THAMMASAT REVIEW
PRINT ISSN: 0859-5747 ONLINE ISSN: 2630-0303
Volume 23 No 1 (January-June) 2020 [Page 1-13]

The Cost of a Sudden Stop During the Global Financial Crisis

Jae-Hyun Suh *

Institute of East and West Studies, Yonsei University, Republic of Korea

Received 7 January 2020; Received in revised form 30 March 2020
Accepted 12 May 2020; Available online 9 June 2020

Abstract

A sudden stop designates a sudden slowdown in private capital inflows and a corresponding sharp reversal from large current account deficits into smaller deficits or small surpluses (Calvo, 1998). This paper studies the effect of it on 19 emerging market economies and 20 advanced economies during the global financial crisis using a panel data set. To my knowledge, while there is a large amount of literature that studies the association between sudden stops and regional financial crises, such as the Latin American crisis and the Asian crisis, there are relatively few studies on the association between the former and the global financial crisis. I hypothesize that it also had a significant impact on both country groups during this remarkable event. The results show that a sudden stop had surged during the global financial crisis regardless of whether countries experienced banking crises or not. Furthermore, although the impact of it on both country groups was detrimental, it was more harmful to emerging market economies than advanced economies. These results are not surprising if we take into account global financial cycle theory which states global risk aversion plays a dominant role in capital flows between countries. Indeed, they suggest policymakers should be especially careful about the possibility of a sudden stop and additional costs from it when there is a severe global recession.

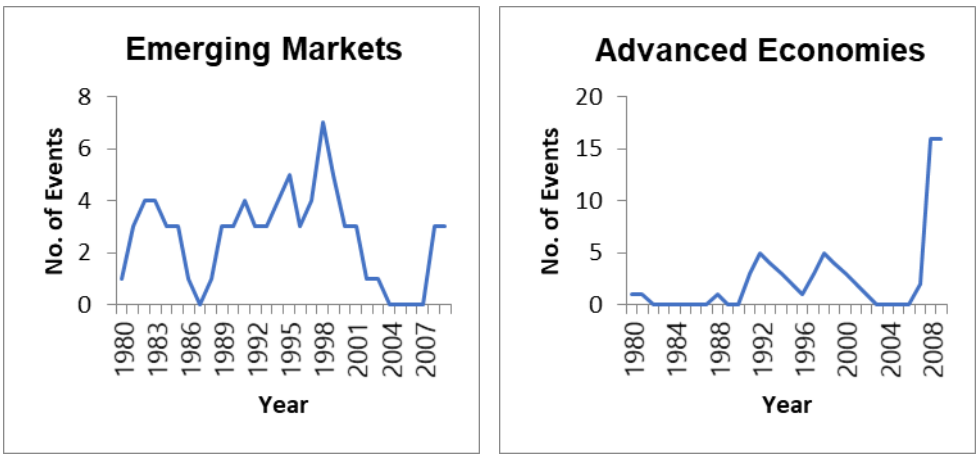
Keywords

Banking crisis, Global financial crisis, Sudden stop

*** Corresponding author:** jcredit500@gmail.com **DOI:** 10.14456/tureview.2020.1

Introduction

The global financial crisis (GFC), which occurred in 2007, was an unprecedented global recession that affected not only the domestic economy but also the global economy in diverse aspects [1] After the US banking crisis in 2007, the crisis was widely spread and, as a result, many countries, especially advanced countries, experienced it between 2007 and 2009 (see Figure 1).[2]



Note: There were a total of 22 developing countries and 24 advanced countries in the data.

Figure 1 The frequency of banking crises between 1980 and 2009 in emerging market economies and advanced economies (Laeven & Valencia, 2012)

For this reason, there have been many studies analyzing GFC with diverse views. For example, Dominguez, Hashimoto, and Ito (2012) studied the role of pre-crisis international reserve accumulations in GDP growth during the post-crisis era and showed that a country with more international reserves had recovered from the crisis faster. Chor and Manova (2012) also showed that international trade flows had severely collapsed during the global financial crisis using a novel data set. Likewise, many researchers have attempted to figure out what happened during these periods and this tide of studies is still being continued today.

[1] There is trivial disagreement in defining the period of the global financial crisis among literatures. Some papers say it was between 2008 and 2009 and some say it was between 2007 and 2009. This paper defines it between 2007 and 2009 because the US banking crisis, which triggered, it started in 2007.

[2] To define developing countries and advanced countries, I used income classifications in the year 2000 based on GNI per capita as reported by the World Bank. Accordingly, “low income” and “middle/lower income” countries are emerging market economies and “middle/higher income” and “higher income” countries are advanced countries. See Table 1 for the list of countries.

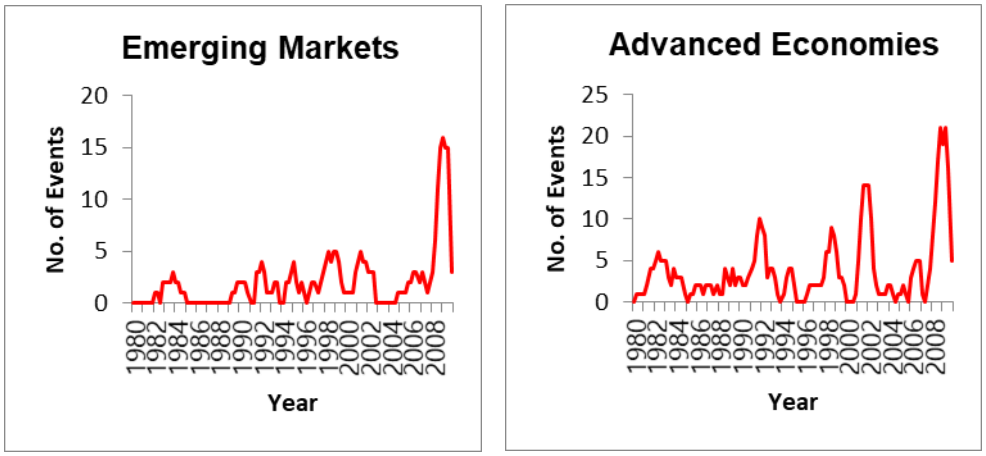
In the same spirit, this paper estimates the costs of sudden stops in both emerging market economies (EMEs) and advanced economies during GFC. Here, a sudden stop designates a sudden slowdown in private capital inflows and a corresponding sharp reversal from large current account deficits into smaller deficits or small surpluses (Calvo, 1998). As several studies suggest, a decrease in GDP increases the likelihood of a sudden stop in the country (e.g., Calderón & Kubota, 2013). Therefore, it is not surprising to see that there was a large number of sudden stop events during the GFC (between 2007 and 2009) in both country groups. Figure 2 and Table 2 show that a sudden stop had surged during this remarkable global recession and there was no country that experienced a banking crisis only without a sudden stop during these periods. This might indicate sudden stops played a significant role in each country, regardless of its income level, by depressing economic growth and motivated this study.

The contribution of this paper to the existing literature on sudden stops is three-fold. First, the paper focuses on sudden stops during the GFC to investigate if they played an important role to depress each country further. To my knowledge, while there is a large body of literature that studies the association between sudden stops and regional financial crises such as the Latin American crisis or the Asian crisis, there are relatively few studies on the association between the former and the global financial crisis. Second, I estimate the costs of sudden stops separating countries into EMEs and advanced economies. As a result, we can see that a sudden stop is more harmful to EMEs rather than advanced economies although it is detrimental to both groups. To explain these heterogeneous effects, we will review the existing literature and discuss them in later sections. Note also that a number of studies on sudden stops focus solely on EMEs and not on advanced economies. Third, I use high frequency data such as quarterly data. Capital flows are sometimes very volatile and it could be especially the case during the global financial turmoil in the late 2000s. Moreover, we might not be able to discover some sudden stop events with low-frequency data, such as annual data, if capital inflows get stabilized quickly in a year. For this reason, I expect that using quarterly data allows us to find more sudden stop events and more information on its characteristics. This is especially important for advanced countries' cases.

The paper is organized as follows. Section 2 reviews existing literature that estimates the costs of sudden stops and summarizes them. Section 3 describes an estimation strategy and explains the data. Section 4 shows the results and interprets them. I also briefly discuss the reason why sudden stops create different costs between EMEs and advanced economies in this section. Section 5 concludes.

Table 1 The list of countries

	Emerging Markets	Advanced Markets
	Argentina	Austria
	Brazil	Czech Rep.
	Chile	Denmark
	Colombia	Estonia
	Croatia	Finland
	Hungary	France
	India	Germany
	Indonesia	Greece
	Latvia	Iceland
	Lithuania	Ireland
	Malaysia	Israel
	Mexico	Italy
	Panama	Japan
	Peru	Korea
	Philippines	Netherlands
	Poland	Norway
	Romania	Portugal
	Russia	Slovak Rep.
	Sri Lanka	Slovenia
	Thailand	Spain
	Turkey	Sweden
	Venezuela	Switzerland
		UK
		US
Total	**22**	**24**



Note: Total 22 EMEs and 24 advanced countries in the data.

Figure 2 The frequency of sudden stop events between 1980 and 2009

Table 2 Countries that experienced a sudden stop and/or banking crisis in 2007-2009

	Emerging Markets	**Advanced Markets**
Only a Sudden Stop	Argentina, Brazil, Chile, Colombia, India, Indonesia, Lithuania, Malaysia, Mexico, Panama, Peru, Philippines, Poland, Romania, Sri Lanka, Thailand, Turkey	Czech Rep., Estonia, Finland, Israel, Japan, Korea, Norway
Only a Banking Crisis	None	None
Both	Hungary, Latvia, Russia	Austria, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden, Switzerland, UK, US
None	Croatia, Venezuela	Slovak Rep.

Literature Review

After the Latin American crisis in the 1980s and the Asian crisis in the 1990s, there has been a large number of studies on sudden stop episodes. About the cost of a sudden stop, Hutchison and Noy (2006) investigate the effects of currency crises and sudden stop on output using a panel data set over 1975-1997 and covering 24 emerging market economies. They show a currency crisis typically reduces output by about 2-3% while sudden stop reduces output by an additional 6-8% in the year of the crisis. They also argue that the cumulative output loss of a sudden stop is even larger, around 13-15% over a three-year period. Joyce and Nabar (2009) measure the adverse effects of sudden stops and banking crises on domestic investment using a broad sample of emerging market economies during the period 1976-2002. They show that a single sudden stop fails to damage countries while the concurrence of sudden stops and a banking crisis significantly depresses their investment. For this reason, they argue banking sectors are the main channels through which sudden stop depress the domestic economy. Lastly, Cavallo et al. (2015) developed a new taxonomy of sudden stops according to reversals in net capital flows and gross capital inflows and outflows and argue the order of the costs of sudden reversals in capital flows on real GDP and real exchange rate are '(reversals in) Gross Capital Outflows' < 'Gross Capital Outflows + Net flows' ≤ 'Gross Capital Net flows' ≤ 'Gross Capital Inflows' < 'Gross Capital Inflows + Net flows' < 'Gross Capital Inflows + Outflows + Net flows'.[3]

There are also some papers that investigate the determinants of sudden stops. Milesi-Ferretti and Razin (1998) study the determinants and consequences of sharp reductions in current account reversals in low- and middle-income countries and argue that both domestic variables, such as the current-account balance, openness, and the level of reserves, and external variables, such as terms of trade shocks, USA real interest rates and growth in industrial countries, play an important role in explaining reversals in current account imbalances. Edward (2004) argues the probability of a country experiencing a reversal is captured by a small number of variables that include the (lagged) current account to GDP ratio, the external debt to GDP ratio, the level of international reserves, domestic credit creation, and debt services. Furthermore, he suggests that current account reversals have had a negative effect on real growth that goes beyond their direct effect on investments. Cavallo and Frankel (2008) use the gravity

[3] Net capital flows = Gross capital inflows - Gross capital outflows.

instrument to see whether having a large tradable sector makes countries more vulnerable to sudden stops or less and find that openness indeed makes countries less vulnerable to crises. Table 3 summarizes the existing literature.

The common features of these papers are as follows. First, most of them use annual data because they cover long periods to estimate the general effects of sudden stops. Second, most of them only consider the cases in emerging market economies (EMEs). Although a few papers study sudden stops in advanced countries, they pool two groups together when running regressions so we do not know the impact of sudden stops on each group separately. For example, Calderón and Kubota (2013) and Cavallo et al. (2015) suggest the possibility that the effect of sudden stops could be heterogeneous across two groups. Finally, none of them focuses on the GFC. On the other hand, I use quarterly data, estimate the effect of sudden stops on both EMEs and advanced countries, and focus on sudden stop events during the GFC because sudden stops could be especially detrimental during the GFC.

Data and the Estimation Strategy

This section explains the data and the estimation strategy to estimate the impact of sudden stops on countries during the GFC**.**

The Definition of a Sudden Stop

A sudden stop is defined by a dummy variable, which is 1 if a country experiences the episode and 0, otherwise. The source of the data is Forbes and Warnock (2009). The data cover 58 countries, including both developing countries and advanced countries at the quarterly frequency. To define the episode, they calculate year-over-year changes in four-quarter gross capital inflows and define episodes using three criteria: (1) current year-over-year changes in four-quarter gross capital inflows is more than two standard deviations below the historical average; (2) the episode lasts for all consecutive quarters for which the year-over-year change in annual gross capital flows is more than one standard deviation below the historical average; and (3) the length of the episode is greater than one quarter.[4] To be specific, letting C_t be the four-quarter moving sum of gross capital inflows (GINFLOW), Forbes and Warnock (2009) compute annual year-over-year changes in C_t as follows:

$$C_t = \sum_{i=0}^{3} GINFLOW_{t-i} \quad \text{with t=1, 2, …, N and}$$

$$\Delta C_t = C_t - C_{t-4} \text{ with t=5, 6, …, N}$$

[4] This definition follows Calvo et al.'s (2004), which is commonly used in the empirical papers. For example, Cavallo and Frankel (2008), Joyce and Nabar (2009), and Cavallo et al. (2015) follow this definition.

Next, they compute rolling means and standard deviations of over the last five years. A "sudden stop" episode is defined as starting the first t that ΔC_t decreases more than one standard deviation below its rolling mean. The episode ends once ΔC_t rises above one standard deviation below its mean. In addition, in order for the entire period to qualify as an episode, there must be at least one quarter t when ΔC_t decreases at least two standard deviations below its mean. Also, note that they use gross capital flows not net flows unlike previous papers because they allow fora more nuanced understanding of extreme capital flow episodes.[5]

Estimation Strategy

To estimate the impact of a sudden stop on each country's output growth between 2007 and 2009, I use the following panel regression model:

$$y_{it} = \alpha + \beta^{SS} D_{it}^{SS} + X_{it}^{'}\beta + \gamma_i + \epsilon_{it}$$

where y_{it} is the output growth of country i at time t, α is a constant term, X_{it} is the matrix for independent variables, and D_{it}^{SS} is a dummy variable for sudden stop events. γ_i is a country fixed effect and ϵ_{it} is a disturbance term, which is assumed to have a zero mean and fixed variance. Because I use quarterly data, there are a total of 12 periods for each country and sample countries are 19 EMEs and 20 advanced markets.[6] The data for independent variables are mostly from the IMF unless they are specified.

Variables

Following Hutchison and Noy (2005, 2006) and Kaminsky (2006), I choose lagged dependent variable, lagged credit growth, openness of the economy to international trade markets, and currency depreciation as the independent variables. 'Credit growth' is the change in the sum of domestic claims on the government, the private sector, and financial institutions. The 'openness' variable is defined as the sum of imports and exports as a percentage of GDP. For 'currency depreciation', I follow Hutchison and Noy (2006) and Kaminsky (2006). First, I extract each country's monthly real exchange rate (RER) data from the IMF IFS. If RER is not directly available, I derive it from a nominal exchange rate index, adjusted for relative consumer prices.[7] After getting the monthly real exchange rate, I derive

[5] See Rothenberg and Warnock (2011).

[6] Some countries were excluded in the estimation results because of data limitations. They are Panama, Sri Lanka, and Venezuela in EMEs and Iceland, Norway, Slovak Rep., and Slovenia in advanced markets.

[7] This value is defined as the relative price of foreign goods in advanced countries (in domestic currency) to the price of domestic goods.

its deviation from the trend to define the devaluation.[8] Lastly, I use the devaluation, which is two months before t in level as the variable.

Table 3 A summary of the existing literature

Paper	Dependent variable	Data frequency
Milesi-Ferretti and Razin (1998)	Output growth	Year
Edward (2004)	Output growth	Year
Hutchison and Noy (2006)	Output growth	Year
Kaminsky (2006)	Output growth	Year
Cavallo and Frankel (2008)	Output growth	Year
Joyce and Nabar (2009)	Investment	Year
Cavallo et al. (2015)	Output growth	Quarter

Paper	Countries	Periods
Milesi-Ferretti and Razin (1998)	86 EMEs	1971-1992
Edward (2004)	157 countries	1970-2001
Hutchison and Noy (2006)	24 EMEs	1975-1997
Kaminsky (2006)	20 countries	1970-2002
Cavallo and Frankel (2008)	141 countries	1970-2002
Joyce and Nabar (2009)	26 EMEs	1976-2002
Cavallo et al. (2015)	63 countries	1980-2012

Results

Interpretation

Table 4 reports the main results.[9] As is mentioned above, I separate countries into two groups according to their income levels to see whether the effects of sudden stops are heterogeneous across them. However, the results for the pooled group are also reported in columns (5) and (6). Columns (1), (3), and (5) are standard fixed- effect specifications and columns (2), (4), (6) are the same ones but with robust standard errors. We can see robust standard errors increase the significance of coefficients for EMEs and pooled groups. If we see the fifth row in the table, which is our main interest, countries' output growths decreased in 2.341 percentage points for EMEs and 2.013 percentage points for advanced markets when they experienced sudden stops during GFC. That is, sudden stops give more damage to EMEs than advanced countries and the effects

[8] HP-filter was used to get trend.

[9] Note that there is no constant term because it is a fixed-effect model.

are significant in both groups. Moreover, it is still significant when two groups are pooled together (2.106 percentage points decrease in this case). Interestingly, the effects of other independent variables on the pooled group are closer to the ones on EMEs rather than the ones on advanced countries even though observations of the former are less than the latter. It suggests the impacts of independent variables on EMEs are stronger than those on advanced countries during the recession.

Table 4 The estimated effects of sudden stops in the global financial crisis

	EMEs		**Advanced Markets**		**Pooled Group**	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged output	0.78***	0.78***	0.71***	0.71***	0.76***	0.76***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)
Lagged credit growth	0.05***	0.05**	0.1	0.1	0.06***	0.06***
	(0.02)	(0.02)	(0.07)	(0.06)	(0.02)	(0.00)
Market openness	0.00***	0.00***	2.29	2.29	0.00*	0.00***
	(0.00)	(0.00)	(2.37)	(2.88)	(0.00)	(0.00)
Depreciation	0.00	0.00***	0.01	0.01	0.00	0.00***
	(0.00)	(0.00)	(0.04)	(0.02)	(0.00)	(0.00)
Sudden Stops	-2.34***	-2.34***	-2.01***	-2.01***	-2.11***	-2.11***
	(0.41)	(0.52)	(0.28)	(0.36)	(0.24)	(0.29)
Obs.	228	228	240	240	468	468

Note: The dependent variable is the output growth, which is in percentage terms. Columns (1), (3), and (5) are results with regular standard errors and (2), (4), and (6) are the ones with robust standard errors. *, **, *** significance at 10%, 5%, and 1%.

It is worth to compare the results in this paper with the ones in others. In Cavallo et al. (2015), the cost of a sudden stop is a decrease in the normalized real GDP by 0.34.[10] Although the results in two papers are not directly comparable because of different dependent variables,[11] we can see that their estimated damage from sudden stops is certainly smaller than the one in this paper. This could be because they estimated the general effects of sudden stops while I estimated the effects when countries were experiencing a severe recession. Meanwhile, Hutchison and Noy's (2006) results are significantly larger because their estimated effect is a decrease in real GDP growth by 6-8% in the year of the crisis. However, their definition of sudden stops is somewhat different from the traditional literature. They defined a sudden stop as the time when a

[10] They normalized real GDP to be a hundred at the time when a country experienced a sudden stop. Therefore, the result indicates its real GDP index was 100. 34 one quarter before the sudden stop occurred.

[11] Cavallo et al.'s (2015) dependent variable is real GDP while the one in this paper is real GDP growth.

currency crisis and a current account reversal occur simultaneously. This would be one reason why the cost of sudden stops in their paper is very large. Joyce and Nabar's (2009) estimates are similar to the ones in this paper. They argue that sudden stops reduce the ratio of investment to GDP by 1.432 percentage points in the short run and by 3.75 percentage points in the long run. However, note that they estimated the effect of sudden stops on investment and not on real GDP growth.

Why is the impact of sudden stops heterogeneous according to countries' income levels?

The results above show that sudden stops generate heterogeneous effects on countries according to their income levels. To explain this, we first need to discuss the channel through which sudden stops cause damage to the domestic economy. Although there are several explanations of why this happens, most studies agree that sudden stops depress economic growth by hurting domestic investment. For example, Calvo (1998) emphasizes the incidence of nonperforming loans and following bankruptcies, which are caused by sudden cessation of capital inflows. Likewise, Mendoza (2010) argues collateral constraints bind as a result of sudden stops and, in this case, domestic companies are forced to pay extra financing premia or liquidate their assets. Consequently, they need to reduce working capital and production and, as a result, factor demands drop. This makes collateral constraints tighter and the same process continues until outputs are severely depressed. Mendoza (2010) calls this process a spiral collapse. Therefore, more damage from sudden stops on EMEs implies more damage to domestic investment in EMEs than advanced markets, to be specific.

Why is domestic investment in EMEs more damaged than that in advanced countries? The flight-to-safety hypothesis may be able to answer this question. Recently, several researchers have argued that investors' risk aversion is one of the most important factors that determine their investment decisions. To support this argument, Rey (2015) provides evidence that investors' global risk aversion, which is proxied by VIX, is the one and the only one that is strongly correlated with capital inflows and outflows. Consequently, she suggests there exists a global financial cycle and each country becomes vulnerable to external shocks if it pursues free capital markets. Cheung et al. (2020) investigated the determinants of capital flight to Germany and showed that crisis-specific factors such as economic policy uncertainty, the European Central Bank collateral policy, and currency misalignment motivate investors' flight-to-safety behavior among others. Moreover, it is evident that EMEs are considered as more crisis-prone and vulnerable countries than advanced markets. We can, therefore, expect that investors would withdraw their investment more from EMEs than advanced markets during GFC and, as a result, EMEs' investment could be more depressed. For this reason, the results in this paper support the flight-to-safety hypothesis and provide evidence for it.

Conclusion

During the GFC many countries experienced huge output drops which made investors withdraw their investments simultaneously. Therefore, it is not surprising to see that there were a number of sudden stop events at the time and we could see that these detrimental events arouse large costs in each country. This suggests that financial crises might bring sudden stops and cause extra burden on the economy. To prevent this negative effect, policymakers will have to monitor the tide of capital flows before and after the recession carefully. Furthermore, this paper supports the fact that sudden stops are especially harmful to emerging market economies. For example, although only three countries among 21 EMEs had experienced banking crises during the GFC, most of them had to suffer from sudden stops. This suggests external variables have played a key role to cause sudden stops in EMEs regardless of their domestic economic activity. For this reason, macroprudential policies are necessitated when the global recession is expected.

This paper suggests some topics for future research. Studying the causal relationship between a banking crisis and a sudden stop is one of them. Furthermore, estimating the interaction between sudden stops and financial crises during the global recession will be another important challenge. To achieve this goal, high-frequency data for financial crises (e.g., quarterly or monthly) are necessary.

References

Calderón, C., & Kubota, M. (2013). Sudden stops: Are global and local investors alike? *Journal of International Economics*, *89*(1), 122–142.

Calvo, G. A. (1998). Capital flows and capital-market crises: the simple economics of sudden stops. *Journal of applied Economics*, *1*(1), 35-54.

Calvo, G. A., Izquierdo, A., & Mejia, L. F. (2004). *On the empirics of sudden stops: the relevance of balance-sheet effects* (No. w10520). National Bureau of Economic Research.

Cavallo, E. a., & Frankel, J. a. (2008). Does openness to trade make countries more vulnerable to sudden stops, or less? Using gravity to establish causality. *Journal of International Money and Finance*, *27*(8), 1430–1452.

Cavallo, E., Powell, A., Pedemonte, M., & Tavella, P. (2015). A new taxonomy of Sudden Stops: Which Sudden Stops should countries be most concerned about? *Journal of International Money and Finance*, *51*, 47–70.

Cheung, Y. W., Steinkamp, S., & Westermann, F. (2020). Capital flight to Germany: Two alternative measures. *Journal of International Money and Finance*, *102*, 102095.

Chor, D., & Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics*, *87*(1), 117-133.

Dominguez, K. M. E., Hashimoto, Y., & Ito, T. (2012). International reserves and the global financial crisis. *Journal of International Economics*, *88*(2), 388-406.

Edwards, S. (2004). Thirty years of current account imbalances, current account reversals, and sudden stops. *IMF Staff Papers*, *51*(SPEC. ISS.), 1–49.

Forbes, K. J., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of International Economics*, *88*(2), 235–251.

Hutchison, M. M., & Noy, I. (2006). Sudden stops and the Mexican wave: Currency crises, capital flow reversals and output loss in emerging markets. *Journal of Development Economics*, *79*(1), 225–248.

Hutchison, M. M., & Noy, I. (2005). How Bad Are Twins? Output Costs of Currency and Banking Crises. *Journal of Money, Credit, and Banking*, *37*(4), 725–752.

Joyce, J. P., & Nabar, M. (2009). Sudden stops, banking crises and investment collapses in emerging markets. *Journal of Development Economics*, *90*(2), 314–322.

Kaminsky, G. L. (2006). Currency crises: Are they all the same? Journal of International Money and Finance, 25(3), 503–527.

Laeven, L., & Valencia, F. (2013). Systemic Banking Crises Database. *IMF Economic Review*, *61*(2), 225–270.

Mendoza, E. G. (2010). Sudden Stops, financial crises, and leverage. *American Economic Review*, *100*(5), 1941–1966.

Milesi-Ferretti, G. M., & Razin, A. (1998). Sharp reductions in current account deficits: an empirical analysis. *European Economic Review*, *42*(3–5), 897–908.

Rey, H. (2015). *Dilemma not trilemma: the global financial cycle and monetary policy independence* (No. w21162). National Bureau of Economic Research.

Rothenberg, A. D., & Warnock, F. E. (2011). Sudden flight and true sudden stops. *Review of International Economics*, *19*(3), 509–524.