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Original Research Article

Output Loss from Sudden Stop of FDI and the Role of Macroeconomic Policies

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Generally, international flows of capital and foreign direct investment attraction are challengeable issues in the literature of economic growth and development in emerging market countries. However, the fluctuations in foreign direct investment, including sudden flood and stop, will affect emerging markets' output and macroeconomic variables. Using an econometric model with unbalanced panel data during 1990-2014 for 38 emerging countries, this study tries to evaluate the determinants of output losses from the sudden stop of foreign direct investment and consider the role of macroeconomic policies. The results show that the sudden stop phenomena and the financial crises have been identified as the main explanatory variables for the output collapse in the selected countries. Moreover, the role of macroeconomic policies is important, and the output losses can be controlled by using active monetary and exchange rate policies.

Keywords: Output Losses, Sudden Flood, Sudden Stops, Financial Crises, Emerging Countries, Unbalanced Panel Data.
JEL Classification: C23, F21, G01.

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1 Introduction

During the past three decades, a significant rise in foreign direct investment (FDI) flows has been experienced worldwide. Also, the growth rates of FDI flows were equal to the growth rates of world trade and output before 1985; and after that FDI flows rose much faster than world trade and world output. Moreover, the meaningful importance of FDI has stimulated the expanding literature on the causes and effects of FDI in international and financial economics, international business, and economic geography, which are emphasized by Barba Navaretti and Venables (2004), Blonigen (2005), and Brakman et al. (2006).

However, the growth of FDI has not continued in a smooth trend. For example, since the 1980s, there have been significant waves of FDI with corresponding surges and stops, particularly in developed countries (Andrade et al., 2001; Burger and Ianchovichina, 2014). Although developed countries have generally received more FDI flows than developing ones and host most of the inward FDI stock, developing countries have caught up (UNCTAD, 2011). In 2010, for the first time, the developing countries received more FDI flows than their developed counterparts, and some developing countries were more successful in attracting FDI than others. As a result, the distribution of FDI inflows has been persistently disproportionate in that investments have concentrated within a limited number of developing countries (Noorbakhsh et al., 2001; UNCTAD, 2012; Burger and Ianchovichina, 2014).

Moreover, one of the main challenging issues in the international economics literature is the adopted policies by developing countries to provide the appropriate capability to attract as much FDI. Therefore, the sudden inflow of FDI leads to positive economic externalities under the economic stability of the society and the optimal allocation of resources from FDI. However, after experiencing a Sudden Flood of FDI, the likelihood of occurring Sudden Stop and Reversal of FDI will rise. Also, according to literature, how the economic structures, the position of business cycles, the trend of macroeconomic variables, and the contagion of financial crises can lead to a sudden stop or permanent outflow of FDI. In this regard, the output losses, which are only one of the implicit consequences of a sudden stop of FDI, will be imposed on the economy. Hence, the fluctuations of FDI will infiltrate the host country, and uncertainty in economic conditions will have devastating effects on the country, which could be the source of many future crises. The results of empirical studies initially carried out in East Asia, then in Latin American countries, and most recently in European countries, show evidence

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of this phenomenon and the occurrence of recent financial crises (Yazdani and Tayebi, 2012, 2013).

In addition, the inflow of FDI may influence the economic, social, and political development of the host countries. The influencing range of the inflow and outflow of FDI is significant and controversial. This type of international capital flow is like a double-edged sword, which both host and guest countries may experience some potential benefits and costs. The attraction of FDI can provide access to resources, management, skilled labor, international production networks, and the benefits of trade and technology transfer to the developing country, however, an economist should consider the lack of rationalization in decision making and the creation of economic turmoil that can cause to irreparable harmful effects and leads to sudden stop and reversal of FDI flows.

In this study, while the theoretical and empirical background related to FDI and its fluctuations, including sudden floods and stops, has been expressed, the effect of a sudden stop of FDI on the output has been evaluated. Also, the role of the macroeconomic environment and policies has been considered to reduce these losses. In this regard, an econometric model has been specified with unbalanced panel data during 1990-2014 for the selected emerging countries (See Appendix).

The remainder of this paper is organized as follows. Section (2) reviews the literature on sudden floods and stop of FDI and the related impacts of this phenomenon on the output. Some realized facts about the sudden stop of FDI in selected emerging countries are reported in section (3). The research methodology and the empirical model are represented in section (4) to evaluate the role of FDI sudden stop on output losses. Section (5) analyzes the empirical results, and finally, section (6) summarizes the findings and offers concluding remarks.

2 Theoretical Background and Literature Review

Despite the financial debacle in advanced economies, a set of emerging market economies (EMs) have proved to be highly resilient to the subprime crisis and are receiving sizable external capital flows. It is good news, given that capital tended to flow towards advanced economies before the subprime crisis, a phenomenon labeled the global imbalance. However, EMs policymakers view capital inflows with some unease because there have been several episodes in which such flows have dried up and caused major domestic problems. Large and unexpected drops in capital flows are labeled Sudden Stops in the literature, and there is ample evidence that they are accompanied by large falls

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in output and employment (Calvo, 1998; Calvo and Reinhart, 2000; Calvo et al., 2008; Calvo, 2013; Ghosh et al., 2016).

Generally, the sudden stop phenomenon is defined as an unexpected reduction of the capital inflows to a country and up to the sudden reduction that has been receiving large volumes of foreign capital (Calvo, 1998). This event occurs due to the volatility of macro-fundamental variables, the conditions of the balance of payment, and the change in investors' behavior (Efremidze, 2009). Moreover, the emerging markets have been affected by these phenomena in the 1990s and 2000s (for example East Asian Crisis (1997-98), the Russian Crisis (1998), and the Mexican Crisis (1994)). This definition of sudden stop episodes was extended by Mendoza (2001), Mendoza and Smith (2002), and Hutchison and Noy (2006). These authors consider the effects of large downward adjustments in domestic production after a sharp reversal in capital inflows and collapses in asset prices and the relative prices of non-tradable goods relative to tradable ones (Sulimierska, 2008).

Moreover, according to the literature, the sudden stop of capital flow includes a reversal in capital inflows associated with a currency and balance of payments crisis (Calvo, 1998; Rodrik and Velasco, 1999; Calvo et al., 2003; Kaminsky and Schumukler, 2003; Hutchison and Noy, 2006). Through a sudden stop in international capital flows, three mechanisms can lead to crises in currency and balance of payments. The first two channels were constructed on the financial friction of the "great depressions" model. The first channel is based on the Keynesian hypothesis of price or wage stickiness and its association with an external financing premium (Bernanke et al., 1999; Ghosh et al., 2016).

The second channel is called Fisher’s debt-deflation analysis motivated by collateral constraints. This analysis was presented by Kiyotaki and Moore (1997) and extended by integrating forms of imperfect credit markets by Mendoza (2001). These two approaches that explore the effect of a fall in credits, attributable to the sudden stop in capital approaches, are combined with an external financing premium, a "financial accelerator," reducing aggregate demand and causing a fall in output. On the contrary, Mendoza's approach to sudden stop models of Bernanke et al. (1999) and Kiyotaki and Moore (1997) is completely different. This analysis concentrates on an extra volatility event and clarifies the unexpected economic collapses of sudden stops as a typical occurrence nested within the co-movements of systematic business cycles. The model also stresses the interaction among uncertainty, risk aversion, and incomplete contingent-claims markets in forming the

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transmission mechanism linking financial frictions to the real economy. This analysis is similar to the models developed by Aiyagari (1993) and Aiyagari and Gertler (1996), where precautionary saving and state-contingent risk premium play a major role in driving business cycle dynamics. In addition, Mendoza (2001) added: "policy uncertainty" and "involuntary contagion" as explanatory variables in the sudden stops model.

Finally, the third mechanism analyzes the existence of the multiple equilibria, more of which were expanded as a fraction of the second and third-generation model (Calvo, 1998; Rodrik and Velasco, 1999; Aghion et al., 2001). However, according to Rodrik and Velasco (1999), in this method, extreme short debt can make borrowing economies vulnerable to abrupt changes in expectations of lenders or investors, which can, in turn, become the self-fulfilling of a currency crisis. Moreover, the cause of the economy's shift to an inappropriate equilibrium might be the sudden capital reversal (Sulimierska, 2008).

However, a common assumption in the body of literature on the sudden stop is the existence of incomplete markets (e.g., credit contracts that are not state-contingent) and collateral constraints. Under these conditions, debt deflation-type effects (Fisher, 1933) arise and could help to magnify the impact of a sudden stop. Moreover, because incomplete capital markets might give rise to pecuniary externalities, market outcomes could be Pareto-dominated by government intervention (e.g., controls on capital inflows; see Mendoza, 2010; Bianchi, 2011; Korinek, 2011). This body of literature further justifies policymakers' concerns and offers some policy options.

Furthermore, sudden stops have received much attention in the literature because of the tumultuous events with which they are typically associated. However, the obverse phenomenon, in which there is a sudden unexpected rise in capital inflows (a Sudden Flood, hereafter), has also been studied and singled out as a possible cause of sudden stops (e.g., Reinhart and Reinhart, 2009; Korinek, 2011; Agosin and Huaita, 2012; Forbes and Warnock, 2012, Calvo, 2014; Ghosh et al., 2016).

The effects of sudden stops are controversially discussed in the theoretical literature. On the one hand, general equilibrium models with collateral constraints and working capital loans can lead to a drop in output, consumption, and investment due to a sudden stop (e.g., Neumeyer and Perri, 2005; Jaimovich and Rebelo, 2008; Mendoza, 2010). On the other hand, Chari et al. (2005) and Kehoe and Ruhl (2009) argue that sudden stops lead to an increase in output, but this effect is overwhelmed by the negative effect of these frictions. Furthermore, Kehoe and Ruhl (2009) notice that the output

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reduction is due to a drop in labor and not a decline in total factor productivity. Given these different theoretical results, an empirical analysis of the effect of sudden stops may yield useful insights regarding modeling strategies. However, the existing empirical literature relies only on a univariate approach. Edwards (2004), Hutchison and Noy (2006), and Bordo et al. (2010) estimate a growth equation to determine the effect of sudden stops on output growth. They find either a negative effect on the GDP growth rate or a negative effect on the GDP trend growth. Following Calvo (1998) and Calvo et al. (2004), the sudden stops are identified as a decline in the change of net capital inflows exceeding minus two standard deviations below the prevailing mean. Bordo et al. (2010) find that their results do not depend on the specification of sudden stops as exogenous or endogenous events. Therefore, the study tries to consider sudden stops as exogenous events.

Moreover, the understanding of the played role by the mode of entry in the incidence of FDI surges and stops is valuable in the context of rising FDI flows to the developing world. These flows have become an important and sometimes dominant source of finance in developing countries, so there is a concern that economic growth might be harmed in countries exposed to extreme fluctuations of either type of these flows (Lensink and Morrissey, 2006; Herzer, 2012). There is also the long-standing concern that sudden stops and surges in foreign capital flows might contribute to and arise because of macroeconomic volatility (Calvo et al., 2006) and crises (Reinhart and Reinhart, 2009; Furceri et al., 2012) as well as complicate macroeconomic management in developing economies. Abiad et al. (2011) and Cowan and Raddatz (2011), for instance, point to a connection between sudden stops and credit market imperfections. Gall et al. (2014) finds that high past exposure to FDI may impede an economy's ability to respond to sudden stops in FDI, especially in industries relying on external financing, and more so in countries with less developed financial markets (Burger and Ianchovichina, 2014; Ghosh et al., 2016).

Burger and Ianchovichina's (2014) paper is related to the broader literature on net capital flows, which are volatile, pro-cyclical, and, during crises, prone to large "sudden stops." The literature originated with Calvo (1998) and broadened to include different conditions as well as the opposite events such as "surges," defined as sharp increases in net capital flows (Reinhart and Reinhart, 2009; Kaminsky et al.; 1998, Levchenko and Mauro; 2007, Mendoza, 2010). However, this paper studies the behavior of gross FDI flows to developing countries as Burger and Ianchovichina (2014) are interested in surges and stops due to the actions of foreigners. Cowan et al. (2008) and

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Rothenberg and Warnock (2011) make the point that measures of "sudden stops" constructed from data on net inflows are not able to differentiate between stops that are due to the actions of foreigners and those due to locals fleeing the domestic markets. In addition, Broner et al. (2013) show that gross capital flows are pro-cyclical and are larger and more volatile than net capital flows.

Calvo (2014) examines the impact of sudden stops and floods in terms of a familiar finance model free from the assumption of collateral constraints and other principal-agent problems. The focus is on FDI, which makes the analysis independent and complementary to the dominant theoretical literature in this field, which focuses on credit and portfolio flows. Focusing on FDI helps illustrate that problems associated with sudden changes in capital inflows are not necessarily remedied by imposing controls that induce changes in the composition of capital flows in favor of FDI. This belief stems from erroneously thinking that a sudden stop is equivalent to a reversal of capital flows and capital-flow reversals are unlikely if capital inflows take the form of FDI; however, by definition, a sudden stop is a large unanticipated fall in capital inflows. It does not necessarily entail a reversal.

The basic model is a non-monetary three-period model in which domestic residents are endowed with one unit of homogeneous output in period 0, which they can invest in two types of investment projects: a one-period or short-term project/asset (maturing in period 1), which exhibits a zero rate of return in terms of output, and a two-period or long-term project/asset (maturing in period 2), which yields a positive return. Short-term assets are valuable for individuals who need to consume in period 1 ("early consumers" or "impatient consumers"), who are hit by what might be called a liquidity shock, requiring immediate access to output, while long-term assets are welcome for more patient consumers who are prepared to wait until period 2 to consume (i.e., "late consumers" or "patient consumers"). Individuals do not know their types when making investment decisions in period 0. An excellent exposition of this model has been presented by Allen and Gale (2007, Section 3.2). They, in addition, have assumed that in period 1 (when long-term projects have not yet matured), their output price is determined in a perfect spot (non-state-contingent) market. This assumption is also adopted here.

The basic model is extended to account for capital inflows, and Calvo (2014) assumed that capital inflows take place in period 1, after domestic residents have chosen their portfolio compositions. These flows aim to purchase long-maturity assets that have already started (i.e., projects that mature in period 2) in exchange for output. Thus, these flows are

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conventionally classified as non-greenfield FDI. It is arguably a realistic assumption in the context of a sudden flood, which is mostly driven by external financial conditions (e.g., the search for yield), which has been a dominant feature in recent capital inflow episodes. Under these circumstances, even if the information held by external investors is the same as that of domestic residents, the sheer size of the externally pushed capital inflows – not prompted by, for example, the discovery of oil wells or mineral mines – makes it unlikely that they would mostly take the form of greenfield projects, for which fresh new ideas are necessary.

To summarize, Calvo (2014) has shown that the surprise component of capital inflows and outflows plays a key role in the impact of these flows on relative prices, output, and welfare distribution. It holds in a context where FDI cannot be rolled back, and credit flows are absent, contrary to the mainstream theoretical literature. Calvo (2014) has also shown that capital inflows can be triggered by external financial shocks and further stimulated by an inverse bank run. The latter is a phenomenon in which the presence of actual and potential external investors increases the liquidity of investment projects in the receiving economy. Hence, an inverse bank run amplifies the effects of external factors and makes the economy more sensitive to liquidity than solvency or fundamental shocks.

Furthermore, Levchenko and Mauro (2007) show that FDI is the least volatile form of financial flow, but when the average size of a net or gross flows is taken into account, Burger and Ianchovichina (2014) show that FDI surges and stops in the developing world are not rare events and therefore are worth an in-depth look. Specifically, their paper contributes to the literature in the following ways. First, they build a database of episodes when foreign investors substantially increase or decrease FDI inflows to a developing country and distinguish between these episodes based on the dominance of the mode of entry. Using this database, which covers the period from 1990-2010 and includes 95 developing economies, they then document the incidence of sudden stops and surges by mode of entry, region, and resource status of the receiving economy. Second, they identify the factors associated with FDI surges and stops by entry mode (i.e., Greenfield investments (GF) and Mergers and Acquisitions (M&A) surges and stops). They show that GF-led and M&A-led extreme events such as surges and stops have different determinants and must be studied separately.

Their approach yields different results from previous studies on surges and stops in FDI flows which do not differentiate between these events based on the mode of entry (e.g., Dell'Erba and Reinhart, 2012). They show that

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different factors are associated with the onset of GF-led and M&A-led FDI surges and stops. Global liquidity is the only common predictor of the two types of FDI surges, while a decline in global growth and an FDI surge in the preceding year is the only significant and consistent predictors of FDI stops. GF-led sudden stops and surges are more likely in lower-income and resource-rich countries than elsewhere. Policies aimed at increasing financial openness are enablers of M&A-led surges, which are also more likely during periods of global growth and domestic economic and financial instability. The results are also policy-relevant as they show that GF-led extreme events occur more frequently than M&A-led ones. Thus, countries relying mostly on GF investments, the more stable type of FDI inflows, are not immune to sudden stops in capital flows and should prepare to withstand them. Knowing the factors behind different types of FDI surges and stops can help policymakers in developing countries craft policies to weather such episodes successfully.

3 Realized Facts

The realized facts have been presented in this section by analyzing and processing the information related to the sudden stop phenomenon of FDI and output losses resulting from this phenomenon in the selected emerging countries during 1990-2014. According to the definition of the sudden stop phenomenon of FDI in equation (2), the phenomenon's occurrence has been determined for each of 38 selected countries. Hence, Table (1) shows the frequency of sudden stop phenomenon for each country using the available information.

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Table 1
Sudden Stop Phenomenon of FDI in the Emerging Market Countries during 1990-2014

Country	Year	Country	Year
Argentina	2001, 2009, 2014	Bahrain	1990, 1993, 2009, 2010
Bangladesh	2002	Brazil	2003, 2005
Bulgaria	2009, 2010, 2011	Chile	1992, 2002, 2013
China	1998, 1999, 2000, 2001, 2009, 2012, 2014	Colombia	1995, 2003, 2010, 2012
Czech Republic	2003, 2004, 2009, 2011	Egypt	1990, 1991, 1992, 2001, 2002, 2003, 2010, 2011
Estonia	2002, 2008, 2011, 2013	Hungary	1994, 2000, 2002, 2003, 2004, 2009, 2010
India	1991, 2012	Indonesia	1998, 1999, 2000
Iran	1990, 2007, 2008, 2014	Jordan	1991, 1993, 2010, 2011, 2012
Kuwait	2001, 2014	Latvia	2001, 2002, 2009
Malaysia	1992, 2000, 2001, 2003, 2014	Mauritius	1991, 1992, 1993, 1998, 2001, 2013
Mexico	1993, 2009, 2011, 2012	Nigeria	2000, 2004, 2010, 2011, 2012
Oman	1994, 1995, 1996, 1999, 2001, 2003, 2010, 2012, 2013, 2014	Pakistan	2000, 2001, 2009, 2010, 2011, 2012
Peru	1991, 1992, 2000, 2013, 2014	Philippine	1992, 1999, 2001, 2003, 2004, 2010
Poland	2002, 2008, 2009, 2012, 2013	Romania	2009, 2010, 2011
Russia	1994, 2011, 2012, 2014	South Africa	2010
Sri Lanka	1995, 2009, 2010	Sudan	1990, 2007, 2008, 2011, 2013, 2014
Thailand	1993, 1994, 2002, 2008, 2009, 2011, 2014	Tunisia	1996, 2011
Turkey	1993, 1996, 1998, 1999, 2010	Ukraine	2013, 2014
Venezuela	2002, 2006, 2009	Vietnam	1998, 1999, 2000, 2001, 2004, 2012, 2014

Source: Research Finding

Moreover, according to Table (2), 154 phenomena of sudden stops have been accrued in the selected emerging countries during the period 1990-2014. The most frequent occurrence of the sudden stop phenomenon is for the years 2001, 2009, 2010, 2011, 2012, and 2014, which 7.15%, 7.80%, 8.45%, 8.45%, 7.15%, and 7.15% percentage of all sudden stop phenomena has happened in these years.

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Table 2
Percentage of Sudden Stop Phenomenon of FDI in the Emerging Market Countries during 1990-2014

Year	Number	Percentage	Year	Number	Percentage
1990	4	2.60	2003	8	5.20
1991	5	3.25	2004	4	2.60
1992	5	3.25	2005	1	0.65
1993	5	3.25	2006	1	0.65
1994	4	2.6	2007	2	1.30
1995	3	1.95	2008	5	3.25
1996	2	1.30	2009	12	7.80
1997	0	0	2010	13	8.45
1998	4	2.60	2011	13	8.45
1999	5	3.25	2012	11	7.15
2000	8	5.20	2013	8	5.20
2001	11	7.15	2014	11	7.15
2002	9	5.85	Total	154	100

Source: Research Finding

In summary, the calculated output losses due to the sudden stops in the emerging economies during 1990-2014 indicate significant output losses. Hence the evaluating affecting factors and their management is necessary. Moreover, it should be mentioned that in some countries, the output losses caused by the sudden stop phenomenon were considerable, where the economy did not return to its previous trend; in other words, the level of the long-term output of the economy has shifted to a lower level.

4 Model and Methodology

The introduced model in this study to evaluate the effects of a sudden stop of FDI on output and its interaction with financial crises is based on an econometric model in the unbalanced panel data approach for the selected emerging market countries during 1990-2014.

According to Sula (2008), Forbes and Warnock (2012), Burger et al. (2013), Gosh et al. (2012), an econometric equation has been introduced to evaluate the effect of sudden stops of FDI and financial crises on the output losses. Although the specified model of this study can be a suitable tool for studying the effect of sudden stop phenomena on each country's output, the possibility of explaining the interaction effects of the sudden stop and financial crises on economic growth has been provided, too. In addition, the deviation of the output from its potential trend can be explained by other

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determinants such as inflation, real exchange rate, budget deficit, money level, trade and capital account openness, and other economic variables.

In other words, in the equation for the output losses based on Calvo (2014), the relationship between the output losses as a continuous variable and the sudden stop phenomenon of FDI as a discrete variable is evaluated. However, the role of other variables such as the sudden flood of FDI at the previous year, financial crises in the previous year, macroeconomic condition and monetary, fiscal and exchange rate policies will be considered. The econometric model is as follow:

$$0L_{it} = \beta_0 + \beta_1 SS_{it} + \beta_2 SS_{it} SF_{it-1} + \beta_3 SS_{it} FC_{it-1} + \beta_4 BC_{it} + \beta_5 SS_{it} BC_{it} + \beta_6 CPI_{it} + \beta_7 LnRER_{it} + \beta_8 TO_{it} + \beta_9 KAO_{it} + \beta_{10} M_{it} + \beta_{11} BD_{it} + \beta_{12} ERA_{it} + e_{it} \quad (1)$$

Where *OL* is the output losses in country i at time t, and it is calculated with emphasizing on sudden stop phenomenon occurring. *SS* and *SF* are proxies for sudden stop and a sudden flood of FDI, respectively. Those are the discrete variables that take the value 1 or 0.

Using UNCTAD data on gross FDI inflows from the World Investment Report (UNCTAD, 2016) and building on the work by Calvo et al. (2004), Reinhart and Reinhart (2009), and Forbes and Warnock (2012), the study describes a flood event as a rise in inflows in a particular year that is more than one standard deviation above the country (five-year rolling) average. In other words, the flood occurrence begins when the FDI-to-GDP ratio rises more than one standard deviation above its rolling mean and ends when the FDI-to-GDP ratio falls below one standard deviation above its rolling mean. In addition, the study poses a restriction to the definition of an FDI flood in which the increase in the FDI-to-GDP ratio should fall within the top 25th percentile of the entire sample's FDI-to-GDP ratio growth. Finally, it ensures that the increase in FDI inflows is substantial and that only a large flood by international standards is included in the definition of a flood (Ghosh et al., 2012; Burger and Ianchovichina, 2014).

This approach merges the two main empirical strategies presented in the literature on flood and stop phenomena. One includes looking at deviations from the mean, while the other needs factoring in minimum threshold values. Moreover, sudden stops phenomena are introduced symmetrically. A stop event is defined as a decline in inflows in a particular year of more than one standard deviation below the rolling average. The sudden stop event starts when the ratio of FDI-to-GDP decreases by more than one standard deviation below its rolling mean and ends when the ratio rises above one standard

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deviation below its mean. The study imposes similar restrictions on sudden stops as on sudden floods. Hence, the following equations can be introduced:

$$SS_{it} = \begin{cases} 1 & if \quad \frac{FDI_{it}}{GDP_{it}} < \overline{\frac{FDI_{it}}{GDP_{it}}} - \sigma_{\frac{FDI_{it}}{GDP_{it}}}, Whenever\ SF_{it} = 0 \\ 0 & o.w. \end{cases} \quad (2)$$

$$SF_{it} = \begin{cases} 1 & if \quad \frac{FDI_{it}}{GDP_{it}} > \overline{\frac{FDI_{it}}{GDP_{it}}} + \sigma_{\frac{FDI_{it}}{GDP_{it}}} \\ 0 & o.w. \end{cases} \quad (3)$$

Where $\overline{\frac{FDI_{it}}{GDP_{it}}}$ and $\sigma_{\frac{FDI_{it}}{GDP_{it}}}$ are average and standard deviation of FDI/GDP during the period t respectively. A restricted condition applied in the definition of sudden stop ensures that a country only experiences a sudden stop phenomenon where the country did not experience the phenomenon of the sudden flood in that particular year.

Also, FC_{it} is a binary variable for financial crises in country i at year t. Generally, the financial crisis term is employed in different situations in which some financial institutions or assets suddenly drop a large part of their value. In the 19th and early 20th centuries, most financial crises were associated with banking panics, and many recessions corresponded with these phenomena. Other situations normally defined as financial crises include stock market collapses and the bursting of other financial bubbles, currency crises, and sovereign defaults (Kindleberger and Robert, 2005; Laeven and Valencia, 2010). Furthermore, many economists have introduced theories about how financial crises occur and how they will be avoided. However, there is little agreement, and financial crises are still regular in international markets (Yazdani and Tayebi, 2013).

Hence, except for the negative effects of financial crises on macroeconomic variables and real sector of the economy, according to the literature, the occurrence of these phenomena can create fluctuation in foreign capital flows, and generally, the probability of sudden stop phenomenon rise during financial crises periods (Calvo and Reinhart, 2000; Kaminsky and Reinhart, 1999). However, the occurred financial crises at year t may carry out output losses, while the economy experiences a sudden stop phenomenon at year t+1 and the output losses are not necessarily due to a sudden stop of FDI. To control this issue, the multiplication of *SS* and *FC* in a previous year is added into the model as an explanatory variable. The FC variable takes the value 1 if a country experiences any financial crisis.

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Moreover, countries may be at different stages in the business cycle when the sudden stop occurred, so we consider a dummy for pre sudden stop business cycle conditions (*BC*) in the model. The dummy variable takes a value of -1 if in three years before the sudden stop occurred, the average growth rate is less than 0 percent, value 0 if the growth rate is 0-3 percent, and value 1 if the growth rate exceeds 3 percent. Also, the interaction between sudden stop phenomena and business cycles in the model will be investigated using a multiplication variable as *SSBC*.

Finally, inflation rate (*CPI*) and log of the real exchange rate (*LnRER*) for controlling the macroeconomic situation, trade openness (*TO*) and capital account openness (*KAO*) for considering the international relation of the selected countries, and monetary policy (*M*), fiscal policy (*BD*) and exchange rate regime (*ERA*) as policy variables, will be added into the model. The information for variables has been collected from the World Bank (WDI Database) and International Monetary Fund (IFS Database) for the emerging market countries during 1990-2014 (For more information about variables, see Table (4) in Appendix).

5 Empirical Results

At first, before estimating the model, the study tries to investigate the stationary process of the variables to determine their co-integrated degree. In this regard, Levin–Lin–Chu (2002), Im–Pesaran–Shin (2003), and Maddala and Wu (1999) tests have been employed to determine the unit root test for each variable. Moreover, the results for Kao residual cointegration test are reported in Table (3) and show that there is no problem for the long-run relationship among variables. The unit root test results show that all variables are stationary, and the results of the estimated model are not spurious.

The estimated results are summarized for the output losses model in Table (3), where the effects of explanatory variables have been evaluated on the output losses caused by the sudden stop phenomenon of FDI in different equations. In equation (1), the determinants of the output losses have been estimated, emphasizing the sudden stop phenomenon of FDI. Furthermore, in the following specifications, including equations (2) to (4), the effect of macroeconomic and policy variables has been estimated on the output losses. In this regard, in addition to the role of FDI flows on the output losses in equation (2), the macroeconomic variables have been added to the model. Also, the variables indicating trade and financial openness have been introduced in equation (3), and finally, in equation (4), the monetary, fiscal,

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and exchange rate policies have been considered. Moreover, diagnostic tests are represented in the last rows of Table (3).

Table 3
Determinants of Output Losses Caused by Sudden Stop of FDI in Selected Emerging Market Countries during 1990-2014

Variable		Equation (1)	Equation (2)	Equation (3)	Equation (4)
Constant		-3.13*** [0.15]	-3.09*** [0.22]	-2.15*** [0.33]	0.16 [0.46]
FDI Flows	SS	1.91*** [0.57]	1.75*** [0.57]	1.94*** [0.56]	1.85*** [0.58]
	SSSF	-1.46*** [0.55]	-1.42*** [0.55]	-1.82*** [0.56]	-2.79*** [0.58]
	SSFC	-0.01 [0.36]	0.03 [0.35]	0.14 [0.34]	0.54*** [0.19]
	BC	-0.67** [0.34]	-0.54* [0.32]	-0.52* [0.30]	-0.65*** [0.15]
	SSBC	-1.11** [0.55]	1.12** [0.55]	1.21** [0.59]	0.89 [0.70]
Macroeconomic Situation	CPI	-	-0.04*** [0.02]	-0.05*** [0.02]	-0.09*** [0.02]
	RER	-	0.08** [0.04]	-0.01*** [0.04]	0.04 [0.05]
Openness	TO	-	-	-0.02*** [0.003]	-0.01*** [0.003]
	KAO	-	-	-0.14* [0.09]	-0.33*** [0.88]
Macro Policies	ERA	-	-	-	-0.17* [0.01]
	BD	-	--	-	-0.23 [0.20]
	M	-	-	-	-0.03*** [0.006]
Diagnostic Test	F-Leamer	3.07 (0.00)	2.84 (0.00)	2.89 (0.00)	3.05 (0.00)
	Hausman Test	5.92 (0.31)	6.45 (0.49)	7.93 (0.54)	10.89 (0.53)
	Kao Residual Cointegration Test	-11.86 (0.00)	-10.53 (0.00)	-11.81 (0.00)	-9.79 (0.00)
	Heteroskedasticity Test	142.64 (0.00)	144.73 (0.00)	152.32 (0.00)	149.66 (0.00)
	Wald Test	15.38 (0.01)	28.2 (0.00)	51.37 (0.00)	372.20 (0.00)

Note: ***, **, and * indicate a significant level of 99, 95, and 90 percent, respectively. The numbers in parentheses represent the probability, and the numbers inside the bracket represent a standard deviation of coefficients.
Source: Research Finding

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According to the results based on equation (4), increasing the probability of sudden stop of FDI will increase the output losses, and its coefficient is statistically significant. Meanwhile, to evaluate the role of the sudden flood of FDI (*SF*) on output losses from *SS*, the *SSSF* variable has been defined as the multiplication of *SS* and *SF* at the previous year. The coefficient of *SSSF* shows that if a sudden flood has occurred in the previous period, it could reduce the output loss caused by the phenomenon of *SS*.

To investigate the role of financial crises (*FC*) on output losses, the SSFC variable has been added into the model, defined as the multiplication of *SS* and *FC* at the previous year. According to the positive sign of *SSFC*, if the phenomenon of *SS* occurs when a crisis has occurred one year before that, the combination of these two factors will increase the output losses. Also, the effect of the business cycles on output losses from *SS* is shown by the *BC* variable in the selected emerging economies. The coefficient of this variable is significant and indicates that at the occurring time of the *SS* phenomenon, the net output losses caused by the sudden stop phenomenon will decrease if the economy has experienced a suitable situation.

Moreover, according to equation (4), it can be mentioned that the macroeconomic variables which indicate the macroeconomic environment of economies have a significant role in the severity of the output losses caused by *SS* phenomena. Hence, if the economy faces the *SS* phenomenon, other economic and control variables can significantly increase or reduce the output loss. The results for *CPI* as a proxy for inflation indicate that if the inflation rises at the occurring time of the *SS* phenomenon, the output losses will decrease where its coefficient is statistically significant. However, the increase in the log of the real exchange rate (*RER*) cannot significantly increase the output loss, although this coefficient is significant in the previous equations.

In addition, economic variables including trade and capital account openness have significant coefficients at 95% and 99% level, respectively, and the results show that these variables can decrease the output losses due to *SS*. However, it can be mentioned that capital account openness is more effective for reducing output losses.

Regarding the exchange rate system (ERA), whatever type of exchange rate system shifts to the floating exchange system, significantly reduces the output losses. In other words, with the more flexible exchange rate system, the possibility of reducing the output losses will increase. Finally, the effectiveness of economic policies on the output losses shows that monetary policy is more effective than fiscal policy.

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6 Conclusion and Policy Implications

In this study, while the theoretical backgrounds related to *FDI* and the fluctuations of this type of investment, including sudden flood and stop is explained, the effect of the FDI's sudden stops on the output losses has been evaluated, and particularly the role of the macroeconomic condition of the selected countries was considered. The specified model was an econometric model with unbalanced panel data for the selected emerging countries during 1990-2014.

According to the results, the sudden stop phenomenon of FDI increases the output losses. However, after considering the sudden flood of FDI, it is possible to reduce the output losses caused by the sudden stop phenomenon of FDI. Also, suppose the country has experienced a sudden stop of FDI and a recession in the real sector of the economy both together. In that case, the output losses are not necessarily due to the effect of the sudden stop phenomenon. Moreover, simultaneously with the sudden stop of FDI, the occurrence of a financial crisis will increase the output losses.

Generally, the estimated results show that macroeconomic variables indicating the macroeconomic environment of economies have a significant role in the severity of the output losses caused by the sudden stop of FDI. In addition, the coefficients of trade and capital account openness were significant. The floating exchange system can significantly reduce the output losses of the exchange rate system. Finally, the effectiveness of economic policies on the output losses shows that monetary policy is more effective than fiscal policy.

As policy recommendations and implications, due to the negative effects of a sudden stop of FDI on output and economic growth, policymakers should eliminate the risk of a sudden stop by determined contracts and impose some conditions on accepting these capital flows. In other words, if the appropriate infrastructure of the economy is not available and the countries experience the sudden flood of FDI, the probability of sudden stop will increase and lead to output losses. Also, due to the impact of the macroeconomic policy on the output losses and efficiency of monetary policies, using active monetary policies will recommend for policymakers. Finally, the international relation of the economies is imperative, and the output losses from the sudden stop of FDI can adjust by using more degree of openness and financial liberalization of the economy.

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Appendix

The selected emerging countries are divided into two groups based on the indicators of the BBVA Research Institute. The first group is EAGLEs. In this group, emerging economies are looking for the goal of economic growth. In this group, based on the GDP index, two subgroups are defined. The first subgroup includes countries seeking economic growth above the G7 GDP average growth (excluding the US) over the next 10 years. The countries in the sub-group are China, India, Indonesia, Brazil, Mexico, Russia, Turkey, and the Islamic Republic of Iran. The second subgroup includes countries that expected incremental GDP in the next decade to be lower than the average of the G6 economies (G7 excluding the US) but higher than Italy's. These countries are Argentina, Bangladesh, Chile, Colombia, Egypt, Malaysia, Nigeria, Pakistan, Peru, Philippines, Poland, Thailand, South Africa, Ukraine, and Vietnam. The second group is referred to as other countries. The other emerging nations include Bahrain, Bulgaria, Czech Republic, Estonia, Hungary, Jordan, Kuwait, Latvia, Lithuania, Morocco, Oman, Qatar, Romania, Slovakia, Sri Lanka, Sudan, Tunisia, UAE, and Venezuela.

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Table 4
The Definition and Sources for Variables

Variable	Symbol	Definition	Source
Output Losses	OL	At any year that the value of sudden stop index is equal to one, the trend of economic growth is calculated for ten years before the phenomenon using the Hodrick–Prescott filter. Then the GDP will be accelerated at the years after the sudden stop phenomenon by the figure of the trend at the previous year, and it is determined as the potential GDP at the time of the sudden stop occurrence. Hence, the output losses are calculated using the difference between actual and potential GDP until the difference is equal to zero.	World Bank, Author Calculations
Sudden Flood of FDI	SF	According to the main text.	World Bank, IMF, Author Calculations
Sudden Stop of FDI	SS	According to the main text.	WDI, IMF, Author Calculations
Financial Crises	FC	Dummy variable takes the value 1 if a country experiences financial crises such as banking, currency, stock market collapses, or sovereign default.	Reinhart and Rogoff, 2010 World Bank, IMF
Business Cycle	BC	The dummy takes a value of -1 if in three years before the sudden stop occurred, the average growth rate is less than 0 percent, value 0 if the growth rate is 0-3 percent, and value 1 if the growth rate exceeds 3 percent.	World Bank, Author Calculations
Inflation Rate	CPI	The annual percentage change in the consumer price index	World Bank, IMF
Real Exchange Rate	RER	The log of the real exchange rate.	World Bank, IMF
Exchange Rate Regime	ERA	The annual report by the International Monetary Fund about Exchange Rate Arrangement of Countries	IMF
Monetary Policy	M	Cycles obtained from the Hodrick-Prescott filter of M2-to-GDP around its long-term trend of the ratio	World Bank, Author Calculations
Fiscal Policy	BD	The ratio of budget deficit to GDP.	World Bank
Trade Openness	TO	The ratio of trade to GDP.	World Bank
Capital Account Openness	KAO	The degree of capital account openness.	CAOP website

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