What explains surges in FDI inflows? Evidence from developing countries

Jagadish Prasad Sahu
Centre for Economic Studies and Planning, Jawaharlal Nehru University

Abstract

This paper examines why developing countries experience surges in FDI inflows (defined as exceptionally large inflows of FDI). Using a threshold approach, we identify the timing of large inflows of FDI and examine the likelihood of these FDI inflow surges in a sample of 56 developing countries over the period 1990–2014. We find that a majority of the countries have experienced incidences of surges in inward FDI flows during the sample period. The distribution of surges shows that South Asia has the lowest incidence of surges among the geographical regions. Our results show that both the global push and domestic pull factors significantly influence the likelihood of a surge occurrence. Specifically, the global factors such as world output growth, long term US interest rate, and the domestic factors like economic growth, level of natural resources and financial development are statistically significant predictors of FDI inflow surges. The results are robust to different specifications and alternative methods of estimation. While global factors are important in explaining FDI inflow surges in developing countries in general, where it ends up depends on country characteristics.

Keywords: Foreign direct investment, surges, developing countries

I. Introduction

Developing countries across the world perceive inward foreign direct investment (henceforth FDI) as an important instrument for their economic development process.[1] In contrast to foreign portfolio investment, FDI is a relatively stable form of international capital, and it is less susceptible to sudden reversals during financial crisis (Fernandez-Arias and Hausmann 2001, Levchenko and Mauro 2007, Sula and Willett 2009). Moreover, it is widely acknowledged that

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[1] Foreign direct investment is defined as an investment to acquire a lasting interest in an enterprise operating in an economy other than that of the investor. It involves a long-term relationship between the direct investor and the enterprise, and a significant degree of influence (ownership of 10 percent or more of voting stock) by the direct investor on the management of the enterprise. Ownership of 10 percent or more of voting stock in the enterprise is used as the basic criterion to classify the investment as direct investment.

FDI brings in modern technology, managerial skills and access to international markets, thereby increases economy-wide productivity via technology spillovers (Blomstrom and Sjoholm 1999, Liu 2002, Javorcik 2004, Todo and Miyamoto 2006, Blalock and Gertler, 2008, Liu 2008), and promotes economic growth in the recipient economy (Balasubramanyam, Salisu and Sapsford 1996, Borensztein, Gregorio and Lee 1998, Li and Liu 2005, Alfaro et al. 2010, Duttaray, Dutt and Mukhopadhyay 2011). Given these potential benefits, there is a strong competition among the developing countries to attract a larger share of global FDI inflows. (Neumayer and Spess 2005, Mottaleb, and Kalirajan 2010, Harding and Javorcik 2011). Most of the developing countries have adopted favorable economic policies in the last two decades so as to attract higher amount of FDI (Kobrin 2005, Cooray, Tamazian and Vadlamannati 2014).

In this era of globalisation, the flow of FDI has become an imperative phenomenon. The worldwide FDI inflows have increased tremendously over the period 1990-2014 (from 204.89 billion USD in 1990 to 1228.28 billion USD in 2014). There is an increasing integration of the developing world with the global economy ever since the early 1990s. As a result, FDI flows into developing countries have increased rapidly during the past two decades. The share of developing countries in total world FDI inflows has increased from 16.89 percent in 1990 to 55.47 percent in 2014 (World Investment Report, 2015). This dramatic increase in the magnitude of FDI flows has led to a voluminous literature that empirically examines the fundamental factors driving this phenomenon (Neumayer and Spess 2005, Busse and Hefeker 2007, Yang, Benhua 2007, Liargovas and Skandalis 2012, Blonigen and Piger 2014).

In this paper, we examine the likelihood of surges in FDI inflows in the developing countries context. Using a threshold approach we identify the timing of large inflows of FDI and investigate the factors that explain these incidents in a sample of 56 developing countries over the period 1990–2014. Our results show that both the global push and domestic pull factors significantly influence the likelihood of a surge occurrence. Specifically, the global push factor such as world output growth has positive effect on the probability of surges, whereas the long term US interest rate (measured as a proxy for rate of return on long term risk free investment in the developed countries) reduces the likelihood of FDI inflow surges in developing countries. Among the domestic pull factors economic growth, rate of inflation, level of natural resources

and financial development are statistically significant predictors of surges in FDI inflows. To be precise, the real GDP growth rate, natural resources rents and domestic bank credit to private sector have positive influence on the probability of surge occurrence, whereas adverse macroeconomic condition like high rate of inflation reduces the possibility of large inflows of FDI. Our results are robust to different specification and methods of estimation. While global factors are important in explaining FDI inflow surges in developing countries in general, where it ends up depends on country characteristics.

The remainder of the paper is structured as follows. In Section II, we review the extant literature on extreme movements in capital flows. Section III describes empirical framework. The results are discussed in Section IV. The paper is concluded in Section V.

II. Review of Literature

The literature on extreme capital flow episodes originated with Calvo's (1998) analysis of sudden stops, defined as sharp slowdowns in net capital inflows. Build on this literature, Reinhart and Reinhart (2008) investigate the stylized facts of capital inflow bonanzas (i.e. episodes of heavy capital inflows) in 181 countries during 1980–2007 and for a subset of 66 economies for the period 1960-2007. Their results show that global factors, such as commodity prices, international interest rates, and growth in the world's largest economies, have a systematic effect on the global capital flow cycle. Moreover, capital inflow bonanzas in emerging market economies (EMEs) are associated with a higher likelihood of economic crises. Cardarelli et al. (2009) examine the macroeconomic implications and policy responses to surges in private capital inflows in a group of 52 emerging and advanced economies. In particular, they identify 109 episodes of large net private capital inflows during 1987–2007, and find that episodes of large capital inflows are often associated with real exchange rate appreciations and deteriorating current account balances. Furthermore, they find that episodes of large capital inflows are associated with GDP growth acceleration. However, growth drops significantly afterwards, and the decline in GDP growth is significantly larger for episodes that end abruptly.

More recent studies for example Forbes and Warnock (2012), Ghosh, Qureshi, Kim, and Zalduendo (2014) examine the causes of unusually large changes in aggregate capital inflows in

cross-country context. Forbes and Warnock (2012) analyze the sharp movements in international capital flows and identify periods of rapid increase and decrease, respectively, of gross inflows and gross outflows for 58 emerging and developed economies over the period from 1980 through 2009. They find that global factors, particularly global risk, are significantly associated with extreme capital flow episodes, whereas domestic macroeconomic characteristics are generally less important. The study reveals that Contagion (whether through trade, banking, or geography) is associated with stop and retrenchment episodes, and there is little association between capital controls and the probability of having capital inflow surges or stops. Ghosh et al. (2014) examine when and why emerging market economies experience surge in capital inflows. Using data on net capital inflows for 56 EMEs over 1980−2011, they find that global factors such as US interest rates and investor risk aversion determine the likelihood of surges in EMEs, and whether a particular economy experiences a surge, and the magnitude of that surge depends mainly on the domestic factors such as its external financing need, capital account openness, and exchange rate regime. Benigno et al. (2015) analyze the stylized facts characterizing periods of exceptionally large capital inflows in a sample of 70 middle- and high-income countries over the period 1975–2015. The study finds that these events of large capital inflows are typically accompanied by an economic boom.

However, the literature on surges in FDI inflows in developing countries is extremely sparse. Burger and Ianchovichina (2014) is the only study that investigates the factors associated with foreign direct investment surges and stops, defined as sharp increases and decreases, respectively, of gross foreign direct investment inflows to developing countries. The study finds that greenfield-led surges and stops occur more frequently than that of mergers and acquisitions-led surges and stops. Their empirical results show that global liquidity is the only factor significantly associated with a surge, regardless of its kind, whereas decline in global economic growth and a surge in the preceding year are statistically significant predictors of a stop. Furthermore, the study finds that greenfield-led surges and stops are more likely to occur in low-income and resource-rich countries than elsewhere. Global growth, financial openness, and domestic economic and financial instability enable mergers and acquisitions-led surges.

Our review of the extant literature on extreme movements in capital flows indicates that surges and stops in foreign capital inflows are common phenomenon in EMEs and these events are driven by both global push and domestic pull factors. Except Burger and Ianchovichina (2014) all the previous studies focus on inflows of aggregate foreign capital. In this context, investigating why FDI inflow surges occur in developing countries is important for the following reasons. First, FDI is fundamentally different from other forms of international capital since the former entails long-term association, whereas foreign portfolio investments are subject to quick reversal at the time of economic turmoil. Therefore, FDI inflow surges may have different implications for the economy as compared to surges in aggregate capital inflows which primarily include short term capital that are of liquid nature. Second, given the fact that developing countries across the world compete for larger share in global FDI inflows, understanding why an economic experience surges in FDI inflows is important from policy prospective.

III. Empirical Strategy

Our empirical analysis involves the following two steps. First, we identify surges in FDI inflows (i.e. years of exceptionally large inflows of FDI measured as percentage of GDP) for each country included in the sample, and then, examine the factors that explain the likelihood of surge occurrence. Following the literature, we use a threshold approach to identify FDI inflow surges. To be precise, we employ two different criteria for surge identification. The first criterion (criterion-1) is that an observation is recorded as a surge if it is in the 4th quartile of the country-specific distribution of FDI inflows and its value exceeds the cross-country sample average of inward FDI flows. Criterion-1 can be written as:

$$S_{jt} = 1 \; if \; FDI_{jt} \in \left\{4^{th} quartile(FDI_{jt})_{t=1}^{T}\right\} \; and \; K_{jt} \geq \left\{average(FDI_{jt})_{j=1,t=1}^{N,T}\right\}, and$$

$$\quad 0 \; otherwise \tag{1}$$

where S_{jt} is an indicator variable that takes value 1 if there is a surge in country j at time t, and 0 otherwise, FDI_{jt} is FDI inflows to country j in time t, and N and T represent total number of countries and years respectively.

According to the second criterion (criterion-2), an observation is defined as a surge if it is both in the 4th quartile of the country-specific distribution of FDI inflows as well as in the 4th quartile of the entire sample distribution of FDI inflows. Criterion-2 can be written as:

$$S_{jt} = 1 \ if \ FDI_{jt} \in \left\{4^{th} \ quartile \ (FDI_{jt})_{t=1}^{T}\right\} \cap \left\{4^{th} quartile(FDI_{jt})_{i=1,s=1}^{N,T}\right\}, \text{and}$$

$$0 \ otherwise \tag{2}$$

Criterion-2 entails more stringent condition than criterion-1, and thus, captures instances of exceptionally large FDI flows into the country. FDI inflows that are not only large by the country's own historical experience but also by cross-country standards are considered as surge. We identify 254 surge instances using criterion-1. Similarly, employing criterion-2 we obtain 215 surge occurrences for the sample of 56 developing countries over the period 1990-2014. The distribution of surges across the geographical regions is shown in Table2.

Then, we proceed to examine the likelihood of surge occurrence and estimate the following model:

$$\Pr(S_{jt} = 1) = F(\beta G_t + \gamma Z_{jt} + \varepsilon_{jt}) \tag{3}$$

where S_{jt} is an indicator variable that takes value 1 if there is a surge in country j at time t, and 0 otherwise, G_t and Z_{jt} includes various global push and domestic pull factors respectively. ε_{jt} is the random error term. We estimate equation (3) using probit regression. In addition, as a test of robustness of the results, alternative estimation methods such as complementary log-log regression and instrumental variable probit (IV-probit) regression are used to estimate the model. We use lagged values of the domestic factors to mitigate potential endogeneity concerns, and include region-specific effects while estimating equation (3). In addition, standard errors are clustered at the country level to address the possibility of correlation in the error term.

IV. Data and Estimation Results

Our sample includes all the developing countries with population more than 10 million, and for which FDI inflows data are available for the whole period 1990-2014. The list of countries included in our study is shown in the Appendix. We use annual FDI inflows as percentage of

GDP to measure the level of inward FDI flows to a particular country. This measure of FDI inflows accounts for the size of the economy since larger economies are expected to receive higher amount of inward FDI flows. The data for our empirical analysis come from several sources such as United Nations Conference on Trade and Development (UNCTAD), World Development Indicators, OECD Statistics and Polity IV Project. The precise definitions of the variables and data sources are given in the Appendix.

Figure-1 depicts the time series plot of total FDI inflows as percentage of GDP to the developing countries as a whole. As evident from Figure-1, FDI flows to the developing world have been episodic. The graph shows that there are two surge episodes between 1990 and 2014. FDI inflows (measured as % of GDP) increased from 0.88% in 1990 to 3.51% in 1999, and then declined owing to the Asian financial crisis and reached to 2.33% in 2002. Another surge episode (period of sharp increase) occurred during 2003–2008 and ended with the onset of global financial crisis. FDI inflows increased from 2.46% in 2003 to 3.65% in 2008. However, not all the developing countries have witnessed rapid increase in FDI inflows during these periods. The inward flow of FDI varies greatly across the countries and over time. Furthermore, there is a significant variation in the magnitude as well as timing of surges in FDI inflows among the individual economies.

Figure1: FDI inflows to developing countries (% of GDP)
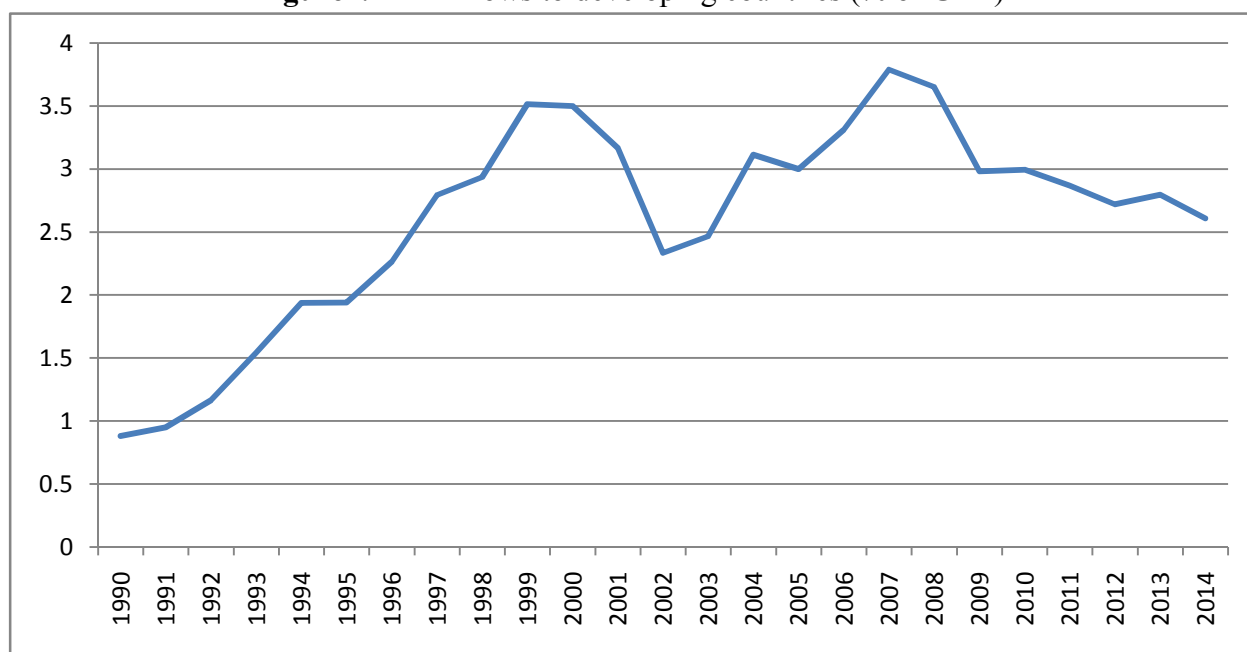
Data source: UNCTAD

Table 1: Summary of the sample

Region	Number of Countries	Number of Observations	Share in Total Observations (%)
East Asia and the Pacific	7	175	12.50
Latin America and the Caribbean	12	300	21.43
Middle East and North Africa	8	200	14.29
South Asia	5	125	8.93
Sub-Saharan Africa	24	600	42.86
Total	56	1400	

Table 2: Distribution of surges across regions

	Number of surges	Surges as % of region total observations	Share in total surges
Surges identified by criterion-1			
Region			
East Asia and the Pacific	31	17.71	12.20
Latin America and the Caribbean	61	20.33	24.02
Middle East and North Africa	33	16.50	12.99
South Asia	9	7.20	3.54
Sub-Saharan Africa	120	20.00	47.24
Total	254	18.14	
Surges identified by criterion-2			
East Asia and the Pacific	30	17.14	13.95
Latin America and the Caribbean	48	16.00	22.33
Middle East and North Africa	30	15.00	13.95
South Asia	5	4.00	2.33
Sub-Saharan Africa	102	17.00	47.44
Total	215	15.36	

Source: Author's calculation

Table 3: Correlation coefficient

	Surge (criterion-1)	Surge (criteria-2)
Surge (criteria-2)	0.905***	1
	[1400]	[1400]
World real GDP growth rate	0.020	0.015
	[1400]	[1400]
US long-term interest rate	-0.174***	-0.163***
	[1400]	[1400]
Log VIX	0.054**	0.052*
	[1400]	[1400]
Real GDP growth rate	0.074***	0.079***
	[1400]	[1400]

Capital openness	0.087***	0.078***
	[1358]	[1358]
Trade openness	0.121***	0.133***
	[1400]	[1400]
Inflation	-0.032	-0.028
	[1327]	[1327]
Natural resources rents	0.111***	0.132***
	[1322]	[1322]
Political regime score	0.039	0.010
	[1361]	[1361]
Domestic credit to private sector	0.015	0.028
	[1335]	[1335]

Note: ***, ** and * represent 1%, 5% and 10% level of significance respectively.
Number of observations is reported in [ ].

Table 4: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Surge (criterion-1)	1400	0.181	0.386	0	1
Surge (criterion-2)	1400	0.154	0.361	0	1
World real GDP growth rate	1400	2.808	1.299	-1.701	4.476
US long-term interest rate	1400	4.957	1.748	1.800	8.550
Log VIX	1400	2.950	0.295	2.517	3.487
Real GDP growth rate	1400	4.419	5.393	-48.812	64.997
Capital openness	1358	-0.440	1.255	-1.895	2.389
Trade openness	1400	58.544	29.897	1.862	211.838
Inflation (based on CPI)	1327	79.599	985.661	-8.975	24411.030
Natural resources rents	1322	9.404	10.266	0.011	63.559
Political regime score	1361	1.841	5.813	-10	10
Domestic bank credit to private sector	1335	28.746	29.066	0.154	166.504

The probit regression results are reported in Table 5 and Table 6. We use lagged values of the domestic factors to mitigate potential endogeneity concerns, and include region specific effects in all the regressions. In addition, standard errors are clustered at the country level to address the possibility of correlation in the error term. We use world GDP growth rate as a measure of global economic activity, long-term US interest rate as a proxy for risk-free return in developed countries and the volatility index (VIX) as a measure global uncertainty and risk aversion. Moreover, we use several country characteristics to account for country attractiveness. In other

words, we use both global push factors as well as domestic pull factors to explain the timing of FDI inflow surges.

Table 5: Probit regression results

	Coefficients		Average marginal effects	
Dependent variable: Surges (identified by criterion-1)				
	Model1	Model2	Model1	Model2
Global factors				
World real GDP growth rate	0.078**	0.081**	0.020**	0.020**
	(0.036)	(0.036)	(0.009)	(0.009)
Long-term US interest rate	-0.095*	-0.100*	-0.024*	-0.025*
	(0.051)	(0.052)	(0.013)	(0.013)
Log VIX	0.513***	0.521***	0.130***	0.132***
	(0.179)	(0.179)	(0.045)	(0.045)
Country characteristics				
Real GDP growth rate	0.035**	0.031**	0.009**	0.008**
	(0.015)	(0.014)	(0.004)	(0.004)
Trade openness	0.002		0.001	
	(0.002)		(0.000)	
Capital openness		0.041		0.010
		(0.053)		(0.013)
Inflation rate	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Natural resources rents	0.013**	0.015***	0.003**	0.004***
	(0.006)	(0.005)	(0.002)	(0.001)
Political regime score	0.008	0.011	0.002	0.003
	(0.011)	(0.010)	(0.003)	(0.003)
Domestic credit to private sector	0.003	0.004*	0.001	0.001*
	(0.003)	(0.003)	(0.001)	(0.001)
Constant	-2.951***	-2.814***		
	(0.724)	(0.746)		
Region dummies	yes	yes		
Number of observations	1184	1183		
Pseudo R-sq	0.067	0.069		

Note: *** p<0.01, ** p<0.05, * p<0.10. Figures in parentheses are standard errors clustered at the country level. All the variables except global factors are lagged one period.

Table 6: Probit regression results (sensitivity analysis)

	Coefficients		Average marginal effects	
Dependent variable: Surges (identified by criterion-2)				
	Model1	Model2	Model1	Model2
Global factors				
World real GDP growth rate	0.076**	0.079**	0.017**	0.018**
	(0.035)	(0.036)	(0.008)	(0.008)
Long-term US interest rate	-0.103**	-0.108**	-0.023*	-0.024**
	(0.052)	(0.053)	(0.012)	(0.012)
Log VIX	0.494**	0.506**	0.112**	0.114**
	(0.198)	(0.199)	(0.045)	(0.045)
Country characteristics				
Real GDP growth rate	0.035**	0.031*	0.008**	0.007*
	(0.016)	(0.016)	(0.004)	(0.004)
Trade openness	0.002		0.001	
	(0.002)		(0.000)	
Capital openness		0.053		0.012
		(0.053)		(0.012)
Inflation rate	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Natural resources rents	0.013**	0.016***	0.003**	0.004***
	(0.006)	(0.005)	(0.001)	(0.001)
Political regime score	0.001	0.004	0.000	0.001
	(0.013)	(0.012)	(0.003)	(0.003)
Domestic credit to private sector	0.004	0.005*	0.001	0.001*
	(0.003)	(0.003)	(0.001)	(0.001)
Constant	-2.958***	-2.802***		
	(0.793)	(0.829)		
Region dummies	yes	yes		
Number of observations	1184	1183		
Pseudo R-sq	0.075	0.078		

Note: *** p<0.01, ** p<0.05, * p<0.10. Figures in parentheses are standard errors clustered at the country level. All the variables except global factors are lagged one period.

The probit regression results show that all the global factors have statistically significant effect on surge occurrence. An increase in global economic activity is positively associated with FDI surge, whereas long-term US interest rate reduces the surge likelihood. The effect of VIX on surge probability is found to be positive and statistically significant. This result is consistent with the earlier studies which suggest that global uncertainty is less likely to have negative influence

on FDI inflows.[2] One possible reason could be that investors pull out funds from speculative investments (which are of liquid nature and primarily guided by short-term profit motives) at the time of higher economic uncertainty and put it in fundamental investments like physical capital. Among the domestic pull factors, economic growth is the most significant predictor of FDI inflow surge. Simply put, countries with high economic growth are more likely to experience surges than others. On the other hand, rate of inflation (a proxy for domestic macroeconomic condition) has negative effect on surge incidences. Natural resource-rich countries have higher probability of surges. Financial development (measured as domestic bank credit to private sector as percentage of GDP) in the country positively influence the surge occurrence. However, this is not a robust predictor of FDI inflow surges as it is not significant in all the specifications.

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[2]Eichengreen et al. (2017) find that higher global risk aversion as measured by VIX reduces portfolio capital inflows but not FDI inflows (the coefficient of VIX is negative and significant for all non-FDI flows and largest for portfolio debt and portfolio equity flows). FDI seems to be affected more by domestic than external factors (for example, GDP growth appears to act as a pull factor for FDI).

Rey (2015) finds that the correlation between FDI inflows and the VIX is positive in all geographical areas whereas other types of capital inflows tend to be negatively correlated with the VIX.

Table 7: Complementary log-log regression results

	Coefficients		Average marginal effects	
Dependent variable: Surges (identified by criterion-1)				
	Model1	Model2	Model1	Model2
Global factors				
World real GDP growth rate	0.114**	0.117**	0.019**	0.019**
	(0.056)	(0.057)	(0.009)	(0.009)
Long-term US interest rate	-0.150*	-0.154*	-0.025*	-0.025*
	(0.084)	(0.085)	(0.014)	(0.014)
Log VIX	0.774***	0.777***	0.128***	0.128***
	(0.284)	(0.289)	(0.047)	(0.048)
Country characteristics				
Real GDP growth rate	0.040**	0.037*	0.007**	0.006*
	(0.019)	(0.020)	(0.003)	(0.003)
Trade openness	0.003		0.000	
	(0.003)		(0.001)	
Capital openness		0.071		0.012
		(0.081)		(0.013)
Inflation rate	-0.001	-0.001*	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Natural resources rents	0.017*	0.022***	0.003*	0.004***
	(0.010)	(0.008)	(0.002)	(0.001)
Political regime score	0.016	0.019	0.003	0.003
	(0.017)	(0.016)	(0.003)	(0.003)
Domestic credit to private sector	0.004	0.006	0.001	0.001
	(0.004)	(0.004)	(0.001)	(0.001)
Constant	-4.534***	-4.313***		
	(1.166)	(1.197)		
Region dummies	yes	yes		
Number of observations	1184	1183		
Zero outcomes	957	957		
Nonzero outcomes	227	226		

Note: *** p<0.01, ** p<0.05, * p<0.10. Figures in parentheses are standard errors clustered at the country level. All the variables except global factors are lagged one period.

The complementary log-log (cloglog) regression results are reported in Table 7 and Table 8. The cloglog regression results are similar to our earlier results obtained from probit regression. The results show that all the global factors are important in explaining surges. Natural resources rents and economic growth are found to be most significant domestic pull factors.

Table 8: Complementary log-log regression results (sensitivity analysis)

	Coefficients		Average marginal effects	
Dependent variable: Surges (identified by criterion-2)				
	Model1	Model2	Model1	Model2
Global factors				
World real GDP growth rate	0.114*	0.118**	0.016*	0.017**
	(0.058)	(0.059)	(0.008)	(0.009)
Long-term US interest rate	-0.168*	-0.173*	-0.024*	-0.025*
	(0.090)	(0.091)	(0.013)	(0.013)
Log VIX	0.762**	0.762**	0.109**	0.109**
	(0.319)	(0.327)	(0.046)	(0.048)
Country characteristics				
Real GDP growth rate	0.039*	0.034	0.006*	0.005
	(0.021)	(0.022)	(0.003)	(0.003)
Trade openness	0.003		0.000	
	(0.004)		(0.001)	
Capital openness		0.099		0.014
		(0.086)		(0.012)
Inflation rate	-0.001	-0.001*	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Natural resources rents	0.019*	0.024***	0.003*	0.003***
	(0.011)	(0.009)	(0.002)	(0.001)
Political regime score	0.006	0.010	0.001	0.001
	(0.021)	(0.019)	(0.003)	(0.003)
Domestic credit to private sector	0.005	0.007	0.001	0.001
	(0.005)	(0.005)	(0.001)	(0.001)
Constant	-4.585***	-4.292***		
	(1.317)	(1.372)		
Region dummies	yes	yes		
Number of observations	1184	1183		
Zero outcomes	991	991		
Nonzero outcomes	193	192		

Note: *** p<0.01, ** p<0.05, * p<0.10. Figures in parentheses are standard errors clustered at the country level. All the variables except global factors are lagged one period.

Table 9: IV-Probit regression results

Dependent variable: Surge (identified by criterion-1)

	Model1	Model2
Global factors		
World real GDP growth rate	0.031	0.015
	(0.81)	(0.38)
US long-term interest rate	-0.084***	-0.069**
	(-2.63)	(-2.17)
Log VIX	0.584***	0.508***
	(3.49)	(3.07)
Country characteristics		
Real GDP growth rate	0.086**	0.082**
	(2.25)	(2.13)
Capital openness	0.040	
	(1.00)	
Trade openness		0.004*
		(1.81)
Inflation	-0.0005	-0.0006
	(-0.92)	(-1.00)
Natural resources rents	0.013**	0.010*
	(2.43)	(1.77)
Political regime score	0.007	0.005
	(0.74)	(0.49)
Domestic credit to private sector	0.005**	0.003
	(2.35)	(1.50)
Constant	-3.326***	-3.356***
	(-4.58)	(-4.46)
Region dummies	yes	yes
Number of observations	1185	1194
Wald test of exogeneity:		
chi2(2)	3.56	7.52
Prob > chi2	0.169	0.023

Note: ***, ** and * indicate significance at 1, 5, and 10% levels, respectively. Figures in parentheses are t-statistics. Real GDP growth rate, capital openness and trade openness are considered as endogenous variables. One period lag of the respective endogenous variable is used as instrument. Newey's two-step estimator is used for estimation.

Table 10: IV-Probit regression results
Dependent variable: Surge (identified by criterion-2)

	Model1	Model2
Global factors		
World real GDP growth rate	0.025	0.006
	(0.61)	(0.14)
US long-term interest rate	-0.086**	-0.069**
	(-2.55)	(-2.06)
Log VIX	0.585***	0.494***
	(3.32)	(2.84)
Country characteristics		
Real GDP growth rate	0.094**	0.089**
	(2.38)	(2.25)
Capital openness	0.052	
	(1.25)	
Trade openness		0.004*
		(1.95)
Inflation	-0.0004	-0.0005
	(-0.87)	(-1.00)
Natural resources rents	0.014***	0.011*
	(2.64)	(1.93)
Political regime score	0.004	0.001
	(0.34)	(0.06)
Domestic credit to private sector	0.006***	0.004
	(2.57)	(1.64)
Constant	-3.451***	-3.460***
	(-4.55)	(-4.42)
Region dummies	yes	yes
Number of obs	1185	1194
Wald test of exogeneity:		
chi2(2)	2.57	7.06
Prob > chi2	0.277	0.029

Note: ***, ** and * indicate significance at 1, 5, and 10% levels, respectively. Figures in parentheses are t-statistics. Real GDP growth rate, capital openness and trade openness are considered as endogenous variables. One period lag of the respective endogenous variable is used as instrument. Newey's two-step estimator is used for estimation.

The IV-Probit regression results (see Table 9 and table 10) are more or less in line with our earlier results. However, world output growth and inflation are not significant in IV-probit regression.

Conclusion

In this paper, we examine surges in FDI inflows in 56 developing countries over the period 1990–2014. Using a threshold approach, we identify the surge instances (criterion-1 gives 254 surges and criterion-2 identifies 215 surge incidences). We find that majority of the countries have experienced surges in inward FDI flows during the sample period, while some countries have seen an extended period of surges (surge episodes). The distribution of surges shows that South Asia has the lowest incidence of surges among the geographical regions. Our results show that both the global push and domestic pull factors significantly influence the likelihood of a surge occurrence. Specifically, the global factors such as world output growth, long term US interest rate, and the domestic factors like economic growth, level of natural resources and financial development are statistically significant predictors of FDI inflow surges. The results are robust to different specifications and alternative methods of estimation. While global factors are important in explaining FDI inflow surges in developing countries in general, where it ends up depends on country characteristics.

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Appendix

List of Countries

Sl. No.	Country Name	Country Code	Number of Surge	Sl. No.	Country Name	Country Code	Number of Surge
1	Afghanistan	AFG	3	29	Malawi	MWI	4
2	Algeria	DZA	0	30	Malaysia	MYS	6
3	Angola	AGO	6	31	Mali	MLI	6
4	Argentina	ARG	3	32	Mexico	MEX	6
5	Bangladesh	BGD	0	33	Morocco	MAR	6
6	Benin	BEN	6	34	Mozambique	MOZ	6
7	Bolivia	BOL	6	35	Myanmar	MMR	6
8	Brazil	BRA	6	36	Niger	NER	6
9	Burkina Faso	BFA	4	37	Nigeria	NGA	6
10	Cameroon	CMR	3	38	Pakistan	PAK	3
11	Chad	TCD	6	39	Peru	PER	6
12	Chile	CHL	6	40	Philippines	PHL	1
13	China	CHN	6	41	Rwanda	RWA	4
14	Colombia	COL	6	42	Saudi Arabia	SAU	6
15	Côte d'Ivoire	CIV	2	43	Senegal	SEN	5
16	Congo, Dem. Rep.	ZAR	6	44	Somalia	SOM	6
17	Dominican Republic	DOM	6	45	South Africa	ZAF	3
18	Ecuador	ECU	6	46	Sri Lanka	LKA	1
19	Egypt	EGY	6	47	Thailand	THA	6
20	Ghana	GHA	6	48	Tunisia	TUN	6
21	Guatemala	GTM	2	49	Turkey	TUR	3
22	Guinea	GIN	6	50	Uganda	UGA	6
23	Haiti	HTI	2	51	Tanzania	TZA	6
24	India	IND	2	52	Venezuela	VEN	6
25	Iran	IRN	0	53	Vietnam	VNM	6
26	Kenya	KEN	0	54	Yemen	YEM	6
27	Korea, Republic of	KOR	0	55	Zambia	ZMB	6
28	Madagascar	MDG	6	56	Zimbabwe	ZWE	5

Variable definition and data source

Variable	Definition	Source
FDI/GDP	FDI inflows as percentage of GDP	UNCTAD
World real GDP growth rate	Growth rate of world real GDP	WDI, World Bank
US long-term interest rate	Yield on 10-year US Treasury Securities	Federal Reserve Bank of St. Louis
VIX	Chicago Board Options Exchange (CBOE) Volatility Index (VIX) measures the implied volatility of S&P index options. The index reflects the price of risk in U.S. equity markets. As a result, a low value of VIX implies low risk aversion.	Federal Reserve Bank of St. Louis
Real GDP growth rate	Growth rate in real GDP	UNCTAD
Trade openness	Sum of exports and imports (as percentage of GDP)	UNCTAD
Capital openness	Capita account openness index (high = liberalized; low = closed)	Chinn and Ito, 2006
Inflation	Rate of inflation based on Consumer Price Index	WDI, World Bank
Total natural resource rents	Total natural resource rents as percentage of GDP	WDI, World Bank
Domestic credit to private sector	Credit to Private Sector by bank as percentage of GDP	WDI, World Bank
Political regime score (polity2)	Combined Polity Score which ranges from +10 (strongly democratic) to -10 (strongly autocratic). We use Polity2 which is a modified version of the Polity variable.	Polity IV Project