnerability to financial crises. Horizontal FDI targets the domestic market, so that a financial crisis that entails a real contraction will adversely affect horizontal FDI. Vertical FDI, in contrast, is mostly concerned with production costs (and production quality). In this case a real depreciation may be beneficial for integrating production networks vertically by reducing the costs associated with this process, whatever the state of the domestic/host economy is and may remain. Vertical FDI is also closely associated with increased trade, and therefore can also be affected by the impacts of financial crises on trade relations (Aizenman and Noy, 2006, 2009).

Empirically, we employ a country-panel regression approach using Arellano–Bond generalized method of moments' estimation (AB-GMM). AB-GMM has become the standard in the international macro literature that uses country time series' panels and we therefore do not include a detailed discussion of the estimation algorithm and its justification. It is worth noting that the algorithm enables us to disregard the time-invariant institutional, legal, and cultural environment in which FDI projects are implemented and which may have an important impact on FDI inflows, and also deals with some types of endogeneity (though at least reverse causality is not a major concern in this case as few view FDI as potentially destabilizing for the financial system).

Relevant Previous Empirical Work on FDI

Beyond the papers that focus on the fire-sale FDI of the Asian Crisis of 1997/1998, the only other paper that looks at a similar question is Soliman (2005) who analyzes the

impact of currency crises on outgoing US FDI and finds some evidence of a fire sale (or at least an increase in FDI following the crisis). Alfaro et al. (2004) focus on the ways in which the growth effects of FDI depend on the strength of the domestic financial markets of the host country. The implication of their findings is that a country with post-crisis weakened financial sector will likely gain less from FDI (FDI will be less productive) and therefore will experience reduced inflows. Several papers have also investigated the response of foreign multinationals to a sharp depreciation of the currency in the host economy, without directly examining FDI. Using US multinational data, for example, Desai et al. (2008) find that foreign firms increase their own investment, following a large depreciation, relative to domestic firms.

3. Data Sources, Descriptive Statistics and Estimation

We focus only on developing/emerging markets; and leave a similar investigation for developed countries for future work. We also exclude the Organization of the Petroleum Exporting Countries (OPEC) member countries as their FDI is heavily concentrated in natural resources. Our sample therefore contains 40 emerging/developing countries (a detailed list is included in the online Appendix A). Our data cover yearly observations for the period of 1987–2009. Online Appendix B describes the crisis typology we use (primarily based on Reinhart and Rogoff, 2009); and Appendix C contains a full list of data sources used in our analysis.

M&A, Greenfield, Horizontal and Vertical FDI

Only a few papers have distinguished between different types of FDI and treated them as separate types of capital flows. A recent example, Wang and Wong (2009) investigate the growth impact of M&A and greenfield FDI separately. More directly relevant to our work, Alquist et al. (2013) investigate whether M&A projects that were implemented in a post-crisis environment fail more often than non-crisis-induced M&A. Given a lack of common source for FDI data, we collected data on four different FDI measures that have been typically used in previous studies: FDI flows, FDI stocks, M&A, and foreign affiliate sales.

Our source of cross-country FDI flows, stocks, and cross-border M&A is the United Nations Conference on Trade and Development (UNCTAD)'s FDI database, compiled by Thomson Financial. M&A are defined as the mergers with, or acquisitions of, domestic firms by a single foreign investor with more than 10% equity capital. One limitation of this dataset is a substantial amount of missing values, and the possibility of significant underreporting, since many of the transactions are between private firms.

Following Wang and Wong (2009), we construct a measure of greenfield FDI by subtracting cross-border M&As from FDI inflows. While this proxy is not ideal, UNCTAD documents that FDI can be considered approximately as the sum of greenfield investment and M&As (UNCTAD, 2000, pp. 114–119).¹

To distinguish between horizontal and vertical FDI, we use the destination market for the sales of US multinationals since 1987 (data from the US Bureau of Economic Analysis, BEA). Following Aizenman and Marion (2004), we measure vertical investment as affiliate sales either back to the USA or to other foreign countries. Horizontal investment is defined by affiliate sales in the local market where the affiliate resides. The assumption is that the latter are sales of final goods, while the former

Table 1. FDI statistics (US\$ millions at current prices and current exchange rates)

<i>FDI Inflows</i>	<i>Total</i>	<i>M&A</i>	<i>Greenfield</i>	<i>Horizontal</i>	<i>Vertical</i>
Totals:	3,495,833.7	698,676	2,656,992.4	4,784,931	2,350,113
<i>By decade</i>					
1980s (1987–1989)	51,431.8	1,105.0	24,101.2	88,767	278,095
1990s (1990–1999)	911,317.1	183,725.0	680,480.1	1,341,525	588,552
2000s (2000–2009)	2,533,084.8	513,846.0	1,952,411.1	3,354,639	1,483,466
<i>By region (No. of countries in group)</i>					
South and East Asia (8)	1,442,765.5	219,481.0	1,198,179.9	1,337,290	869,685
Middle East & N. Africa (4)	116,737.1	36,336.0	60,293.1	30,254	9,951
Sub-Saharan Africa (10)	212,899.1	40,115.0	115,741.5	197,004	74,713
Latin America (18)	1,150,643.2	247,800.0	866,846.1	2,917,919	1,281,832
E. Europe and C. Asia (4)	572,788.7	154,944.0	415,931.8	302,464	113,932

represent intermediate goods requiring further processing in the parent country or a third country. This is the best available metric to distinguish between horizontal and vertical FDI.

Table 1 reports FDI statistics for our sample of 44 countries by region, decade, and type of FDI. We note that well-known dramatic increase in FDI volumes between 1987 and 2009 is observable for all regions and all types of FDI. We also observe that comparatively, FDI in Asia is more vertical, and includes less M&A compared with Latin America, the other region that receives much FDI.

Typology of Crises and Data Sources

The literature on financial crises is quite large, but only in the last few years a typology of crises has become used more often, especially since the publication of the comprehensive examination of the historical record provided by Reinhart and Rogoff (2009). We follow Reinhart and Rogoff (2009) in identifying banking, currency, debt (external and domestic), stock market, and inflation crises. We also distinguish severe crises: systemic banking crises (as identified by bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions), and hyperinflation crises (identified as an annual inflation rate of 500% or higher).

Reinhart and Rogoff (2009)'s comprehensive data set on financial crises provides the dating of various types of crises in seventy countries over the period 1970–2010. It builds heavily on the work of earlier scholars, but also employs a considerable amount of new material from diverse primary and secondary sources. We focus on the period of 1987–2009 when FDI became prevalent in the developing/emerging countries in our sample.

To identify systemic banking crises, we use a database developed by Leaven and Valencia (2010). The database covers worldwide systemic banking crises for the period of 1970–2007. Table 2 presents a summary of our data on crisis types in our sample. It reports the number of distinct episodes of crises as well as the total number of years in crises by crisis type and by decade.

As can be seen from Table 2, developing countries have been prone to financial crises in the last two decades. In the period of 1987–2009, our sampled countries experienced 68 distinct episodes of banking crises, 42 of which constituted systemic banking crises. Currency crises occurred in developing countries 118 times, adding up

Table 2. *Crises in Developing and Emerging Countries, 1987–2009*

<i>Crisis types</i>	<i>Number of distinct crisis episodes (Total years in crisis)</i>	<i>By decade</i>		
		<i>1987–1989</i>	<i>1990–1999</i>	<i>2000–2009</i>
Banking crisis	68 (255)	27 (85)	31 (131)	10 (39)
Systemic banking crisis	42 (122)	16 (45)	20 (58)	6 (19)
Currency crisis	118 (326)	50 (152)	39 (126)	28 (47)
Inflation crisis	54 (315)	21 (143)	24 (133)	9 (39)
Hyperinflation crisis	10 (27)	6 (14)	3 (9)	1 (4)
Stock Market crisis	90 (212)	16 (63)	44 (85)	30 (64)
Domestic debt crisis	17 (80)	11 (39)	3 (27)	3 (13)
External debt crisis	54 (361)	37 (167)	20 (117)	9 (73)

to a total of 326 years of currency crises, or an average of 8 years per country. Inflation crises were less prevalent—54 distinct episodes with 10 hyperinflation episodes. Stock markets crashed a total of 90 times, and there were 54 (17) episodes of external (domestic) debt crises. There is no apparent increasing time trend in the frequency of crises among developing/emerging countries, in spite of the recent global turmoil.

Control Variables

Our main concern in the choice of additional variables to include in our estimation is to prevent any bias of omitted variables from affecting the estimates we obtain for our right-hand side variables of interest (the financial crisis indicators). Given this concern, we choose to err on the side of caution and include an extensive list of controls. Blonigen and Piger (2011) conclude, using the Bayesian averaging technique, that a fairly extensive list of controls should be included in FDI regressions, though they also point to a few that are probably not robustly associated with FDI (see also Biswas, 2002; Asiedu and Freeman, 2009).

Adhering to their findings, we control for broad macroeconomic conditions, political, socioeconomic, and business environment in the host country by using a set of indicators on corruption, government stability, and investment climate from the Freedom House and International Country Risk Guide—Political Risk Service (ICRG-PRS) databases. We also include measures from the World Bank's World Development Indicators (WDI) on relative factor endowments, communications infrastructure, and trade costs. Finally, we control for geographic spatial issues and possible agglomeration effects (Head et al., 2010). Given that Blonigen and Piger's (2011) study focused on the long-term effects of FDI determinants and we examine the short-run economic downturns of FDI, we also control for the exchange rate in the model. We expect that exchange rate is an important determinant of FDI, as

argued in other studies in the literature (Blonigen, 1997, 2005). For readability, we do not include coefficients for these controls in the reported regressions; complete results are available upon request from the authors.

Estimation Methodology

We estimate the following equation:

$$FDI_{it}^T = \beta_1 + \beta_2 CRIS_{it}^P + \beta_3 X_{it} + \varepsilon_{it} \quad (1)$$

where FDI_{it}^T is the measure of FDI inflows to country i in year t , and of type T (M&A, greenfield, horizontal, vertical), $CRIS_{it}^P$ is the binary crisis indicator for crisis type P , and X_{it} is a vector of control variables as described in the previous section. We use panel Arellano–Bond GMM estimation instead of relying on the cross-sectional datasets that are sometimes used in the FDI literature. Panel estimation methods offer us a way to control for unobservable time-invariant effects and hence give more reliable estimates, while the AB-GMM estimation algorithm allows us to control for potential endogeneity of some of the control variables within the context of a dynamic panel.

In our baseline regressions, we treat the crisis variable as predetermined, assuming that the current period error term is uncorrelated with current and lagged crises, but may be correlated with the future crises. It is a weaker restriction than strict exogeneity, which requires the variable to be uncorrelated with past, present, and future shocks. We also follow the standard practice of reporting the one-step estimates as Arellano and Bond (1991) show that the two-step procedure has poor finite-sample properties. For all regressions, we make the Windmeijer finite-sample correction to the reported standard errors in two-step estimation, without which those standard errors tend to be severely downward biased.

When using estimators of this type, the number of instruments will increase at a rate that is quadratic in T . As discussed by Roodman (2009), the fundamental issue here is that when there are too many instruments relative to the sample size, the R^2 on the first stage will approach unity and the second stage estimator will be almost equivalent to ordinary least squares (OLS). We follow the literature and limit the maximum number of lags that can be used as instruments at one.

4. Results

Tables 3 and 4 report the results of our empirical analysis. We ran separate estimations for the levels of FDI (stocks and flows) as well as FDI shares of GDP (stocks and flows). For each measure of FDI activity, we use 10 different specifications: we include each crisis separately, all crises jointly, and in a last specification in each case, only include severe crisis episodes (severe banking crises and hyperinflation). Because of editorial space constraints, however, we only report the results for all measures of crises jointly, and for the measures of their severe versions. All other results, as well as the coefficients for our other control variables are available online in our Web Appendix or by request from the authors (Stoddard and Noy, 2013).

The control variables are often significant with the expected sign. FDI is positively related to the host country's level of government stability, GDP per capita, gross fixed capital formation, and socioeconomic conditions. Education level in host country has a positive effect on greenfield and horizontal investment, but a strong negative effect on total FDI flows and vertical FDI in particular, suggesting, not surprisingly, that

Table 3. *Arellano–Bond Difference GMM Estimation for FDI*

	(1) <i>All crises</i>	(2) <i>Severe crises</i>	(3) <i>All crises</i>	(4) <i>Severe crises</i>
	<i>FDI flows</i>		<i>FDI stocks</i>	
Banking crisis	3,211.6*** (742.6)		-108,115.0** (51,319.6)	
Systemic banking crisis		-1,219.3 (909.5)		-66,480.5 (64,634)
Inflation crisis	-2,185.5** (893.1)		-93,265.6 (60,785.6)	
Hyperinflation crisis		-19,690.2*** (2,166.5)		-1,284,376.0*** (170,267.6)
Currency crisis	40.9 (704.7)		-30,524.3 (47,965)	
Stock market crisis	751.7 (730.2)		44,795.6 (49,709.2)	
Domestic debt crisis	164.5 (1,118.6)		21,423.5 (105,997.1)	
External debt crisis	-4,832.7*** (1,149.3)		-126,134.4 (79,537.1)	
No. of observations	527	529	543	545
No. of countries	34	34	34	34
No. of instruments	244	170	267	189

*, **, *** Denotes significance at 10%, 5%, and 1% respectively. One-step standard errors in parentheses. Results for all other control variables (see text) are available upon request from the corresponding author.

vertical FDI is attracted to cheap labor in host developing countries. Surprisingly, greenfield FDI and horizontal FDI are also positively affected by corruption and negatively by the quality of institutions.

Table 3 reports the estimates for determinants of FDI flows and stocks, without distinguishing between the different types of FDI. Coefficients for banking crisis, inflation crisis, hyperinflation crisis, and external debt crisis are negative and statistically significant in the specifications for FDI flows. Banking crises are shown to reduce FDI by US\$3.4 billion, while inflation and hyperinflation crises lead to a decrease in FDI flows by US\$2.9 billion, and US\$19.7 billion respectively. An external debt crisis in a given year is shown to decrease FDI flows by US\$5.5 billion. Columns (3) and (4) report the estimates for determinants of FDI stocks. Coefficients for banking crises, and hyperinflation crises are negative and statistically significant.

In Table 4, we distinguish between the different types of FDI and examine the effects of the crises on vertical, horizontal, M&A, and greenfield FDI separately. We observe that an inflation crisis (and particularly a hyperinflation crisis) has a strong negative and significant effect on vertical FDI in our sample. An inflation crisis in a given year is shown to decrease vertical FDI by US\$29.8 billion; while a hyperinflation crisis exaggerates this effect tenfold. External debt crises are also shown to reduce the value of vertical FDI by US\$32.9 billion. The effects of the other types of crises on vertical FDI are shown to be insignificant.

Horizontal FDI targets the domestic market, so we expect that a financial crisis that entails a real contraction will adversely affect horizontal FDI. Indeed, we observe that

Table 4. Arellano-Bond Difference GMM Estimation for FDI by Type

	Vertical FDI		Horizontal FDI		M&A		Greenfield	
	(1) All	(2) Severe	(3) All	(4) Severe	(5) All	(6) Severe	(7) All	(8) Severe
Banking crisis	3,866.7 (6,897.8)		22,515 (15,435.2)		-951.0* (540.4)		505.3 (583.6)	
Systemic banking crisis		7,543.148 (8,537.0)		34,567.3* (19,255.7)				30.8 (742.4)
Inflation crisis	-20,274.6** (9,560.8)		-36,516.5 (25,378.3)		-449.9 (833.2)		-678.8 (925.1)	
Hyperinflation crisis		-298,405.0*** (33,642.7)		-585,585.4*** (62,537.9)				-2,871.2 (1,869.9)
Currency crisis	5,150.4 (7,142.0)		-10,445.9 (17,280.9)		91.4 (524.6)		635.9 (582.2)	
Stock market crisis	-1,764.6 (6,432.4)		8,767.9 (14,465.9)		-159.3 (457.6)		346.7 (504.1)	
Domestic debt crisis	4,080.8 (14,781.5)		61,669.6 (40,808.4)		-959.1 (1,109.4)		1,143.5 (1,181.5)	
External debt crisis	-22,597.1** (10,433.5)		-73,236.8*** (26,625.7)		-1,177.7 (791.9)		-639.1 (915.8)	
No. of observations	282	282	247	249	278	280	281	283
No. of countries	21	21	22	22	30	30	30	30
No. of instruments	253	179	233	177	221	166	223	166

*, **, *** Denotes significance at 10%, 5%, and 1% respectively. One-step standard errors in parentheses. Results for all other control variables (see text) are available upon request from the corresponding author.

the same types of crises that affect vertical FDI, have a strong negative effect on horizontal investment. We find that an inflation crisis and hyperinflation crisis reduces the value of horizontal FDI by US\$65.3 and US\$580.5 billion respectively in a given year. An external debt crisis also negatively impacts horizontal FDI, reducing its value by US\$86.7 billion dollars. We also find that a systemic banking crisis increases the value of horizontal FDI by US\$34.6 billion.

Columns 5–6 report our results on M&A investment. We find that, contrary to the Fire-Sale FDI hypothesis, financial crises have a significant adverse effect on the value of M&A. In particular, banking crises are shown to reduce M&A investment by US\$1.4 billion ($p = 0.02$). Both domestic and external debt crises also affect M&A investment adversely, reducing its value by US\$2.4 billion ($p = 0.04$) and US\$1.6 billion ($p = 0.05$) respectively, though this final result does not remain when we include all types of crises in our specification (column 5). Lastly, we examine the effects of FDI on greenfield investment in columns (7) and (8), and find no statistically observable effect. This result may also be perceived as unsurprising, since greenfield investment usually takes years to implement, and our interest here is in the short-term reaction to financial turmoil.

To be consistent with the portfolio allocation literature and to avoid a potential size and significance bias, we scale dependent FDI variables by a country's GDP level. The effects of crises on the scaled FDI variables remain largely consistent, although some significance disappears. Online Tables 9 and 10 report the results of Arellano–Bond GMM estimation with scaled FDI flows and stocks as a dependent variable. The impact of banking crises and external debt crises remains negative and significant. A banking crisis reduces FDI flows as a share of GDP by 57.8%, while an external debt crisis leads to a significant decrease in the share of FDI stocks as a share of GDP. Consistent with baseline results presented in Tables 3 and 4, inflation, hyperinflation, and external debt crises all have a negative effect on scaled vertical and horizontal investment (all less than 1%). With an exception of inflation crises, the effects of financial crises on M&A and greenfield investment (as a share of GDP) is insignificant, but negative, consistent with the baseline results reported earlier. Moreover, to ensure the robustness of our results, we replicate our analysis using nominal and logged values of FDI as dependent variable as well as controlling for exchange rates. The signs and significance of our coefficients of interest remain largely unchanged.

Finally, we explore persistence of crisis effects on FDI by including multiple lags of crisis variables as a dependent variable. To determine the appropriate number of lags to include we use the Akaike information criteria (AIC) for each of the FDI measures. We report our results in the Online Appendix. We observe that the effects of different types of crises on various forms of FDI vary in terms of their duration and persistence. The most persistent type of crisis appears to be a hyperinflation crisis.² The effects of the external debt crisis on FDI stocks also remain significant well into the fifth year following a crisis, albeit slightly diminishing each year. A similar trend is observed with banking crises and inflation crises, both of which significantly reduce all forms of investment for two years following the onset of a crisis. The negative impact of the external debt crises on vertical FDI and M&A, on the contrary, is larger in the year after the crisis relative to the year that the crisis emerges.

5. Conclusions

We find that financial crises have an adverse effect on FDI in our sample of developing and emerging countries. In particular, banking crises, inflation crises, hyperinfla-

tion crises, and external debt crises lead to a significant decline in FDI inflows. Crises are also shown to reduce the value of vertical FDI, horizontal investment, and M&A. In general, we find no empirical evidence of fire-sale FDI in our sample of developing countries.

While these results may seem expected, they do not fit the pattern described by Krugman's Fire-Sale FDI analysis of the Asian crisis. There may be at least two possible explanations for this difference. First, Asia was unique and the reasons for the Asian crisis different from other cases of financial crises. While Krugman focused on the Asian financial crises, our sample is broader both in its coverage of countries and years. We find no evidence of fire-sale FDI following an average financial crisis in developing countries. Secondly, as is the case with any macroeconomic data, there are questions about the quality of FDI data (particularly, M&A data) and it may be that the data are simply not good enough to identify this fire-sale pattern.

It is important to note that Krugman's impetus was also normative. He asks: "does the foreign purchase of Asian assets represent the transfer of control to efficient owners who were previously unable to buy at a reasonable price? Or does it represent sales to inefficient owners who happen to have cash?" He further inquires: "Does the fire sale of domestic firms and their assets represent a burden to the afflicted countries, over and above the cost of the crisis itself?" (Krugman, 2000, p. 44).

We introduce no normative claims, and do not believe our work implies any prescriptive conclusions. It may well be that while on net there is no fire sale associated with large financial crises, some FDI transactions do involve fire-sale characteristics and may even be ethically questionable (as Krugman appears to suggest). In particular, it may be the case that some of the transactions that occur after a financial collapse do transfer ownership to inefficient foreign owners and that this imposes additional long-term burden on the afflicted countries. None of what we find suggests that this does not happen; examining net FDI flows, however, does not provide evidence of any such adverse impacts. It is also possible that the inflow of FDI attributed to the fire sale is exactly cancelled out by the decrease of FDI owing to heightened levels of risk and lower expected returns.

Moreover, our claim that FDI inflows also decline in the aftermath of financial crises, like other types of capital flows, does not necessarily contradict the consensus that FDI is preferable to "hot money" during times of financial turmoil. The FDI reversals that we record are still probably much smaller than the reversals associated with other types of financial flows (especially short-term debt).

The topic of financial crises and FDI is an important and timely one today given recent global financial turmoil (Tille, 2012). The findings of the paper are relevant not only because they evaluate the effects of crises on FDI, but because they inform us about the types of crises that these countries are experiencing (or are at least perceived to be experiencing). Just as Krugman concluded, observing or not observing fire-sale FDI lends support to either the fundamental explanation or the panic view behind the cause of the crisis. Our results find support in the FDI reversal that is apparent in the immediate aftermath of the 2008–2010 global financial crisis. While the long-run effects of this crisis still remain to be seen, the current downturn has been accompanied by a precipitous decline in FDI flows worldwide of 40% between the peak in 2007 and the trough in 2009 (UNCTAD, 2011).³ The recent crisis, of course, was global, so credit contracted everywhere; and we observed large declines in FDI inflows of (almost) all types.

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Notes

1. Given the lack of existing greenfield investment data, this measure is the most natural alternative proxy. However, since FDI data are reported on a balance-of-payment basis, where inward FDI in a host country is measured as the aggregation of greenfield investment, M&A sales, re-investments, and disinvestments undertaken by multi-national companies, this proxy does not perfectly reflect the actual value of greenfield investment.
2. Results for hyperinflation crises, however, are not robust and are sometimes counter-intuitive. Given the well-known difficulties in collecting reliable macroeconomic data in a macroeconomic environment of wildly fluctuating prices we do not believe that the evidence is robust enough for any more general conclusions regarding hyperinflations.
3. For detailed evidence about the contraction of incoming FDI in the core of the global financial crisis, the USA, see Contessi and De Pace (2012).