

## **Macroeconomic Policies and Output Loss from Sudden Stop of FDI**

MEHDI YAZDANI and ELMIRA DARYANI

International flows of capital and attraction of foreign direct investment (FDI) are challenging issues in the economic growth and sustainable development literature for emerging countries. However, the output and macroeconomics variables are influenced by fluctuations in FDI including sudden flood and stop in emerging markets. In this study, while the theoretical and empirical backgrounds related to FDI and its fluctuation has been expressed; the output losses from sudden stop of FDI on output has been evaluated, and the role of macroeconomic environment and policies will be 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. The results show that the sudden stop phenomena and the financial crises have been identified as the main explanatory variables for output. Hence the sudden stops of FDI have been considered one of the main causes of the output collapse in the selected emerging markets. Furthermore, the role of macroeconomic policies is important in this regard and the output losses can be controlled by using active monetary and exchange rate policies.

*JEL Classification:* F21, G01, C23

*Keywords:* Output Losses, Sudden Flood, Sudden Stops, Financial Crises, Emerging Countries, Unbalanced Panel Data

### **1. INTRODUCTION**

During the past three decades, a significant rise in foreign direct investment (FDI) flows has been experienced in the world. Also, it should be mentioned that the growth rate of FDI flows was equivalent to the growth rates of world trade and output before 1985, and after that FDI flows raised at a much faster speed than either world trade and world output. The meaningful importance of FDI has stimulated expanding literature on the causes and effects of FDI in international and financial economics, international business, and economic geography which are emphasised 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 the majority of the inward FDI stock, developing countries have caught up [UNCTAD (2011)]. In 2010, for the first time, the developing

Mehdi Yazdani <ma\_yazdani@sbu.ac.ir> is Assistant Professor of Economics, Faculty of Economics and Political Sciences, Shahid Beheshti University, Tehran, Iran. Elmira Daryani <elmiradaryani@gmail.com> is MA in Economic Systems Planning, Faculty of Economics and Political Sciences, Shahid Beheshti University, Tehran, Iran.

countries received more FDI flows than their developed counterparts, and some developing countries were more successful in attracting FDI than others. 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 international economics literatures is the adopted policies by developing countries in order 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 optimal allocation of resources from FDI. After experiencing a Sudden Flood of FDI, however the likelihood of Sudden Stop and Reversal occurring will rise. Also, according to literature, how the economic structures, the position of business cycles, the trend of macroeconomic variables and contagion of financial crises can lead to sudden stop or permanent outflow of FDI. In this regard, the output losses, which are only one of the implicit consequences of sudden stop 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 that were initially carried out in East Asia, then in Latin American countries and most recently in European countries, show evidences of this phenomenon and 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 flows 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 rationalisation 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 flood and stops has been expressed; the effect of sudden stop of FDI on the output has been evaluated, and the role of macroeconomic environment and policies will be 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.<sup>1</sup>

<sup>1</sup>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 US) over the next 10 years. The countries in the sub-group are China, India, Indonesia, Brazil, Mexico, Russia, Turkey, and Islamic Republic of Iran. The second subgroup includes countries 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.

The remainder of this paper is organised as follow. Section (2) reviews the literature of sudden flood and stop of FDI and the related impacts of these phenomenon on the output. Some realised facts about sudden stop of FDI in selected emerging countries are reported in Section (3). The methodology of research and empirical model to evaluate the role of FDI sudden stop on output losses will be represented in Section (4). Section (5) analyses the empirical results, and finally, Section (6) summarises the findings and offers concluding remarks.

## 2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

Despite the financial debacle in advanced economies, there is a set of emerging market economies (EMs) that have proved to be highly resilient to the subprime crisis and that are receiving sizable external capital flows. This is good news, given that prior to the subprime crisis, capital tended to flow towards advanced economies, a phenomenon labeled the global imbalance. However, EM policy-makers view capital inflows with some unease, because there have been a number of 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 in output and employment [Calvo (1998); Calvo and Reinhart (2000); Calvo, *et al.* (2008); Calvo (2013)].

Generally, the sudden stop phenomenon is defined as an unexpected reduction of the capital inflows to a country and up to time of sudden reduction that have been receiving large volumes of foreign capital [Calvo (1998)]. This event occurs due to volatility of macro-fundamental variables, the conditions of balance of payment and the change in investors' behavior [Efremidze (2009)]. Moreover the emerging markets have been affected by these phenomena in 1990s and 2000s [for example East Asian Crisis (1997-98), Russian Crisis (1998) and Mexican Crisis (1994)]. This definition of sudden stop episode 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 in 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)]. There are three mechanisms through which a sudden stop in international capital flows can lead to currency and balance of payments crises. 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)].

The second channel is called as Fisherian analysis of debt-deflations 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). Basically, these two approaches explored the effect of a fall in credits, attributable to the sudden stop in capital approaches, 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 Bernanke, *et al.* (1999) and Kiyotaki and Moore’s (1997) sudden stop models 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 makes stresses upon interaction among uncertainty, risk aversion and incomplete contingent-claims markets in forming the transmission mechanism linking financial frictions to the real economy. This analysis is the same as 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 sudden stops model.

Finally, the third mechanism is the analysis of existence the multiple equilibria more of which were expanded as 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 lenders’ or investors’ expectations, which can in turn become self-fulfilling of a currency crisis. Moreover the cause for the shift of the economy to an inappropriate equilibrium might be the sudden capital reversal [Sulimierska (2008)].

However, a common assumption in the body of literature on 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 the concerns of policy-makers 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)].

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 are able to produce the 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 that this effect is overwhelmed by the negative effect of these frictions. Furthermore, Kehoe and Ruhl (2009) notice that the output reduction is due to a drop in labour and not due to 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 modelling 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 is going to treat sudden stops as exogenous events.

Moreover, understanding the role played 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 types of 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 as a result 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) find that high past exposure to FDI flows 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)].

The paper of Burger and Ianchovichina (2014) 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 actions of foreigners. Cowan *et al.* (2008) and 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 sudden floods in terms of a familiar finance model that is 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 to 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 favour of FDI. This belief

stems from erroneously thinking that a sudden stop is equivalent to a reversal of capital flows, and that 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 they make investment decisions in period 0. An excellent exposition of this model has been presented by Allen and Gale (2007, Section 3.2), who, 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 are aimed at purchasing long-maturity assets that have already started (i.e., projects that mature in period 2) in exchange for output. Thus, these flows are conventionally classified as non-greenfield FDI. This 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 summarise, Calvo (2014) has shown that the surprise component of capital inflows and outflows plays a key role in the impact that these flows have on relative prices, output, and welfare distribution. This holds in a context in which 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, as opposed to 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 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 mode of entry (i.e. Greenfield investments and Mergers and Acquisitions surges and stops). They show that GF-led and M&A-led extreme events such as surges and stops have different determinants and therefore 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 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 a FDI surge in the preceding year are 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. Knowledge of the factors behind different types of FDI surges and stops can help policy makers in developing countries craft policies to successfully weather such episodes.

### 3. REALISED FACTS

The realised facts have been presented in this section by analysing 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 the 1990-2014. According to the definition of the sudden stop phenomenon of FDI in Equation (2), the occurrence of the phenomenon has been determined for each of the studied countries. Hence, by using the available information, Table 1 shows the frequency of sudden stop phenomenon for each country.

Moreover, there were 154 phenomena of sudden stop in the selected emerging countries during the period 1990-1994, according to Table 2. The most frequent occurrence of the sudden stop phenomenon is for the years 2001, 2009, 2010, 2011, 2012, and 2014, which 7.15 percent, 7.80 percent, 8.45 percent, 8.45 percent, 7.15 percent and 7.15 percent percentage of all sudden stop phenomena have happened in these years.

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, 201
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.

Table 2

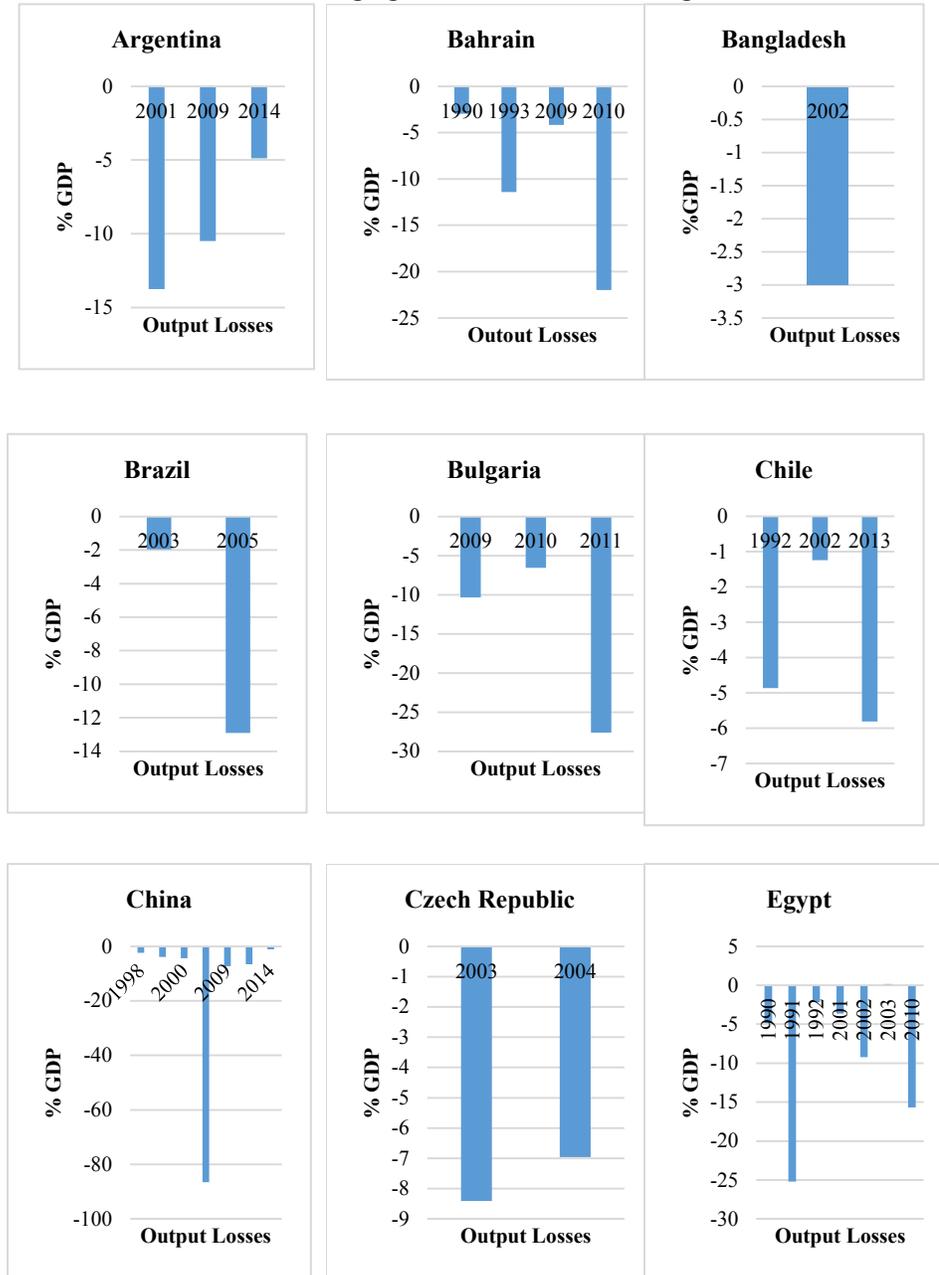
*Percentage of Sudden Stop Phenomenon of FDI in the Emerging Market Countries during 1990-2014*

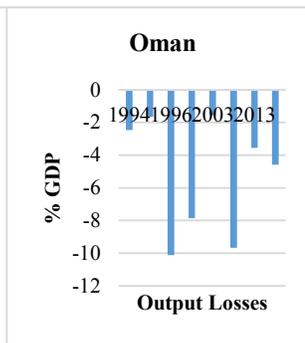
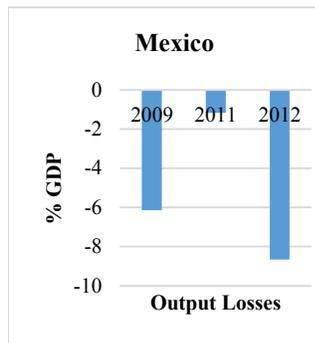
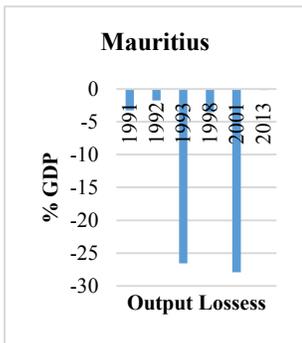
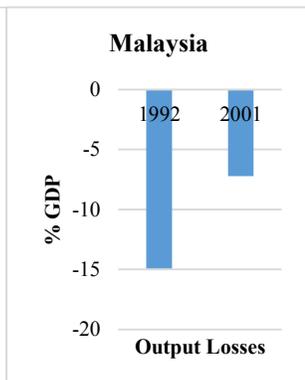
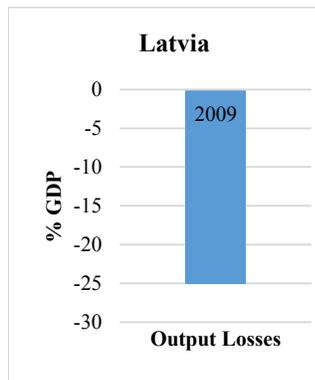
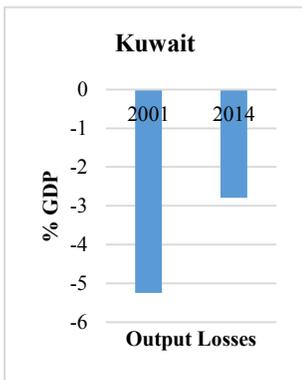
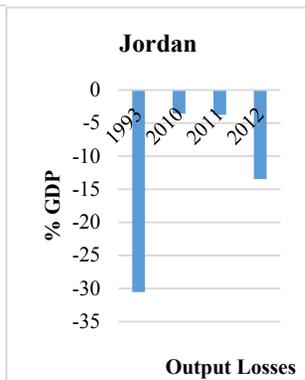
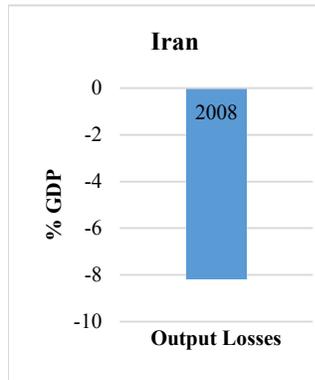
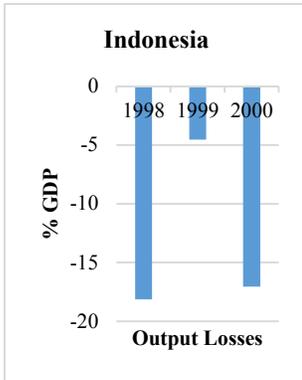
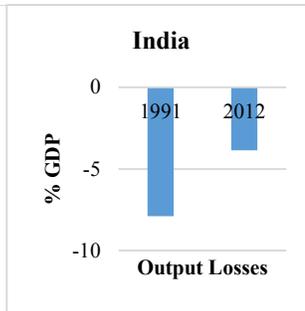
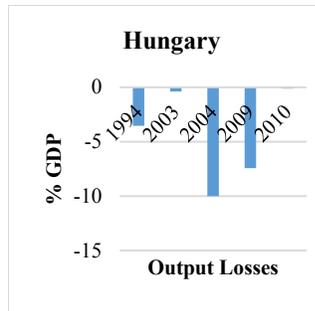
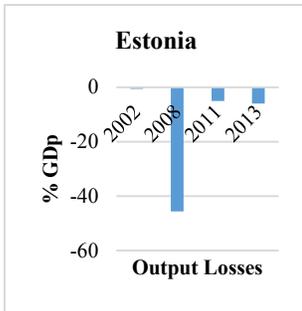
Year	Number	Percentage	Year	Number	Percentage
1990	4	2.60	2003	8	5.20
1991	5	3.25	2004	4	2.60
1992	5	3.25	2005	1	0.65
1993	5	3.25	2006	1	0.65
1994	4	2.6	2007	2	1.30
1995	3	1.95	2008	5	3.25
1996	2	1.30	2009	12	7.80
1997	0	0	2010	13	8.45
1998	4	2.60	2011	13	8.45
1999	5	3.25	2012	11	7.15
2000	8	5.20	2013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

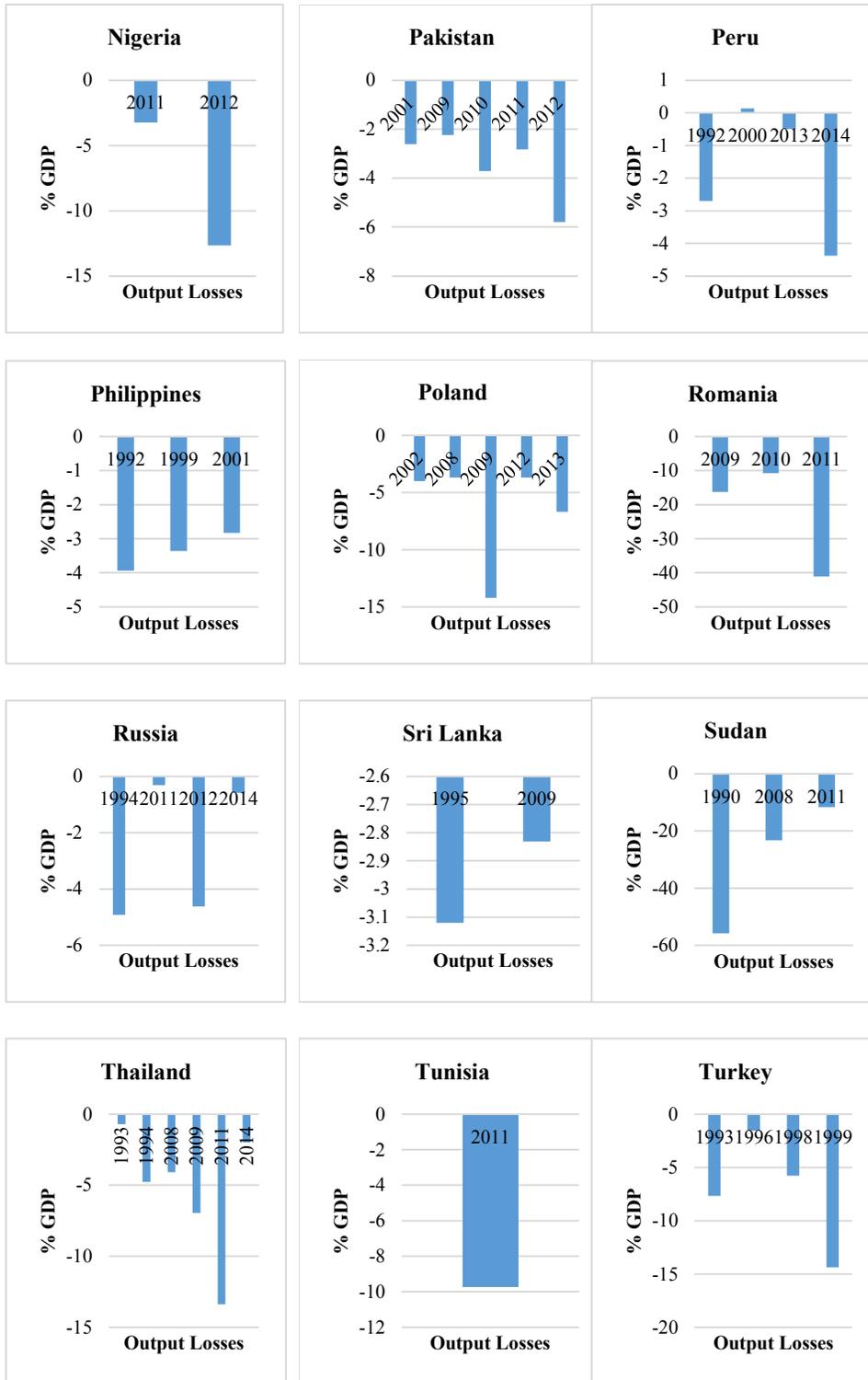
Source: Research Finding.

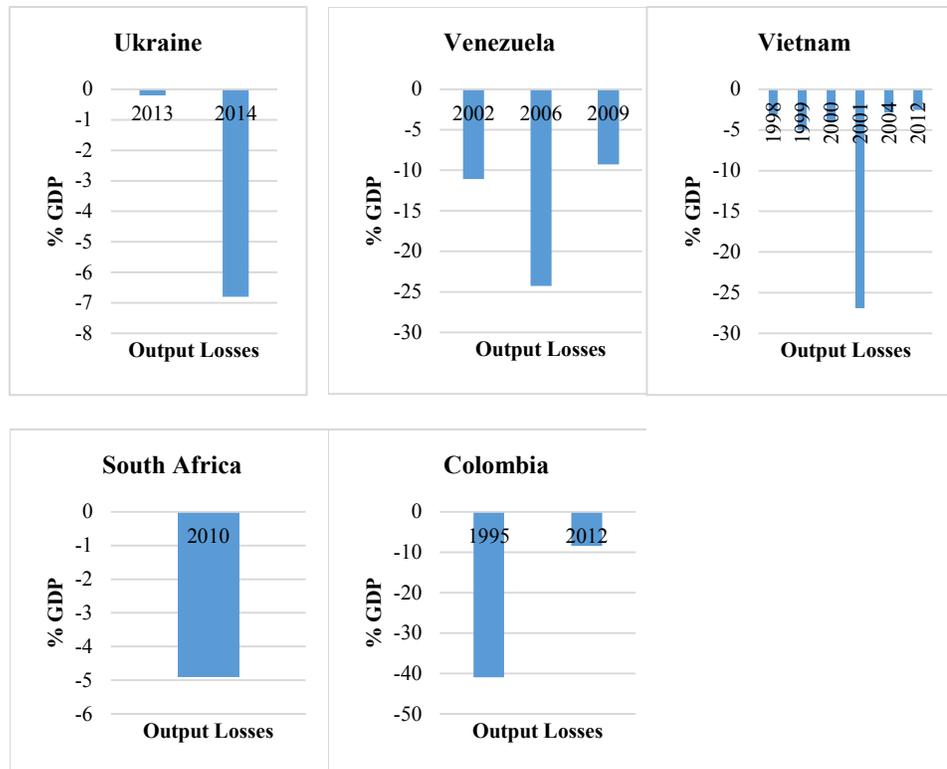
In Figure 1, the output losses due to the sudden stop phenomenon of FDI as a percentage of GDP have been displayed for the selected emerging market countries during 1990-1994.

**Fig. 1. Accumulated Output Losses (%GDP) From Sudden Stop Phenomenon of FDI in Selected Emerging Market Countries during 1990-2014**









Source: Research Finding.

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

#### 4. MODEL AND METHODOLOGY

The introduced model in this study to evaluate the effects of sudden stop of FDI on output and its interaction with financial crises, is based on an econometric model in the 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), the 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 the output of each country, 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 degree of the output from its potential trend can be explained by other 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 sudden flood of FDI at the previous year, financial crises at the previous year, macroeconomic condition and monetary, fiscal and exchange rate policies will be considered. The econometric model is as follow:

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

where *OL* is the output losses in country *i* at time *t* and it is calculated with emphasising on sudden stop phenomenon occurring. *SS* and *SF* are proxies for sudden stop and sudden flood of FDI, respectively. They are the discrete variables that take 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 an rise in inflows in a particular year that is more than one standard deviation above the country (five-year rolling) average. 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 25<sup>th</sup> percentile of the entire sample’s FDI-to-GDP ratio growth. This not only ensures that the increase in FDI inflows is substantial, but also that only large flood by international standards are 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 stops phenomena. One includes looking at deviations from the mean, while the other needs factoring in minimum threshold values. Moreover, sudden stops phenomena are introduced in a symmetric way, with a stop event defined as a decline in inflows in a particular year that is more than one standard deviation below the rolling average. The sudden stop event starts when the ratio of FDI-to-GDP decreases more than one standard deviation below its rolling mean and ends when the ratio rises above one standard deviation below its mean. The study imposes similar restrictions on sudden stops as on sudden flood. Hence, the following equations can be introduced:

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

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

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 sudden flood in that particular year.

Also, *FC* is a binary variable for financial crises at year  $t-1$ . Generally, the term of financial crisis is employed to 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 that are 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 a regular event in international markets [Yazdani and Tayebi (2013)].

Hence, except the negative effects of financial crises on macroeconomic variables and real sector of the economy, according to the literature, the occurring 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, it is possible that the occurred financial crises at year  $t$  carry out output losses, while the economy experiences sudden stop phenomenon at year  $t+1$  and the output losses are not necessarily due to sudden stop of FDI. To control this issue, the multiplication of *SS* and *FC* at previous year is added into the model as explanatory variable which the *FC* variable takes the value 1 if a country experiences any type of financial crises.

Moreover, it is possible that countries be at different stages in the business cycle when the sudden stop occurred, so we include 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 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 have been collected from World Bank (WDI Database) and International Monetary Fund (IFS Database) for the emerging market countries during 1990-2014.<sup>1</sup>

## 5. EMPIRICAL RESULTS

At first, before estimating the model, the study tries to investigate the stationary process of the variables to determine the co-integrated degree of them. In this regard, Levin-Lin-Chu (2002), Im-Pesaran-Shin (2003) and Maddala and Wu (1999) statistics have been employed to determine the unit root test for each variable. The results of the

<sup>1</sup>For more information about variables, see Table 4 in Appendix.

unit root test show that all the variables are stationary and the results of the estimated model are not spurious.

The estimated results are summarised for the output losses model in Table 3 where in different equations, the effects of explanatory variables have been evaluated on the output losses caused by the sudden stop phenomenon of FDI. In the Equation (1), the determinants of the output losses has been estimated with emphasising on the sudden stop phenomenon of FDI. Furthermore, in the following specifications including Equations (2) to (4), the role of the 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 into the model. Also, the variables indicating trade and financial openness have been introduced in the Equation (3), and finally in the Equation (4), the monetary, fiscal and exchange rate policies have been considered. Moreover, in the last rows of the Table 3, diagnostic statistics are represented.

Table 3

*Determinants of Output Losses Caused from Sudden Stop of FDI in Selected Emerging Market Countries during 1990-2014*

Variable	Equation (1)	Equation (2)	Equation (3)	Equation (4)	
FDI Flows	SS	1.91*** [0.57]	1.76*** [0.57]	1.93*** [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]
	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)
	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)

Source: Research Finding.

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.

According to the results based on Equation (4), increasing the probability of sudden stop of FDI will increase the output losses by 1.85 units, while 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 multiplication of *SS* and *SF* at previous year. The coefficient of *SSSF* shows that if a sudden flood has occurred in the previous period, could reduce the output loss caused by the phenomenon of *SS* by 2.79 units.

To investigate the role of financial crises (*FC*) on the output losses, the *SSFC* variable has been added into the model which is defined as multiplication of *SS* and *FC* at 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 have an increasing effects on the output losses. Also, the effect of the business cycles on output losses from *SS* is shown by *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 have experienced suitable situation.

Generally, according to the Equation (4), it can be mentioned that the macroeconomic variables which indicating the macroeconomic environment of economies, have the significant role on the severity of the output losses caused from *SS* phenomena. Hence, if the economy faces the *SS* phenomenon, there are other economic and control variables that can significantly increase or reduce the output loss. The results for *CPI* as 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 real exchange rate (*RER*) cannot significantly increase the output loss. Although, this coefficient is significant in the previous equations.

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

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

## 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 sudden stops on the output losses has been evaluated, and particularly the role of 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, with considering the sudden flood of FDI, it is possible to reduce the output losses caused by the sudden stop phenomenon of FDI. Also, if the country has experienced a sudden stop of FDI and a recession in the real sector of the economy both together, the output losses is not necessarily due to the effect of sudden stop phenomenon. Moreover, simultaneously with the sudden stop of FDI, the occurrence of a financial crises will increase the output losses.

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

As policy recommendations and implications, due to the negative effects of sudden stop of FDI on output and economic growth, policy-makers should eliminate the risk of sudden stop by determined contracts and impose some conditions on accepting these capital flows. In other words, if the appropriate infrastructure of the economy are not available and the countries experienced the sudden flood of FDI, the probability of sudden stop will increase and will 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 policy-makers. Finally, the international relation of the economies is imperative and the output losses from sudden stop of FDI can adjust by using the more degree of openness and financial liberalisation of the economy.

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 Hedric-Prescott filter. Then the GDP will be accelerated at the years after the sudden stop phenomenon by the figure of 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 main text.	World Bank, IMF, Author Calculations
Sudden Stop of FDI	SS	According to main text.	WDI, IMF, Author Calculations
Financial Crises	FC	Dummy variable takes the value 1 if a country experiences any type of 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 consumer price index.	World Bank, IMF
Real Exchange Rate	RER	The log of real exchange rate.	World Bank, IMF
Exchange Rate Regime	ERA	The annual report by International Monetary Fund about Exchange Rate Arrangement of Countries.	IMF
Monetary Policy	M	Cycles obtained from the Hedrick-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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