

Capital Flows and the Interaction with Financial Cycles in Emerging Economies

Jinnipa Sarakitphan

A Thesis Submitted to

The Graduate School of Public Policy, The University of Tokyo

in partial fulfillment of the requirements for

Master of Public Policy

Advisor: Professor Kenichi Ueda

May 2016

Abstract

This paper analyzes the characteristics and dynamics of capital flows and its extreme movements, using both net capital flows and gross capital flows, which is the capital flow data that differentiates the flows as being initiated by foreigners and domestic agents, in 14 emerging economies from 1980 to the second quarter of 2015. Moreover, the paper investigates the relationship between extreme capital flow movements and financial cycles characterized by the amplitude and duration. The key findings are that the extreme movement of net capital inflows in emerging economies has still been increasing and dominated by capital inflows from foreigners. However, the role of capital outflows from domestic agents in reducing the pressure from inflows from foreigners has been also increasing. The regression analysis shows that the emerging economies in general are currently more resilient in facing the large capital inflows, nevertheless, capital flows tends possibly to somewhat affect financial cycle in case of frequent extreme outflows.

Keywords: Capital flows, Emerging Markets, Financial cycle, Surge, Stop

Table of Contents

Abstract	2
Introduction.....	5
Literature Review.....	7
Capital Flows and Financial Stability in Emerging Economies	7
Capital Flows and the Identification of Episodes of Extreme Movements	10
Definition, Measures, and the Determinants of Financial Cycles	15
Data and Methodology.....	22
Identifying Episodes of Extreme movements of Capital Flows	22
Financial Cycles.....	27
Capital Flows and Financial Cycles.....	30
Methodology and Other Control Variables	32
Regression Results and Discussion.....	36
Conclusion	39
Tables	41
Table 1 <i>Summary Statistics of Capital Flows of Emerging Economies in the Sample</i> <i>(percent of GDP)</i>	41
Table 2 <i>Summary Statistics of the Deviation of Capital Flows</i>	42
Table 3 <i>Summary Statistics of the Episodes of Extreme Movements of Capital Flows</i>	43
Table 4 <i>Frequency of Coincidences of Extreme Movement of Capital flows</i>	44

Table 5 <i>Summary Statistics of Credit to GDP</i>	44
Table 6 <i>Average Amplitude and Duration of Financial Cycles</i>	45
Table 7 <i>Average of Amplitude and Duration of Financial Cycles During the Episodes of Extreme Movements in Capital flows</i>	46
Table 8 <i>Regression Results</i>	47
References.....	48
Appendix.....	50
Appendix 1: <i>Figures of Credit to GDP and Financial cycles</i>	50
Appendix 2: <i>List of Dependent Variables and Possible Independent Variables</i>	52
Appendix 3: <i>Correlation Matrix of Dependent and Possible Independent Variables</i> ..	54
Appendix 4: <i>Baseline Regressions</i>	56
Appendix 5: <i>Robustness Check Regressions</i>	60

Introduction

Large and high volatile capital inflows is of concern in emerging economies because it can translate into significant macroeconomic and financial instability in their domestic economies. Furthermore, emerging economies faced greater challenges in dealing with capital flow due to their relatively small and less diversification of domestic economies and financial systems and structural and institutional characteristics. As a result, the capital inflows are always in the interest of policymakers.

The past literature on capital flows has focused on net capital flows and the interaction with macroeconomic and financial stability variables or selected aspects of cycles, because the explanations of macroeconomic consequences of capital flows are related to net term. However, few recent studies move the focus to gross capital flows, which is the capital flow data differentiates the flows as being initiated by foreigners and domestic agents. As a result of the recent development of gross flows that differ from net flows, in addition, financial stability risks and the explanation of external financing by banks are closer related to gross capital inflows by foreigners. Furthermore, the research on extreme movement of capital flows, and the relationship with the whole financial cycle are limited.

This study, therefore, aims to explore the characteristics and dynamics of capital flows and its extreme movement, both net and gross terms, and the relationship between them and financial cycles to answer the following questions. Is the behaviour of gross flows by foreigners and domestic agents different and how they affect the net capital flows, especially in the episodes of extreme movements, in emerging economies? And, do the extreme movements of capital flows affect the financial cycles, characterized by the amplitude and duration?

In term of data and methodology, the study uses the quarterly capital flow data from financial account of IMF Balance of Payments Statistics and employs the recent suggestion of using ARIMA to derive the deviation over its trend of macroeconomic variable following Broto et al. (2011). Financial cycles are constructed from quarterly credit to GDP from BIS Credit to the non-financial sector database by BP filter from 14 emerging economies from 1980 to the second quarter of 2015. To explore the relationship between extreme capital flow movements and financial cycle's amplitude and duration, GLM estimation with clustered standard deviation will be employed following Stremmel and Zsámboki (2015).

The key findings of the study can be concluded as follow. First, the volatility and the extreme movements of net capital inflows in emerging economies has still been increasing and dominated by those of gross inflows from foreigners. However, gross flows from domestic agents can generally reduce the pressure from inflows from foreigners to net capital inflows, and this role has been also increasing despite the fact that it sometimes, especially during stops, add more pressure on net capital inflows. Second, emerging economies' financial cycles was sensitive to capital flows in the past. However, emerging economies in general are currently more resilient in facing the fluctuation of capital flows as shown by insignificant of extreme movements of capital inflows in determining amplitude and duration of financial cycles, nevertheless, capital inflows are somewhat important in determining financial cycle when the extreme outflows happen frequently.

The remainder of the paper is organized as follows. In the next section, the paper explores the relevant literature review. The third section describes the data and methodology used in the study and some findings from the descriptive statistics of the data, whereas the fourth section discusses on regression results. Finally, the last session is the conclusion of the study.

Literature Review

Capital Flows and Financial Stability in Emerging Economies

Large and high volatile capital flows is of concern in emerging economies because it can translate into significant macroeconomic and financial instability in their domestic economies. Furthermore, emerging economies have faced greater challenges in dealing with capital flow due to their relatively small size and less diversification of domestic economies and financial systems and weaker structural and institutional characteristics. In term of empirical studies, many empirical studies find the relationship of volatility and extreme movement of net capital flows, especially periods of large capital inflows and macroeconomic and financial variables, or selected aspects of financial cycles, such as booms or crises. However, the research on the whole financial cycles, extreme movement of gross capital flows, and the relationship between capital flows, especially gross capital flows, and financial cycle are limited.

Although capital inflows are beneficial by enhancing growth and productivity by weakening funding constraints, it can be of concern because capital flow volatility can translate into significant macroeconomic and financial instability in the domestic economy of recipient countries. Explaining on the large capital inflows side, large capital inflows in net terms can lead to strong upward pressure on the exchange rate appreciation and widen current account deficits, contributing macroeconomic overheating in term of inflationary pressures and asset booms, and higher debt ratios (Claessens and Ghosh, 2013 and Ghosh, 2010). Moreover, large capital inflows from foreigners, especially bank loans, can lead to increase in financial sector vulnerabilities and the macroeconomic overheating by expanding credit to boost investment and consumption or directly to sectors such as real estate and stock market and funding by noncore liabilities when credit expansion outpaces locally available core deposits, such as wholesale

funding, especially in international sources. In addition, asset price inflation can increase the collateral value of banks' customers, leading to reinforcing of cycle of credit expansion and asset price inflation, or can be called as "financial cycles". Even banks, especially smaller domestic banks, are unable to borrow abroad directly, the cycle can take place if the external borrowings by other residents who can raise fund abroad are deposited in the domestic banks (Ghosh, 2010). Consequently, bank portfolios and balance sheets can become vulnerable, such as rising in banks' balance sheets noncore-to-core liabilities, loan-to-deposit ratios and leverage ratios (Claessens and Ghosh, 2013) and more expose to risky sectors (Ghosh, 2010).

Emerging economies have faced greater challenges in dealing with capital flow for several reasons. First, emerging economies tend to receive capital flows that are relatively large to their domestic economies and financial systems, even in net terms (Claessens and Ghosh, 2013) and the fluctuations in net capital flows were much sharper for emerging market economies compared with advanced economies. Second, emerging economies are more sensitive to shocks due partly to less diversification of their economies, less domestic economic and political stability, and other structural and institutional characteristics. In emerging market economies, capital inflows from foreigners outweigh capital outflows from domestic agents; for example, net capital inflows fell dramatically during the crisis and rebounded sharply afterward. By contrast, in advanced economies capital outflows from domestic agents largely offset capital inflows from foreigners, generating smoother movements in net flows (IMF, 2011). This lead to high volatility of net capital inflows in emerging economies. Moreover, structure of emerging economies' financial sectors is still largely bank dominated with heavily rely on collateral and high presence of foreign banks. The large capital inflows through bank and other lending tend to interact with and amplify the domestic financial cycles (Claessens and Ghosh (2013)), in

addition, the presence of foreign-owned banks can further reinforce the cycle given their easier access to both international financial markets and the internal capital of their parent banks and strong adjustment in their lending (Stremmel and Zsámboki, 2015). Meanwhile, the institutional weaknesses, for instance, legal regime and enforcement, market discipline of financial institution, information disclosure and transparency, and prevalence of insider-type corporate governance arrangements, could make emerging economies subject to sudden stops and reversals of capital flows in the face of even minor shocks (Claessens and Ghosh, 2013). As a result of facing great challenge from volatile capital flows, policymakers of emerging economies have implemented the combinations of macroeconomic policies, prudential regulations, and capital flow management tools to strengthen the economic absorption to shock, to avoid buildup in macroeconomic and financial sector vulnerability, and to reduce the size and volatility of capital inflows.

In term of empirical studies, many empirical studies have focused on the relationship of volatility and extreme movement of net capital flows, especially periods of large capital inflows and macroeconomic and financial variables or selected aspects of financial cycle, such as booms or crises, and find the relationship of them in emerging economies. Claessens and Ghosh (2013) is one of recent study on the relationship of surge in net capital flows and macroeconomic and financial variables, including business and financial cycle. Its event study indicates that large capital inflows in net term can lead to macroeconomic and financial vulnerability. In addition, Claessens and Ghosh (2013) also analyzes the overlap of business cycle, financial crisis, financial distress, and extreme movement of net capital inflows, finding that capital flow cycles in emerging economies overlap to a greater degree with domestic financial cycles and financial crises compared with the experience of advanced economies.

However, the research on the whole financial cycles, extreme movement of gross capital flows, and the study on relationship of gross capital flows and financial stability and financial cycle are limited, for example, Broner et al. (2013) finds that both net inflows and gross capital flows decline during crises in middle-income countries, and the patterns are more extreme in upper-middle-income ones. More specifically, the study of Broner et al. (2013), which focuses on dynamics of gross capital flows over business cycles and during financial crisis, finds that both gross flows both from foreigner and domestic agents are pro-cyclical, or they generally increase during economic expansion and decline during economic downturn and during crisis years, and the patterns are more extreme in upper-middle-income countries. But the behavior of net capital flows is contrasting. During crisis net capital inflows increase in high-income countries but net capital flows decline in middle-income countries, especially in upper-middle-income ones. This evidence is consistent with during crisis, the retrenchment by domestic agent being stronger than the capital outflows by foreigner in high-income countries but weaker in middle-income economies.

Capital Flows and the Identification of Episodes of Extreme Movements

The past literature on capital flows has focused on net capital flows because the explanations of macroeconomic consequences of capital flows are related to net term. However, financial stability risks and the explanation of external financing by banks are related to capital inflows by foreigner, combined with recent development of gross flows, few recent studies turn to focus on gross capital flows by foreigners and domestic agents. The previous empirical studies on characteristics and dynamics of net capital inflows in emerging economies draw the similar conclusions that net capital flows have been sizable and its volatility has increased over time despite no clear evidence of increase in magnitude of net capital inflows. Meanwhile, the study

on gross capital flows explain that magnitude and volatility of gross flows are relative large and have been increased overtime, moreover, positive correlation of capital inflows by foreigners and capital outflows by domestic agents, which has been increased over time, contributed net capital flows to relatively stable. In the studies of the episodes of extreme movements of capital flows, deviation over its trend, derived from mean of entire observation or rolling average, is generally one of the methods used in research. However, the other methodologies have been recently adopted to derive the trend and deviation, such as Autoregressive Integrated Moving Average (ARIMA). The recent research finds that episodes of extreme capital inflows using gross data are substantially different from those using net capital flows, however, net capital flows are mainly driven by foreigners rather than domestic agents and there is strong positive correlation between capital inflows stop by foreigner and retrenchments by domestic agents during global financial crisis but it does not exist during all crisis.

The capital flow data, both in net and gross term, generally refer to the financial account of balance of payment. According to the IMF's the Sixth Edition of the IMF's Balance of Payments and International Investment Position Manual (or BPM6), the financial account shows "net acquisition of financial assets" and "net incurrence of liabilities". Net acquisition of financial assets is the net changes in resident's financial assets, its positive value then indicates capital outflows by domestic agents or called "gross outflows" (hereafter stated as COD). On the other hands, net incurrence of liabilities is the net changes in resident's financial liabilities, then its positive value indicates the capital inflows by foreigners or called "gross inflows" (hereafter stated as CIF). Therefore, net capital inflows is CIF subtracted by COD. In detail, CIF and COD can be classified by functions into five accounts; (1) direct investment, (2) portfolio investment,

(3) financial derivatives (other than reserves) and employee stock options, (4) other investment, and (5) reserve assets.

The past literature on capital flows has focused on net capital flows because the explanations of macroeconomic consequences of capital flows, such as exchange rate appreciation, current account deficit, and inflationary pressures, are related to net term. In case of emerging economies, moreover, their net capital inflows still largely correspond to CIF and relatively little action on COD (Ghost et al., 2012). The example of recent study on net capital inflows is Ghost et al. (2012) which examines the determinants of surge in net capital flows, defined as annually total net flows excluding “other investment liabilities of the general government”, reserve assets, and use of IMF credit, expressed in percent of GDP in 56 emerging market economies during 1980 – 2009.

However, financial stability risks, such as foreign currency exposure of unhedged domestic borrowers and the explanation of external financing by banks, are related to gross external liabilities, or CIF, in addition, the size and volatility of gross flows have increased recently while net capital flows have been more stable (Forbes and Warnock, 2012). Consequently, few recent studies focus gross capital flows by foreigners and domestic agents. The example of recent research based on gross flows are Forbes and Warnock (2012) which analyses the factors driving the extreme movement of gross capital flows in 58 economies over the period of 1980 – 2009 and Broner et al. (2013) which analyses the dynamics, especially during crisis, of gross capital flows measured as a percentage of trend GDP in 103 countries from all income level during 1970 - 2009.

The previous empirical studies on characteristics and dynamics of net capital inflows in emerging economies draw the similar conclusions that (1) net capital flows have been sizable

(Claessens and Ghosh, 2013), however, there is no clear evidence of increase in magnitude of net capital inflows (Broner et al., 2013), (2) direct investment is most important category of capital flows representing half of total flows since 1990s (Broto et al., 2011) (3) volatility of net capital flows has increased over time (IMF, 2011, Claessens and Ghosh, 2013, and Broto et al., 2011) and are somewhat more volatile than that of advanced economies (IMF, 2011) (4) Bank loans are more volatile compared to other categories of capital flows (Claessens and Ghosh, 2013, Broner et al., 2013 and Broto et al., 2011), meanwhile, direct investment is less volatile and quite stable even during financial crisis (Broto et al., 2011). However, the study of Broner et al. (2013) gives additional information on the nature of capital flows that the magnitude and volatility of gross flows are large and have been increased overtime, moreover, positive correlation of CIF and COD, which has been increased over time, contributed net capital flows to relatively stable.

On the identification of extreme movements of capital flows, the terminology to name the extreme movement of capital flows, sharp increases in net capital inflows is generally named as “bonanzas” or “surges”, meanwhile, sharp decreases or slowdowns in net capital inflows is generally named as “sudden stops” “stops” or “outflows”. In recent study of extreme movements of gross flows, such as Forbes and Warnock (2012), the terms “surges” and “stops” are also used to define sharp increases and decreases of CIF, respectively, and defines sharp increases and decreases of COD as “flight” and “retrenchment”, respectively. Meanwhile, threshold approaches, indeed deviation over trend and percentile, are generally used in research to identify the episodes of extreme movements in capital flows. The deviation over its trend can be identified as the measure of volatility of capital flows and the measurement of magnitude of extreme movement. The cut-off of deviation over trend normally used the times of standard deviation, and the trend is generally derived from mean of entire observation or rolling average.

For example, Forbes and Warnock (2012) use quarterly data on gross capital flows and define a surge and flight as an annual increase in CIF and COD, respectively, that starts when change in flows exceeds more than one standard deviation above the five-year rolling average and ends when it falls below that level, where the increase is at least two standard deviations above the average in at least one quarter. On the other hand, stop and retrenchment are defined in symmetric way. However, the other methodologies have been recently adopted to be threshold and to derive the trend and deviation. For example, Broto et al. (2011) applies “Autoregressive Integrated Moving Average (ARIMA)”, which is proposed to derive the trend and measure deviation of macroeconomic variables to overcome the drawbacks of simple mean and standard deviation, to derive the volatility of capital flows in 58 emerging economies during 1980 – 2006

The summary of findings on the episodes of extreme movements of capital flows are that (1) they are likely to be synchronized internationally but not all economies are affected, (2) episodes of extreme capital inflows using gross data are substantially different from those using net capital flows, however, Ghost et al. (2012) indicates that most of surges are in line with CIF surges rather than COD retrenchments, and (3) there is strong positive correlation between stop and retrenchments during global financial crisis but it does not exist during all crisis. (Forbes and Warnock, 2012). More specifically, Forbes and Warnock (2012) finds that the evolution of incidence of each type of episodes have large swing in the percent of sample experiencing an episode, for example, there was spike in the incident of retrenchment at greater than 60 percent of the sample in the fourth quarter of 2008, but retrenchment occurred not in so many countries during other periods. This finding implies that the episodes of extreme movements of capital flows are likely to be synchronized internationally but not all economies are affected, consistent with the finding of Ghost et al. (2012) that surge is likely to be synchronized internationally but

not all emerging economies are affected even in times of such global surges. Moreover, Forbes and Warnock (2012) finds that episodes of extreme capital inflows using gross data are substantially different from those using net capital flows, for example, net capital inflows identify more surge episode and fewer stop episodes during the height of the GFC because many countries' domestic agents bring their money home. If the size of retrenchment by COD was larger than that of CIF stop, the net capital flows will not identify as stop and possibly show up as surge. However, Ghosh et al. (2012) indicates that most of surges in emerging economies, about two-third, are driven by CIF rather than COD retrenchment, which outnumber CIF driven surge in two out of 30 years of sample in 1982 and 2008.

Definition, Measures, and the Determinants of Financial Cycles

Although, there is no consensus on the definition of financial cycle and how to measure it, Borio (2014) defines the financial cycle as self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into boom followed by busts, and mentioned that the financial cycle variables generally involve credit and asset prices especially property prices, as representing of financial constraint and perception of value and risk, respectively. On the methodology sides, two groups of methodologies have been employed in financial cycle literature; frequency-based filter methodology and turning point analysis. Meanwhile, the previous empirical studies of financial cycles draw the similar conclusions on characteristics of financial cycles that (1) duration of financial cycles is about six quarters in short-term cycle and 20 quarters in medium-term cycle, in addition, upturns last longer downturns on average, (2) financial cycles of emerging economies are more volatile than those of advanced economies, and (3) peak of financial cycles seems to be related to crisis and period of financial distress. Meanwhile, the research on the determinants of financial cycle

characteristics indicates that previous phase's amplitude and duration, policy regime, global and domestic condition, and banking sector structure are significant factors in determining the amplitude and duration of financial cycles.

Although, there is no consensus on the definition of financial cycle and how to measure it, one of the most often quoted definition of financial cycle is explained by Claudio Borio that the financial cycle is self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into boom followed by busts, moreover, these interactions can amplify economic fluctuations and possibly lead to serious financial distress and economic dislocations (Borio, 2014). The complete of financial cycle combines with two phases, consisted of (1) the phase from trough to the peak or called as boom, expansion, or upturns in previous literature (hereafter stated as "upturns"), and (2) the phase from peak to trough or called as bust, contraction, or downturns (hereafter stated as "downturns"). Each phase can be characterized according to their amplitude (intensity) and duration. The amplitude is the magnitude of change in the variable from a trough to the next peak in case of upturns, on the other hand, the amplitude of downturn is the magnitude of change in variable from a peak to the next trough. Meanwhile, the duration is the measure of the time takes in each phase.

Due to no consensus on how to measure financial cycle, there is a variety of indicators and methodologies to measure financial cycles in the previous empirical studies. Nevertheless, Borio (2014) mentioned about indicators using in construction of financial cycle that the financial cycle variables generally involve credit and asset prices especially property prices, as representing of financial constraint and perception of value and risk, respectively. At one end, the studies extensively focus on credit or called "credit cycle". At another end, the studies combine statistically many variables of financial price and quantity, or some studies call them as synthetic

financial cycles. In between, studies focused on the behavior of credit and asset price taken individually among them and other variables.

To construct the financial cycle, there are two groups of methodologies have been employed in financial cycle literature. First, frequency-based filter methodology, which defines cycles by statistically isolating financial variable fluctuations or cycles around the trend, and then identifies a “financial cycle” as a deviation from this trend. The advantage of this method is that the single frequency filtered time series are additive, it therefore a proper tool to construct a financial cycle from combined variables (Stremmel, 2015). In recent literature, there are two dominant types of frequency-base filters are utilized, the Hodrick-Prescott filter (or HP filter) and the band-pass filter (or BP filter). The cycle derived from BP filter, which is basically two-sided moving average filter, is smoother than that derived from HP filter (Stremmel, 2015). Therefore, the BP filter has been used in many literature, for example, Drehmann et al. (2012), Stremmel (2015), and Stremmel and Zsámboki (2015). Drehmann et al. (2012) applies the BP filter with five financial variables - (1) credit to the private, non-financial sector, (2) the ratio of credit to GDP, (3) equity prices, (4) residential property prices, and (5) an index of aggregate asset prices combining residential property, commercial property, and equity prices - of seven advanced economies over 1960 – 2011 with a cycle duration between 5 and 32 quarters for short-term cycles between 8 and 30 years for medium-term cycles to construct short-term and long-term financial cycles. Whereas, Stremmel (2015) and Stremmel and Zsámboki (2015) employs BP filter to derive financial cycle from credit-to-GDP ratio, and six synthetic financial cycles, which derived from credit-to-GDP and some combinations of house prices to income ratio, credit growth, house price growth, and other banking sector indicators, with the cycle duration from 8 to 32 years. Meanwhile, the one-sided HP filter, which only employs historical data, are often

used in the macro-prudential literature so that it is equipped to be handy for prudential policymaker (Stremmel, 2015). The another methodology to construct financial cycles is turning point analysis or “classical” definition of a cycle, which generally employs in the business cycle literature, focuses on changes in levels of variable, for instance the studies of Claessens et al. (2011), Claessens et al. (2012), and Drehmann et al. (2012).

The previous empirical studies of financial cycles, which dominated by the study of advanced economies, draw the similar conclusions on characteristics of financial cycles that (1) duration of financial cycles is about six quarters in short-term cycles and 20 quarters in medium-term cycle, in addition, upturns last longer downturns on average, (2) financial cycles of emerging economies are more volatile than those of advanced economies, and (3) peak of financial cycles seems to be related to crisis and period of financial distress. More specifically, the findings on duration of financial cycles can be classified into two time horizons, short-term and medium to long term. Drehmann et al. (2012), which focuses on both time horizons, finds that median of duration of short-term financial cycles is seven quarters in upturns and five quarters in downturns and that of medium-term ones is 27 quarters in upturns and 13 quarters in downturns. Claessens et al. (2011) and Claessens et al. (2012) finds that downturns lasts about five to eight quarters but upturns tend to last much longer, consistent with the finding of short-term duration of Drehmann et al. (2012). In addition, Claessens et al. (2012) indicates that the financial cycles of emerging economies are more volatile, as supported by the findings that the amplitude of financial cycles of emerging economies is statistically greater than that of advanced economies and the duration of upturns of emerging economies in some cycle measures is shorter than that of advanced economies. Meanwhile, the result of duration from the research of Stremmel and Zsámboki (2015), which finds that the median of upturn durations is 25 quarters,

longer than that of downturn durations at 14 quarters, is consistent with the medium term duration from Drehmann et al. (2012). Moreover, Drehmann et al. (2012) and Stremmel (2015) finds the relationship of peaks of financial cycles and financial distress. Stremmel (2015) concludes that peaks of financial cycles seem to be related to periods of financial distress although not every peak is associated with financial crisis. Whereas, Drehmann et al. (2012) finds that all financial crises with domestic origin occur at or close to the peak of financial cycles.

Besides capital flows, previous phase's amplitude and duration, policy regime, global and domestic condition, and banking sector structure are significant factors found in previous literature. First, the previous phase of financial cycle's duration and amplitude has been stated as one of determinants of current's amplitude and duration with the explanation that the financial boom sows the seed of the subsequent bust, as a result of vulnerabilities built up and protracted unwind (Borio, 2014). Secondly, the policy regimes in place have been mentioned as likely important to determine duration and amplitude of financial cycles; especially three factors, financial regime, monetary regime and real-economy regime (Borio, 2014). Financial liberalization weakens financing constraints, supporting the full self-reinforcing interplay between perceptions of value and risk, risk attitudes and funding conditions, the duration and amplitude are then likely to increase with higher degree of financial liberalization (Borio, 2014). Meanwhile, monetary regime that narrowly focused on controlling near-term inflation removes the need to tighten policy when financial boom takes place during low and stable inflation and bring to too-loose monetary policy stance contributable to the build-up of financial cycles by extending banks' balance sheets, triggering additional bank risk-taking and boosting credit supply (Stremmel and Zsámboki, 2015). The narrow-focus-on-inflation monetary regime and

too-loose monetary policy stance are likely to increase the amplitude and duration of financial cycles, especially in upturns. Real-economy regime, where major positive supply side developments; for example, higher degree of trade openness, and low inflation environment, raise potential growth and hence the scope for credit and asset prices with no acceleration of inflation (Borio, 2014). Thirdly, global and domestic condition can be one of determinants of amplitude and duration. The more favorable global or domestic condition will facilitate the credit expansion and asset price inflation, therefore it is expected to have positive relationship with amplitude and duration during upturns but have negative relationship during downturns, as many studies of financial cycles find the interaction of them and business cycles. Last, the banking sector or financial sector structure is the set of variables used to explain the financial cycles, especially the studies of credit cycles, because banking or financial sector structure possibly affects the risk-taking behavior and credit expansion. Moreover, a long-term gradual build-up of the cycle may swiftly reveal vulnerabilities in financial sector (Stremmel and Zsámboki, 2015).

The previous empirical studies support the importance of previous duration, policy regime, global financial condition, domestic economic condition, and banking structure in determining financial cycle's amplitude and duration. More specially, Claessens et al. (2011) studies the determinants of duration and amplitude of financial phase, using the global economic growth as proxy for global financial condition, domestic inflation rate as proxy for domestic economic dynamics, duration of previous phase, trade openness, financial openness, and dummy of post 1985 as a set of the dependent variables. It finds that all dependent variables in the study have significant effect on financial cycles, for example, (1) when the duration of the previous expansion is longer, the exit from a downturns of house price becomes less likely, (2) the duration and amplitude of financial cycle has increased markedly since the mid-1980s, where is a

good approximation for the beginning of the globalization period, (3) strong global condition immediately after the beginning of downturn make recovery of financial cycle faster, (4) greater trade and financial openness are in general associated with significant shorter downturns, and (5) inflationary pressures in the run-up to downturns make an exit less likely. The findings of increase in duration and amplitude of financial cycle since the mid-1980s are also in line with the result of Drehmann et al. (2012) which elaborates the mid-1980 as the proxy for the start of financial liberalization in advanced economies, for the establishment of monetary policy regimes more successful in controlling inflation, and for trade liberalization. However, some empirical studies conclude weak relationship with monetary policy. For example, the empirical study of Stremmel and Zsámboki (2015), utilizing the Generalized Linear Model (GLM) estimation to analyze the relationship between the financial cycle amplitude, banking sector characteristics in six areas, and monetary policy stance, suggests that the banking sector characteristics matter more than the monetary policy stance for building up of the financial cycle phase amplitude over the medium term. Meanwhile, the relationship between the financial cycle amplitude and banking sector characteristics in six areas, (1) high degree of concentration of banking sector as proxy by assets of the three largest banks as a fraction of the total banking assets, (2) high level of activity of foreign banks in domestic market as proxy by the fraction of number of foreign banks to total banks, (3) less stability of banking as proxy by higher bank deposit-to-GDP ratio and credit-to-deposit ratio (4) deeper financial system as proxy by banks' asset-to-GDP ratio and stock market capitalization-to-GDP ratio, (5) bank loans as ratio of GDP, and (6) financial integration as proxy by the ratio of BIS reporting banks' consolidated foreign claims-to-GDP, significantly increases financial cycle's amplitude.

Data and Methodology

Identifying Episodes of Extreme movements of Capital Flows

This study aims to study the characteristics and dynamics of net and gross capital flows, in term of extreme movement in both the deviation and the frequency of episode of extreme movement, and the relationship between them and the amplitude and duration of phase of financial cycles. Hence, measures of deviation of capital flows and the episodes of extreme movement are needed. Deviation over its trend are utilized from both net and gross capital flows data, express in percent of GDP, from financial account in 14 emerging economies from 1980 to the second quarter of 2015. The study employs ARIMA to derive the deviation over its trend, as recently suggests following Broto et al. (2011) and threshold following Forbes and Warnock (2012) for identifying the episodes of extreme capital flow movements. Our analysis indicates that the volatility and the extreme movement of net capital inflows in emerging economies has still been increasing and dominated by those of CIF, however, COD movements can generally reduce the pressure from CIF movement to net capital inflows, and this role has been also increasing, in line with the faster pace of COD growth despite the fact that COD sometimes, especially during stops, add more pressure on net capital inflows.

The quarterly capital flows data, both net and gross, is retrieved from financial account of IMF Balance of Payments Statistics, however, the items of capital flows consist of the direct investment, portfolio investment, financial derivatives (other than reserves) and employee stock options, and other investment, excluding reserve assets which are controlled by monetary authorities. The capital flows will be expressed in percent of GDP to eliminate the effect of different economic sizes. Due to the availability of credit-to-GDP data, the scope of the studies is 14 economies, namely Argentina, Brazil, Mexico, China, India, Indonesia, Malaysia, Thailand,

Hungary, Poland, Turkey, Russia, South Africa, and Saudi Arabia from 1980 to the second quarter of 2015¹

The summary statistics of capital flows in Table 1 shows the results that are consistent with previous empirical studies and are worth noting as follow; (1) most of emerging economies is generally recipient of net capital flows but some economies and some periods of time turned to be the contributors of net capital flows, (2) the volatility of net capital inflows has still been dominated by CIF especially in form of loans, meanwhile, COD movements can generally reduce the pressure from fluctuation of CIF movement to net capital inflows volatility, and (3) the role of COD in determining the size and volatility of net capital inflows has been also increasing, in line with the fast pace of COD growth. Generally, emerging economies are the recipients of capital flows from foreigners but the domestic agents also invest aboard with much smaller size than inflows from foreigners, except Malaysia, Russia, and Saudi Arabia. In case of Malaysia, the size of COD and CIF are close. However, in case of Russia and Saudi Arabia, the size of COD, which has been dominated by non-loan component associated with international trade of other investment, is greater than that of CIF since global financial crisis. Meanwhile, in Hungary since the global financial crisis, the foreigners and domestic agents have pulled their money back to home countries, but the size of capital outflows by foreigner is larger.

Considering the categories of CIF, the main contribution of CIF, more than half of CIF, was in form of loans during 1980s. but CIF changed to direct investment afterward, as mentioned in Broto et al. (2011). Meanwhile, almost all of COD was in term of other investment's non-loan

¹ The starting period of data in each economy is different due to data availability. The data of Brazil, India start from the first quarter of 1975. Those of Argentina and Thailand start from the first quarter of 1976. Those of Mexico, Indonesia, Turkey, and South Africa start from the first quarter of 1979, 1981, 1984, and 1985, respectively. Those of Hungary, Russia, and Malaysia start from the first quarter of 1991, 1994, and 1999, respectively. Those of Poland, China, and Saudi Arabia start from the first quarter of 2000, 2005, and 2006, respectively.

before 2000s but direct investment, portfolio investment, and loans has been growing afterward. However, direct investment growth has outpaced and becomes the main contribution of COD. Comparing the volatility indicated by the standard deviation, net capital inflows' volatility of most of emerging economies is slightly more stable than that of CIF but higher than that of COD before 1990s due to small size of COD. Since 1990s, however, the size and volatility of COD are likely to increase, despite slight drop since global financial crisis, on the other hand, those of CIF has grown in slower pace. Consequently, COD volatility turned to be greater than that of net capital inflows but still lower than that of CIF. This implies that COD movements generally reduce the pressure from fluctuation of CIF movement to net capital inflows and role of COD in determining volatility and size of net capital inflows has been increasing. Considering capital flows volatility by categories, other investments and portfolio investment of both CIF and COD have high volatility compared to direct investment consistent with most of previous literatures, except for Hungary, which volatility of direct investment of both CIF and COD has been very high since 2003. Within other investment categories, the volatility came mainly from loan component before 1990s but both loan and non-loan have contributed to volatility of other investment since then. This shows that high volatility of CIF in form of loan has still dominated the movement of net capital inflows, even its proportion has declined

[Table 1: Summary Statistics of Capital Flows (percent of GDP) is here]

The deviations of capital flows are calculated from the 4-quarter moving average of residual of ARMA(1,4), which is the methodology to derive the trend and deviation. The method is adapted from Broto et al. (2011), in order to taking persistence and quarterly seasonality into consideration. Meanwhile, the threshold for defining the episodes of extreme movements of capital flows and their terminology; namely surge and stop of net capital flows and CIF, and

flight and retrenchment of COD, are adapted from Forbes and Warnock (2012). Surge are defined as the period that deviation of net capital flows or CIF exceed its two standard deviation at least one quarter, the period begins when the deviation exceeds one standard deviation and ends when it goes back to be less than that level. Similarly, flight are defined as the period that deviation of COD exceed its two standard deviation at least one quarter, the period begins when the deviation exceeds one standard deviation and ends when it goes back to be less than that level. Meanwhile, Net capital flows or CIF stop and COD retrenchment are symmetrically defined as the period that the deviation falls below its two standard deviation on the downside at least one quarter, the period begins when the deviation falls below one standard deviation on the downside and ends when it recovers back to exceed that level

The summary statistics of deviation of capital flows indicates the same findings as the statistics of capital flow data that net capital inflows of most of emerging economies is slightly more stable than CIF but more volatile than that of COD before 2000, however, COD volatility turned to be greater than that of net capital inflows but still lower than that of CIF, as shown by the mean of absolute value of deviation in Table 2. More specifically, the mean of absolute value of deviation, as one of the measure of volatility, before 2000 of CIF is at 1.15 percent of GDP, higher than that of COD and net capital inflows at 0.66 and 1.11 percent of GDP, respectively. Meanwhile, the volatility since 2000 of all three measures of capital flows is likely to increase, especially COD.

[Table 2 Summary Statistics of the Deviation of capital flows is here]

Meanwhile, our analysis on the episodes of extreme movements of capital flows confirms the findings from the summary statistics of capital flows that the movement of net capital inflows has been dominated by that of CIF, however, movement of COD can reduce the pressure from

that of CIF to net capital inflows. The data in Table 3 shows that the extreme movement of CIF and COD happened 32 times and 41 times respectively. Meanwhile the frequency of extreme movement of net capital inflows is 31 times, less than that of COD and CIF. Moreover, data in Table 4 shows that the coincidences of the episodes of extreme movement of net capital inflows and those of only COD are rare, indeed only one of net capital flow surges coincides with COD retrenchment and two of net capital inflow stops coincides with COD flight. This implies the dominance of extreme movements of CIF in determining those of net capital inflows, consistent with the findings of Ghost et al. (2012). However, movement of COD can reduce pressure from CIF extreme movements on net capital flows movement, as shown by Table 4 that just one of CIF surges together with COD retrenchments turned to be net capital inflows surges and one CIF stops together with COD flights turned to be net capital flow stops. This finding also confirm the result of Forbes and Warnock (2012) that episodes of extreme capital inflows using gross flow data are substantially different from those using net capital inflows.

[Table 3 Summary Statistics of the episodes of the extreme movements of capital flows is here]

[Table 4 Frequency of Coincidences of Extreme Movement of Capital flows is here]

Although COD can reduce the pressure of CIF on net capital inflows, domestic agents sometimes add more pressure on net capital inflows, especially on stop side. As shown in Table 4, there are three net capital inflow stops occurred from CIF stops together with COD flights. Moreover, the average length of net capital inflow stops, as shown in Table 3, is 5.6 quarters, higher than that of CIF stops and COD flight at 3.9 and 4.5 quarters respectively. This implies that the length of net capital flow stops is possibly not only contributed from CIF stops but it was

extended from COD flight. However, the average length of net capital inflow surges, CIF surges, and COD retrenchments, at 5.7, 5.6, and 5.8 quarters respectively, is quite close.

Financial Cycles

In this study, financial cycles are constructed from credit to GDP by BP filter with 16- minimum duration of financial cycles from 14 emerging economies from 1980 to the second quarter of 2015. The result indicates that size, volatility, and dynamics of financial sector and amplitude, duration, and dynamics of financial cycle in emerging economies are somewhat different among economies. However, financial cycles of most of emerging economies are less volatile.

Due to the limitation of residential price data in emerging economies, this study will conduct the financial cycles from only credit data using quarterly BIS credit to the non-financial sector database, expressed as percent of GDP, in all available 14 emerging economies as mentioned earlier.²

The size, volatility, and dynamics of financial sector, as represented by credit to GDP, are somewhat different among emerging economies. Some economies, for instance, Hungary, China, Malaysia, and Thailand, have huge financial sector shown by average credit to GDP that far greater than 100 percent, especially Hungary and China that have credit to GDP exceed 200 percent since 2009 and 2012 respectively. All of these economies' credit to GDP, except that of Thailand, have high volatility measured by standard deviation that greater than 30 percent of

² The starting period of data in each economy is different due to data availability. The data of Malaysia and South Africa starts from the first quarter of 1975. The data of India starts from the first quarter of 1981. The data of Mexico, Argentina, and China starts from the fourth quarter of 1990, 1992, and 1995, respectively. The data of Thailand and Brazil starts from the first quarter of 1997 and 1998, respectively. The data of Hungary starts from the fourth quarter of 1998. The data of Poland starts from the first quarter of 1999. The data of Russia and Saudi Arabia starts from the fourth quarter of 1999. The data of Turkey and Indonesia starts from the first and four quarter of 2001, respectively.

GDP. However, coefficient of variation, which taking the size into consideration, indicates that the credit-to-GDP volatility of these economies is not such high, averaging at about 20 percent, and closes to that of other economies with smaller credit to GDP. But coefficient of variation shows that Argentina and Saudi Arabia have high volatility with greater than 40 percent. In case of Argentina, the credit to GDP dramatically surged from about 70 percent of GDP to nearly 200 percent of GDP during crisis in 2001 to 2003, and substantially dropped in the late of the crisis until it reached pre-crisis level in 2006. Meanwhile, Saudi Arabia's credit to GDP had downward trend since our oldest data in 1999 from about 140 percent of GDP to 40 percent of GDP in 2012, but slightly pickup afterward. Meanwhile, most of economies have the upward trend of credit to GDP. However, credit to GDP in some economies, for example Indonesia, Thailand, and Russia, declined during Asian financial crisis, and have been increased afterward but never reaches to their high pre-crisis level. (More detail in Appendix 1: Figures of Credit to GDP and Financial cycles)

[Table 5 Summary Statistics of Credit to GDP is here.]

The BP filter will be employed to derive financial cycle following Stremmel (2015), however, 16-minimum duration of financial cycles, which is shorter than that in Stremmel (2015) and Drehmann et al. (2012) for medium-term cycle, will be applied. The justification of shorter duration in this study is that financial cycles in emerging economies are more volatile than those in advanced economies, which are the scope of both studies, as found by study of Claessens et al. (2012) and the shorter-duration financial cycles seem to slightly better capture the financial cycle in emerging economies, for example, peak of financial cycle and crisis time, identified by Laeven and Valencia (2013), in India and China as shown in appendix 1.

Average duration and amplitude of financial phase in Table 6 shows that (1) amplitude, duration, and dynamics of financial cycle in emerging economies are somewhat different among economies, possibly as a result of differences in characteristics of financial sector and (2) the duration of financial phase of emerging economies is about 7 – 21 quarters on average without obvious difference between upturns and downturns. Considering average of duration of financial cycles in Table 6 shows that the characteristics of financial cycles of emerging economies are somewhat different, for example, the wide range of average duration and amplitude of financial cycles in our sample. The average duration of financial cycles of each economy is varying from about 7 – 18 quarters in upturns and 7.5 – 21 quarters in downturns, consistent with results of previous studies in both short term and medium term. However, the indifference of duration in upturns and downturns is contrasting with previous study findings of longer duration of upturns, this possibly reflects the prolonged crisis recovery in emerging economies. Meanwhile, the average amplitude is varying from 1.9 – 34.3 percent of GDP.

[Table 6 Average Amplitude and Duration of Financial Cycles is here]

The dynamics of financial cycles are to some extent different. However, financial cycles of most of emerging economies are less volatile, as shown by the comparison of before 2003 and since then that finds the longer duration, or the less amplitude, or both. However, financial cycles of some economies, for example, Argentina, Brazil, Indonesia, and Hungary, have longer duration and greater amplitude. On the other hand, financial cycles of India and Saudi Arabia, are more volatile reflected by the shorter duration and greater amplitude. This possibly due to differences in characteristics of financial sectors as roughly shown by the differences in credit to GDP.

Capital Flows and Financial Cycles

The study of average of deviation and the episodes of extreme movements of capital flows during each phase of financial cycles shows that the size of net capital inflows on average of upturns and downturns is not substantially different but gross flows decline during downturns. Meanwhile, the stops and flights are involved with crises, as stops and flights normally occurred around the peak of financial cycles and the length of stops is likely to be longer during crises. In contrast, the extreme movements of capital inflows rarely happened during peaks or crises. Moreover, comparing the average amplitude and duration of financial phase with and without the episode of extreme movement of capital flows signals the effect of periods of extreme movements of capital flows of both in net and gross term during downturns, but questionable figures of data during upturns.

The average of deviation of capital flows during each phase in Table 2 shows that the size of net capital inflows on average of upturns and downturns is not substantially different but gross flows decline during downturns. More specifically, the average of deviation of CIF and COD is positive during both upturn and downturn albeit smaller size during downturns. Meanwhile, the deviation of net capital inflows is close to zero during upturns and slightly negative during downturns. This finding is consistent with the findings of Broner et al. (2013) that both gross flows both from foreigner and domestic agents are pro-cyclical and net capital flows decline in middle-income countries during crisis.

Crises, defined by Laeven and Valencia (2013), involved with stops and flights, in addition, the episodes of net capital inflow and CIF stops are likely to be longer during crises time. As shown in Table 3 that the net capital inflow stops, CIF stops, and COD flights, occurred eight, six, and four times during crises – or about half of the number of net capital inflow stops

and CIF stops and about one sixth of the number of COD flights. Meanwhile, there are only two COD retrenchments occurred during crises. The example of crisis involved extreme capital outflows are Indonesia and Thailand during Asian financial crisis in 1997-2001, Argentina in 2001-2003, Turkey in 2000-2001, and Hungary and Russia during global financial crisis and European sovereign debt crisis since 2008. The net capital inflow stops during crises came from both foreigners and domestic agents in some cases, for example Thailand, Argentina, and Turkey. However, in some cases the net capital inflow stops occurred only with CIF stops, e.g. Indonesia, and in some cases the net capital inflow stops occurred only with CIF retrenchments, i.e. Hungary and Russia. Meanwhile, the average length of net capital inflow stops and that of CIF stops during crises at 6.8 and 5.9 quarters respectively greater than those in normal period at 4.6 and 3.1 quarters, respectively. Furthermore, the extreme movement of capital flows over the phase of financial cycles confirms that the extreme movement of capital outflows occurred around crises or peaks, as shown by 16 out of 17 of net capital flow stops, 14 out of 16 of CIF stops, and 25 out of 28 of COD flights occurred during upturns, peaks, and downturns. In contrast, the extreme movements of capital inflows rarely happened during peaks or crises as shown by none of net capital inflows surge, two out of 16 of CIF surge, and one out of 13 of COD retrenchment occurred during peaks.

However, comparing the average amplitude and duration of financial phase with and without the episodes of extreme movement of capital flows in Table 7 signals the effect of periods of extreme movements of capital flows of both in net and gross term. During the downturns, the extreme capital inflows; namely the net capital inflows surges, COD retrenchments, and CIF surges since 2003, are likely to reduce the amplitude because the capital inflows can alleviate the stress in credit and asset markets, however, they are likely to lengthen

the duration due possibly to delay of downturn solution from taking inflows as signals of ending of downturns. Meanwhile, the extreme capital outflows; including the net capital inflows stops, CIF stops, and COD flights, are likely to increase the amplitude as a result of worsening the stress in credit and asset market albeit no obvious change in duration. During upturns, the extreme capital inflows are likely not to affect the duration and amplitude, but the extreme capital outflows are likely to increase amplitude, this finding is very questionable and contrasting with our understanding. Consequently, formal regression analysis need to be utilized to control for other possible factors.

[Table 7 of Amplitude and Duration of Financial Cycles During the Episodes of Extreme Movements in Capital flows is here]

Methodology and Other Control Variables

To explore the relationship between capital flows, in term of deviation and the frequency of the episodes of extreme movements, and financial cycle's amplitude and duration, Generalized Linear Model (GLM) estimation with clustered standard deviation will be employed. Besides, the variables of capital flows, the set of control variables includes variables as proxy for previous phase amplitude or duration, global and domestic economic condition, policy regimes, in line with Claessens et al. (2011), and adds banking sector structures following Stremmel and Zsámboki (2015), as detailed in Appendix 2. However, many variables are likely theoretically and statistically to be high correlated as shown in Appendix 3. Therefore, few variables, i.e. trade openness, world economic growth, and bank's credit-to-deposit ratio, are included in regression to avoid multicollinearity problem.

This study explores first the relationship between the deviation of capital flows and financial cycle's amplitude and duration as follow, and run three set of regressions; (1) the whole

sample (2) the phase before 2003, and (3) the phase since 2003 to roughly investigate the dynamics of relationship as less volatile financial cycles in most of emerging economies in our sample.

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + \beta_3 wrld + \beta_4 wrld * phase\ dummy + \beta_5 bnk + \delta_1 dvt_i + \delta_2 dvt_i * phase\ dummy$$

Whereas, y_j denotes dependent variables j , where j = amplitude and duration

$y_{j,-1}$ denotes dependent variables j in previous phase, where j = amplitude and duration

trd denotes trade openness, average over the phase

$wrld$ denotes world economic growth, average over the phase

bnk denotes bank's credit-to-deposit ratio, average over the phase

$phase\ dummy$ denotes phase of financial cycles which equals to one when it is in upturns and equals to zero when it is in downturns.

dvt_i denotes the average of deviation over its trend of capital flow measure i ,

where i = net capital inflows, CIF, and COD

In other word, the equation of downturns, or when phase dummy equals to zero, is

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + \beta_3 wrld + \beta_5 bnk + \delta_1 dvt_i$$

And the equation of upturns, or when phase dummy equals to one, is

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + (\beta_3 + \beta_4) wrld + \beta_5 bnk + (\delta_1 + \delta_2) dvt_i$$

Moreover, this study also explores the relationship between the frequency of the episode of each types of extreme capital flows movement and financial cycle's amplitude and duration by estimation of twelve equations with the same set of control variables as the regression on the deviation.

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + \beta_3 wrld + \beta_4 wrld * phase\ dummy + \beta_5 bnk + \gamma_1 xtrm_i \\ + \gamma_2 xtrm_i * phase\ dummy$$

Whereas, $xtrm_i$ denotes the proportion of period that facing extreme movements i during each phase, where i = net capital inflow surges, CIF surges, COD retrenchments, net capital inflow stops, CIF stops, and COD flights.

In other word, the equation of downturns, or when phase dummy equals to zero, is

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + \beta_3 wrld + \beta_5 bnk + \gamma_1 xtrm_i$$

And the equation of upturns, or when phase dummy equals to one, is

$$y_j = \beta_0 + \beta_1 y_{j,-1} + \beta_2 trd + (\beta_3 + \beta_4) wrld + \beta_5 bnk + (\gamma_1 + \gamma_2) xtrm_i$$

As above equation, dependent variables in our study is the amplitude and duration of financial phases. As stated earlier, the amplitude is the magnitude of change from a trough to the next peak in case of upturns, on the other hand, the amplitude of downturn is the magnitude of change from a peak to the next trough. Meanwhile, the duration is the quarters take in each phase. As shown in equations above, the amplitudes of both upturns and downturns are included in the same equation, but imposing the interaction terms of some independent variables and dummy of financial phase are used to separate the possible different effect during upturns and downturns.

On the side of independent variables, the control variables consist of trade openness, world economic growth and their interaction with phase dummy, and bank's credit to deposit. Trade openness, as measured by the summation of export of goods and services and import of goods and services in term of percentage of GDP, is the proxy for real economy regime. We expected the positive relationship of trade openness and financial phase' amplitude and duration because the higher trade openness raises potential growth and hence the scope for credit and

asset prices without inflationary pressure. World economic growth, as proxy for global financial and economic condition, is expected to differently affect financial cycles in upturns and downturns. The more favorable global financial and economic condition will facilitate the credit expansion and asset price inflation, therefore the world economic growth is expected to have positive relationship with amplitude and duration during upturns, but have negative relationship during downturns. Bank's credit-to-deposit, as proxy for less stability of banking, is expected to increase financial phase's amplitude, as found in Stremmel and Zsámboki (2015).

Three types of the deviation of capital flow and all six measures of the proportion of periods that facing extreme movements of capital inflows during each phase, and the interaction terms of them with dummy of financial phase are independent variables in our interest. As mentioned in literature review, extreme capital inflows can fuel the reinforcing of credit expansion and asset price inflation, extreme capital inflows then are expected to increase amplitude and duration during upturns. However, extreme capital inflows during downturns possibly alleviate the credit slowdown and asset price deceleration, extreme capital inflows then are expected to decrease amplitude and duration. Consequently, the higher average of deviations of net capital inflows and CIF, representing the extreme inflows, is expected to decrease amplitude and duration during downturns or δ_1 is expected to be negative. Meanwhile, it is expected to increase them during upturns or $\delta_1 + \delta_2$ is expected to be positive. In contrast, the higher average of deviation of COD, representing the extreme outflows by domestic agents, is expected to increase amplitude and duration during downturns or δ_1 is expected to be positive. Meanwhile, it is expected to decrease them during upturns or $\delta_1 + \delta_2$ is expected to be negative. The frequency of facing the extreme movement of net capital inflow surges, CIF surges, and COD retrenchments, as the extreme inflows, is expected to decrease the amplitude and duration

during downturns or γ_1 is expected to be negative, and expected to increase amplitude and duration during upturns or $\gamma_1 + \gamma_2$ is expected to be positive. In contrast, net capital inflow stops, CIF stops, and COD flights are expected to have positive relationship with amplitude and duration during downturns or γ_1 is expected to be positive and have negative relationship during upturns or $\gamma_1 + \gamma_2$ is expected to be negative.

Moreover, to check the robustness of our result, all regressions will be re-estimated using the data from only ten economies by removing four economies, i.e. Malaysia, Russia, Saudi Arabia, and Argentina, because the characteristics of capital flows of the first three economies are to some extent different from others, as they are not always the recipient of capital flows, and Argentina's amplitude of financial phase is quite large compared to others. Furthermore, the equations of 14 economies with more than one type of extreme movements will be estimated to control for the effect of another type of extreme movements incident in the same phase.

Regression Results and Discussion

The key finding from the regressions is that the emerging economies in general tend to be more resilient in facing the fluctuation of capital inflows, measured in term of the size and the frequency of facing extreme inflows, nevertheless, both net capital inflows and CIF tend possibly to somewhat affect financial cycle in case of frequent extreme outflows.

The baseline regressions on the deviation of net capital inflows, CIF, and COD with the whole sample in Table 8.1, shows that only deviation of net capital inflows statistically affects the amplitude, as the higher deviation of net capital inflows increase the amplitude during upturns, but the result is not robust. However, before-2003 subsample baseline regressions show that the deviation of net capital inflows, CIF, and COD statistically significant related to amplitude subsample models but they are all statistically significant in since-2003 subsample

baseline regressions. More specifically, before-2003 subsample models show the same result of deviation of net capital inflows as whole sample model. Meanwhile, the higher deviation of CIF on average, the statistically significantly lower amplitude of upturns, but the result is not robust and insignificantly amplify amplitude of downturns. On the other hands, the higher deviation of COD, the statistically significantly higher amplitude during downturns and the result is robust, but insignificant lower amplitude during upturns. Despite the statistical significance of the deviation of capital flows on financial cycle's amplitude, the deviation of capital flows does not statistically affect financial cycle duration, as shown in Table 8.1 (More detail on baseline regressions and robustness check regressions are in Appendix 4 and Appendix 5)

[Table 8 Summarize of Regression Result is here]

The above regression results probably imply that the emerging economies' financial cycles was sensitive to capital inflows in the past, but the emerging economies in some economies tend to be more resilient in facing the fluctuation of capital flows. This result is in line with our data that the financial cycle in most of emerging economies are likely to less volatile, in contrast to capital flows. This is due possibly to the strengthening domestic economic and political stability, the development of structural and institutional characteristics, and the effectiveness of combination of policy tools implemented to handle with the fluctuation of capital flows.

Statistically insignificance of deviation of net capital inflows and CIF over the whole sample is somewhat in line with the result of the baseline regressions on frequency of extreme movement that the frequency of CIF surges and net capital inflow surges does not statistically significantly affect the amplitude and duration of financial phase, as shown in Table 8.2. This

supports that the emerging economies are to some degree resilient to extreme capital inflows, measured in term of the size and the frequency of facing extreme inflows.

However, net capital flow stops statistically significantly increase downturn's amplitude, interpreting as the net capital flow stop can worsen downturns of financial cycle. In addition, net capital flow stops decrease upturn's duration but the result is not robust, showing the possibility of net capital flow stops in shortening the length of financial upturns, as the trigger of the peak of financial cycle. Meanwhile, CIF stops statistically significantly increase the amplitude the whole cycles but the results are not definitely robust. The result differs from the expectations but consistent with the data comparing the average amplitude with and without the episodes of extreme capital flow movements. The possible explanation why frequent CIF stops relating to the higher upturn amplitude is that CIF stops during upturns possibly trigger the concern of policymaker on upcoming downturns or crisis, consequently, the excessive policies are probably implemented to induce the capital inflows. In conclusion, the results imply that net capital flows and CIF tend possibly to somewhat affect financial cycle in case of frequent extreme outflows.

The regressions of the frequency of periods of extreme movement of COD on amplitude and duration show some relationships but the result is questionable because the effect in some parts are different from expected, moreover, COD has still been relatively small. The results probably suffer reverse causality or the results refer the behavior of COD during phase of financial cycles. For instance, the more frequent COD flight, the statistically significantly lower amplitude and duration of the whole cycle, meanwhile, the more frequent COD retrenchment, the statistically significantly longer duration of downturn. The possible explanation is that during the mild domestic financial downturns, domestic agents can keep on, or even increase, their

investment abroad but domestic agents may need to withdraw their money back if the domestic financial downturn is prolonged.

Considering other variables, most of the results are as expected, although the results are not definitely robust. The regressions indicate that the amplitude and duration statistically significantly depends on the previous phase's level robustly. Meanwhile, better world economic growth statistically significant increase upturn amplitude and duration, in addition, decrease the duration of downturns. Moreover, trade openness and bank's credit to deposit have significantly positive relationship with the amplitude of financial cycle despite the fact that the result is not completely robust, but they insignificant increase the duration.

Conclusion

This study aims to study the characteristics and dynamics of net and gross capital flows in term of extreme movements in both the deviation and the frequency of episodes of extreme movements using ARIMA model and the relationship between them and the amplitude and duration of financial cycles in emerging economies. Our analysis on capital flows indicates that the volatility, as measured by deviation, and the extreme movements of net capital inflows in emerging economies has been increasing and dominated by those of CIF. Although the size of COD has still been small relatively to CIF, COD movements can generally reduce the pressure from CIF movement to net capital inflows, and this role has been also increasing, in line with the pace of COD growth. This finding are somewhat supportive of capital liberalization on outflow from residents. However, this study also finds that COD sometimes add more pressure on net capital inflows, especially during stops. Moreover, the stops and flights are mostly involved with financial distresses or crises, as stops and flights normally occurred around the peak of financial cycles and the length of stops is likely to be longer during crises. This probably is one of the

concern on capital liberalization on outflow from residents, however, the proper and timely macroeconomic policies to reduce the uncertainty and panic during financial distresses and prompt action in case of extreme outflows may help to relieve this concern.

The key finding from the regression analysis is that the emerging economies in general tend to be more resilient in facing the fluctuation of capital inflows as shown by insignificant of deviation of net capital inflows and the frequency of surges in determining amplitude and duration of financial cycles in since-2003 subsample model, nevertheless, both net capital inflows and CIF tend possibly to somewhat affect financial cycle in case of frequent extreme outflows. The finding of more resilient of financial cycle in response to extreme movement of capital flows, especially surges, is probably considered as evidence of effectiveness of the combination of policies implemented in the past, such as macroeconomic policies, prudential regulations, and structural and institutional reforms, to strengthen the economic absorption to shock, and to avoid buildup in macroeconomic and financial sector vulnerability.

Tables

Table 1 Summary Statistics of Capital Flows of Emerging Economies in the Sample (percent of GDP)

	Whole period			Sub period							
	Q1 1975 – Q3 2015			Q1 1975 – Q4 1993		Q1 1994 – Q4 2002		Q1 2003 – Q4 2008		Q1 2009 – Q3 2015	
	Median	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Overall											
Net capital inflows	2.50	2.40	5.43	2.92	3.79	1.85	5.90	2.94	6.59	1.79	5.60
Capital inflows by foreigners	3.76	4.32	8.01	3.37	3.85	3.58	5.86	7.42	12.42	3.66	8.72
Of which direct investment	1.43	2.25	5.71	0.73	1.06	2.32	3.12	4.48	9.44	2.30	6.62
- exclude Hungary	1.32	1.80	2.01	0.63	0.70	1.88	2.49	2.47	1.80	2.43	1.81
Of which portfolio investment	0.41	1.18	3.85	0.71	2.68	1.20	4.65	1.28	4.50	1.74	3.58
Of which other investment	1.10	1.25	4.47	1.93	3.79	0.14	4.89	2.05	5.25	0.77	3.71
- loans	0.57	0.81	3.51	1.78	3.22	0.01	3.81	0.67	3.88	0.40	2.82
Of which financial derivatives	0.00	-0.29	1.17	0.00	0.00	-0.09	0.57	-0.38	1.41	-0.85	0.00
Capital outflows by residents	1.01	2.06	6.52	0.45	1.63	1.97	3.76	4.90	10.59	1.87	7.62
Of which direct investment	0.19	0.93	5.42	0.05	0.18	0.36	1.13	2.69	9.63	1.24	0.12
- exclude Hungary	0.18	0.65	1.46	0.05	0.18	0.30	1.22	1.06	1.83	1.38	1.88
Of which portfolio investment	0.01	0.40	1.34	0.09	0.87	0.37	1.17	0.60	1.70	0.71	1.59
Of which other investment	0.48	1.11	3.09	0.31	1.34	1.33	3.47	1.98	4.43	1.20	2.66
- loans	0.02	0.08	1.25	0.06	0.93	-0.08	1.74	0.32	1.38	0.04	0.80
Of which financial derivatives	0.00	-0.29	1.20	0.00	0.00	-0.09	0.67	-0.37	1.37	-0.87	1.95
Malaysia											
Net capital inflows	0.17	-0.01	9.14	n.a.	n.a.	0.17	4.79	-0.06	12.43	-0.09	7.84
Capital inflows by foreigners	3.86	3.76	11.60	n.a.	n.a.	7.72	2.12	4.77	14.41	n.a.	n.a.
Capital outflows by residents	8.18	9.80	6.50	n.a.	n.a.	7.72	5.38	10.30	6.47	n.a.	n.a.
Russia											
Net capital inflows	-2.33	-2.00	7.05	n.a.	n.a.	-2.23	7.20	-0.33	9.23	-3.12	3.68
Capital inflows by foreigners	3.61	4.22	6.69	n.a.	n.a.	2.53	5.78	9.21	7.15	1.96	5.00
Capital outflows by residents	6.86	6.22	5.37	n.a.	n.a.	4.75	5.28	9.55	4.98	5.17	4.63
Saudi Arabia											
Net capital inflows	-2.48	-1.76	6.17	n.a.	n.a.	n.a.	n.a.	1.67	6.43	-3.35	5.47
Capital inflows by foreigners	2.79	4.29	4.21	n.a.	n.a.	n.a.	n.a.	6.44	3.20	3.29	4.29
Capital outflows by residents	6.29	6.05	4.47	n.a.	n.a.	n.a.	n.a.	4.76	5.20	6.64	4.06

Source: Balance of Payment, IMF

Note: The starting period of data in each economy is different due to data availability. The detail is mentioned in footnote 1

Table 2 Summary Statistics of the Deviation of Capital Flows

	Capital inflows from foreigners			Capital Outflows from Domestic Agents			Net capital flows		
	mean (mean of absolute value)	minimum	maximum	mean (mean of absolute value)	minimum	maximum	mean (mean of absolute value)	minimum	maximum
All sample	(1.74)	-25.47	49.94	(1.25)	-27.20	49.04	(1.45)	-14.50	9.22
before 2000	(1.15)	-8.38	8.81	(0.66)	-5.71	4.70	(1.11)	-7.42	9.22
since 2000	(2.36)	-25.47	49.94	(1.88)	-27.20	49.04	(1.79)	-14.50	8.53
Average over phase									
All sample	0.06	-13.21	15.45	0.22	-9.73	15.21	-0.03	-6.64	3.50
upturns	0.11	-10.84	15.45	0.28	-3.79	15.21	0.004	-6.64	3.21
downturns	0.01	-13.22	12.49	0.16	-9.73	8.62	-0.05	-5.43	3.50

Table 3 Summary Statistics of the Episodes of Extreme Movements of Capital Flows

	Net Capital inflows		Capital inflows by foreigners		Capital outflows by domestic agents	
	surge	stop	surge	stop	retrenchment	flight
Classified by time period						
No of extreme movement	14	17	16	16	13	28
- before 2000	3	7	5	8	2	5
- since 2000	11	10	11	8	11	23
Average length	5.7	5.6	5.6	3.9	5.8	4.5
- before 2000	8.0	6.3	6.0	4.8	7.0	3.8
- since 2000	5.1	5.1	5.4	3.0	5.5	4.7
Minimum length	4	2	1	1	4	1
Maximum length	10	14	10	10	10	10
Classified by time period						
No of extreme movement						
- during crisis	0	8	0	6	2	4
- no crisis	14	9	16	10	11	24
Average length						
- during crisis	-	6.8	-	5.2	4.0	3.3
- no crisis	5.7	4.6	5.6	3.1	6.1	4.8
Classified by stage of financial cycle						
No of extreme movement						
- upturn	6	3	6	3	5	6
- peak	0	4	2	4	1	6
- down	4	5	6	2	3	11
- trough	2	1	1	2	3	3
Average length						
- upturn	4.8	3.3	5.5	2.7	5.8	5.5
- peak	-	6.8	7.5	3.8	5.0	4.7
- down	5.3	7.0	4.2	7.0	4.3	3.7
- trough	8.0	9.0	9.0	2.5	8.0	6.7

Note: Crisis date comes from Laeven and Valencia (2013)

Table 4 Frequency of Coincidences of Extreme Movement of Capital flows

	Inflows		outflows	
	surge defined by net capital inflows	no extreme movement in net capital inflows	stop defined by net capital inflows	no extreme movement in net capital inflows
extreme movement in same direction of CIF and COD	1	-	3	-
extreme movement in only CIF	5	3	6	3
extreme movement in CIF but different direction of that in COD	1	6	1	3
extreme movement in only COD	1	7	2	16
extreme movement in COD but different direction of that in CIF	-	3	-	6
no extreme movement of CIF and COD	6		5	

Table 5 Summary Statistics of Credit to GDP

	first observation	since 1975	1975-1993	average			Maximum	Minimum	Standard deviation	Coefficient of variation
				1994-2002	2003-2008	2009-2015Q2				
Argentina	1992 Q4	74.1	47.9	76.5	96.0	55.7	199.2	45.0	34.5	0.47
Brazil	1998 Q1	109.8	-	96.6	105.1	124.3	142.9	77.2	14.5	0.13
Mexico	1990 Q4	57.7	62.3	60.1	46.8	62.0	86.2	44.0	10.8	0.19
China	1995 Q4	163.7	-	134.6	157.0	202.3	243.7	107.7	33.0	0.20
India	1981 Q1	106.4	91.0	101.2	125.4	127.1	132.0	72.1	17.2	0.16
Indonesia	2001 Q1	65.9	-	92.0	70.2	56.8	98.5	49.9	13.1	0.20
Malaysia	1975 Q1	156.4	137.9	178.6	161.9	174.7	201.1	70.4	35.5	0.23
Thailand	1997 Q1	137.4	-	156.6	121.3	134.5	188.8	112.8	20.0	0.15
Hungary	1998 Q4	166.1	-	115.5	154.5	209.8	229.1	109.8	40.1	0.24
Poland	1999 Q1	105.2	-	79.1	96.7	129.1	136.0	72.7	21.3	0.20
Turkey	2001 Q1	92.9	-	101.7	83.7	98.6	114.5	77.3	10.0	0.11
Russia	1999 Q4	73.4	-	92.9	61.4	74.7	139.8	50.9	15.9	0.22
South Africa	1999 Q4	99.1	91.9	105.3	99.8	111.3	121.2	83.2	8.9	0.09
Saudi Arabia	1975 Q1	80.0	-	126.7	84.4	52.6	139.1	41.5	32.1	0.40
all		106.3	-	108.4	104.6	115.6	243.7	41.5	21.9	0.21

Source: BIS Credit to the non-financial sector database

Table 6 Average Amplitude and Duration of Financial Cycles

	upturns					downturns				
	No.	before 2003		since 2003		No.	before 2003		since 2003	
		average amplitude	average duration	average amplitude	average duration		average amplitude	average duration	average amplitude	average duration
Argentina	4	25.1	11.0	31.9	13.0	4	20.1	7.0	34.3	15.0
Brazil	3	2.9	7.0	7.2	12.0	3	4.7	10.0	4.9	21.0
Mexico	4	7.1	11.3	7.8	13.0	5	7.0	7.7	6.6	13.5
China	3	13.9	11.0	14.0	12.0	3	14.9	12.0	14.0	12.5
India	5	2.1	14.0	2.1	12.5	5	1.9	15.0	2.6	13.0
Indonesia	3	-	-	2.9	10.0	3	2.0	6.0	2.6	9.5
Malaysia	7	14.2	11.8	12.7	13.0	7	14.9	11.2	12.4	13.5
Thailand	3	15.6	10.5	3.7	15.0	2	22.3	11.0	8.4	18.0
Hungary	4	6.4	9.5	12.6	11.5	3	5.3	9.0	14.9	11.0
Poland	2	8.3	12.0	6.5	13.0	2	-	-	6.7	16.0
Turkey	2	-	-	3.8	10.5	3	10.1	12.0	4.1	7.5
Russia	3	15.5	11.0	8.5	12.0	3	13.3	8.0	10.2	12.0
South Africa	7	5.1	11.2	3.9	17.0	7	5.3	10.7	4.9	15.0
Saudi Arabia	2	3.7	18.0	16.6	12.0	3	4.8	13.0	12.9	8.5
all	52	2.9 – 25.1	7 – 18	3.7 – 31.9	7 – 15	53	1.9 – 20.1	10 – 17	4.1 – 34.3	7.5 – 21

Table 7 Average of Amplitude and Duration of Financial Cycles During the Episodes of Extreme Movements in Capital flows

		upturns		downturns	
		with	without	with	without
net capital inflows surge	all	8.0 (12.6)	9.6 (11.5)	5.6 (14.0)	10.2 (11.4)
	before 2003	13.8 (12.0)	9.9 (11.2)	5.5 (12.5)	8.8 (10.3)
	since 2003	7.2 (12.7)	9.0 (11.8)	5.8 (15.0)	11.5 (12.4)
net capital inflows stop	all	13.8 (11.9)	8.0 (11.6)	10.6 (11.0)	9.5 (11.9)
	before 2003	26.6 (10.7)	7.5 (11.4)	11.3 (10.0)	7.6 (10.7)
	since 2003	7.3 (12.5)	8.8 (12.0)	9.7 (12.3)	11.0 (12.8)
CIF surge	all	8.5 (12.2)	9.4 (11.5)	10.9 (13.5)	9.4 (11.3)
	before 2003	8.7 (11.0)	10.3 (11.3)	14.8 (12.3)	7.4 (10.2)
	since 2003	8.4 (12.7)	8.0 (11.8)	8.6 (14.2)	11.4 (12.3)
CIF stop	all	20.4 (11.8)	7.3 (11.6)	18.7 (10.4)	8.5 (11.8)
	before 2003	34.4 (10.0)	7.7 (11.4)	12.5 (8.3)	7.8 (10.9)
	since 2003	13.3 (12.8)	6.7 (11.9)	27.9 (13.5)	9.1 (12.7)
COD retrenchment	all	9.7 (13.0)	9.1 (11.3)	8.6 (13.2)	10.0 (11.2)
	before 2003	12.4 (13.3)	9.6 (10.8)	8.1 (11.0)	8.5 (10.4)
	since 2003	7.0 (12.8)	8.4 (11.9)	8.8 (14.1)	11.6 (12.1)
COD flight	all	10.2 (12.3)	8.8 (11.4)	10.7 (12.4)	9.2 (11.4)
	before 2003	30.3 (12.0)	8.1 (11.2)	12.2 (10.0)	8.0 (10.6)
	since 2003	5.8 (12.3)	10.2 (11.9)	10.4 (12.8)	11.1 (12.7)

Note: The figures are the average amplitude and the numbers in parentheses are average duration.

Table 8 Summarize of Regression Results**Table 8.1 The summarize of regression results amplitude (A) and duration (D) of financial cycles on the deviation of capital flows**

capital flows	phase of financial cycle	expected sign	Whole Sample				Before 2003				Since 2003			
			baseline		robust		baseline		robust		baseline		robust	
			A	D	A	D	A	D	A	D	A	D	A	D
Net capital inflows	downturns	-	×	×	×	×	×	×	×	×	×	×	×	×
Net capital inflows	upturns	+	+	×	×	×	+	×	+	×	×	×	×	×
CIF	downturns	-	×	×	×	×	-	×	×	×	×	×	×	×
CIF	upturns	+	×	×	×	×	×	×	×	×	×	×	×	×
COD	downturns	+	×	×	×	×	+	×	+	×	×	×	-	×
COD	upturns	-	×	×	×	×	×	×	-	×	×	×	+	×

Table 8.2 The summarize of regression results amplitude (A) and duration (D) of financial cycles on the frequency of the episodes of extreme movements of capital flows

capital flows	phase of financial cycle	expected sign	baseline		Robust (10 economies)		Robust (2 types of extreme movement of capital flows)	
			A	D	A	D	A	D
Net capital inflows surges	downturns	-	×	×	×	×		
Net capital inflows surges	upturns	+	×	×	×	×		
Net capital inflows stops	downturns	+	+	×	+	×		
Net capital inflows stops	upturns	-	×	-	×	×		
CIF surges	downturns	-	×	×	-	×	xx	xx
CIF surges	upturns	+	×	×	-	×	xx	xx
CIF stops	downturns	+	+	×	×	×	++x	xxx
CIF stops	upturns	-	+	×	+	×	++x	xxx
COD retrenchment	downturns	-	×	+	×	×	xxx	+++
COD retrenchment	upturns	+	+	×	+	×	+xx	xxx
COD flight	downturns	+	-	×	-	-	--	xx
COD flight	upturns	-	-	-	-	-	--	--

Note: + denotes positive coefficient with 0.1 level of significance, - denotes negative coefficient with 0.1 level of significance and × denotes statistical insignificance

References

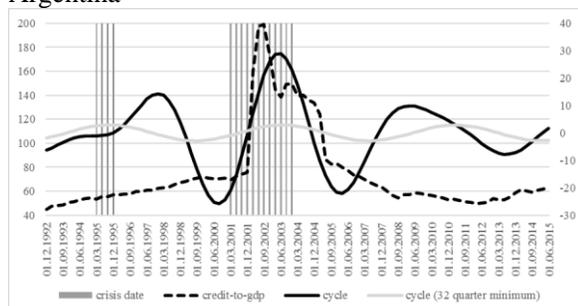
- Aikman, D., Haldane, A. G., & Nelson, B. D. (2015). Curbing the Credit Cycle. *The Economic Journal*, 1072-1109.
- Avouyi-Dovi, S., & Matheron, J. (2005). Interactions between Business Cycles, Financial Cycles, and Monetary Policy: Stylised Facts. *BIS papers No.22*.
- Borio, C. (2014). The Financial Cycle and Macroeconomics: What have we learnt? *Journal of Banking and Finance*, 182-198.
- Broner, F., Didier, T., Erce, A., & Schmukler, S. L. (2013). Gross Capital Flows: Dynamics and Crises. *Journal of Monetary Economics*, 113-133.
- Broto, C., Díaz-Cassou, J., & Erce, A. (2011). Measuring and Explaining the Volatility of Capital Flows towards Emerging Countries. *Journal of Banking and Finance*, 1941-1953.
- Calvo, G., Alejandro, I., & Mejía, L.-F. (2004). On the Empirics of Sudden Stops: the Relevance of Balance Sheet Effects. *NBER Working Paper 10520*.
- Claessens, S., & Ghosh, S. R. (2013). Capital Flow Volatility and Systemic Risk in Emerging Markets: The Policy Toolkits. In *Dealing with the Challenges of Macro Financial Linkages in Emerging Markets*. World Bank Studies.
- Claessens, S., Kose, M. A., & Terrones, M. E. (2011). Financial Cycles: What? How? When? *IMF working paper 11/76*.
- Claessens, S., Kose, M. A., & Terrones, M. E. (2012). How do Business and Financial Cycles Interact? *Journal of International Economics*, 178-190.
- Drehmann, A., Borio, C., & Tsatsaronis, K. (2012). Characterising the Financial Cycle: Don't Lose Sight of the Medium term. *BIS Working Paper No. 380*.

- Forbes, K. J., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of International Economics*, 235-251.
- Ghosh, S. R. (2010). Dealing with the Challenges of Capital Inflows in the Context of Macrofinancial links. *Economic Premise, the World Bank*.
- Ghost, A. R., Kim, J., Qureshi, M. S., & Zalduendo, J. (2012). Surges. *IMF Working Paper* 12/22.
- IMF. (2011, April). International Capital Flows: Reliable or Fickle? *Tension from the Two-Speed Recovery: Unemployment, Commodities, and Capital Flows*, p. Chapter 4.
- IMF. (2013). *The Sixth Edition of the IMF's Balance of Payments and International Investment Position Manual (BPM6)*.
- Kaminsky, G. K. (2005, December). International Capital Flows, Financial Stability and Growth. *DESA Working Paper No.10*.
- Laeven, L., & Valencia, F. (2013). Systemic Banking Crises. In S. Claessens, M. A. Kose, L. Laeven, & F. Valencia, *Financial Crises: Causes, Consequences, and Policy Response* (pp. 61-138).
- Stremmel, H. (2015). Capturing the Financial Cycle in Europe. *European Central Bank Working Paper Series No. 1811*.
- Stremmel, H., & Zsámboki, B. (2015). The Relationship between Structural and Cyclical Features of the EU Financial Sector. *European Central Bank Working Paper Series No. 1812*.

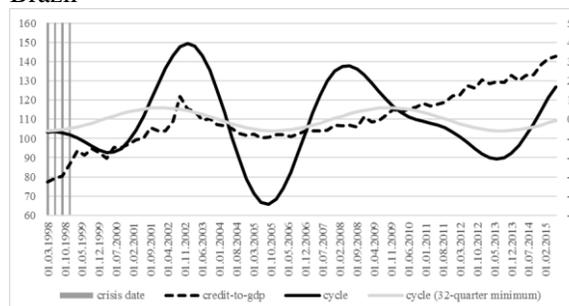
Appendix

Appendix 1: Figures of Credit to GDP and Financial cycles

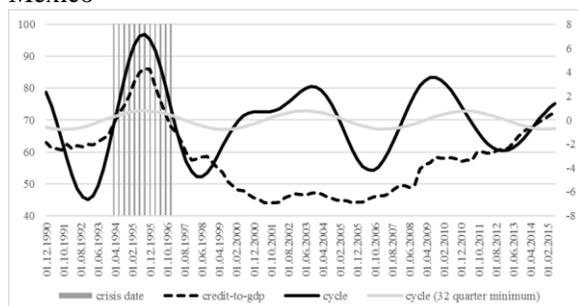
Argentina



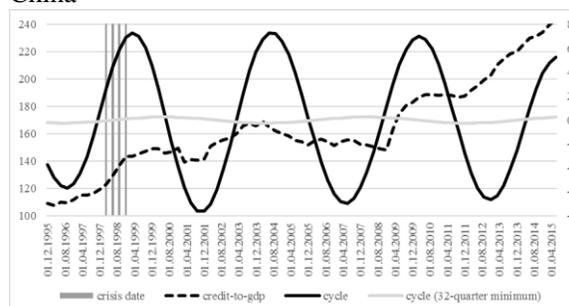
Brazil



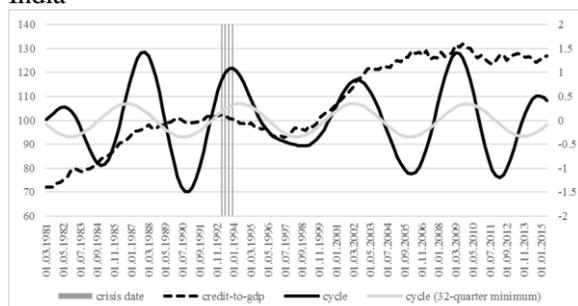
Mexico



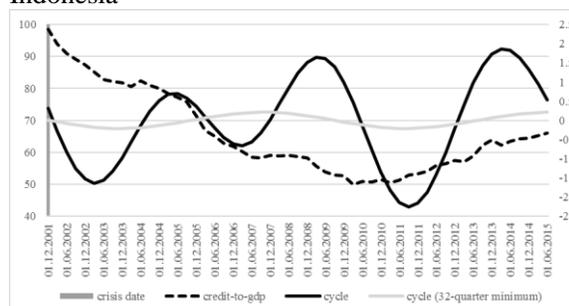
China



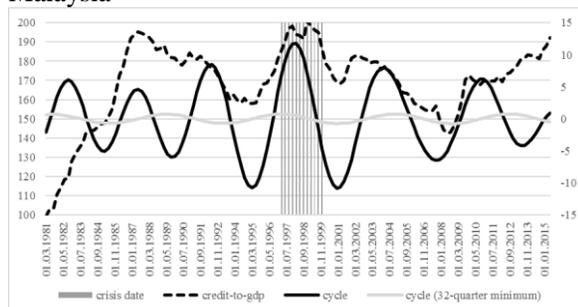
India



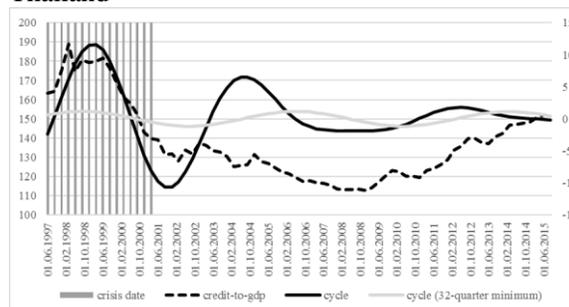
Indonesia



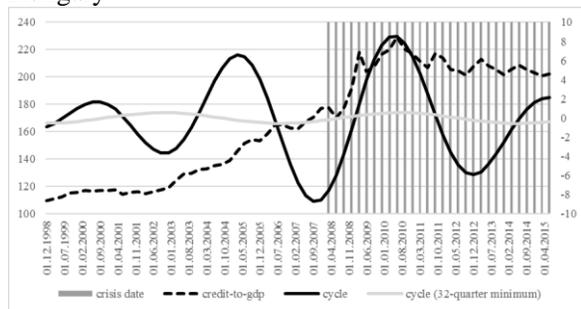
Malaysia



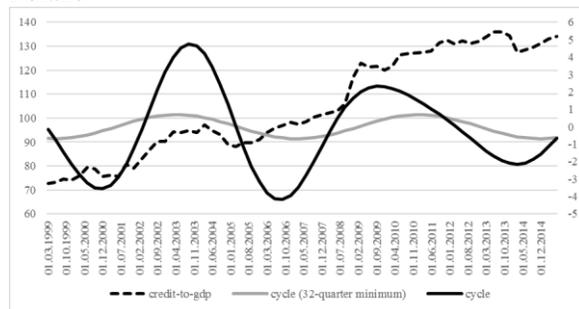
Thailand



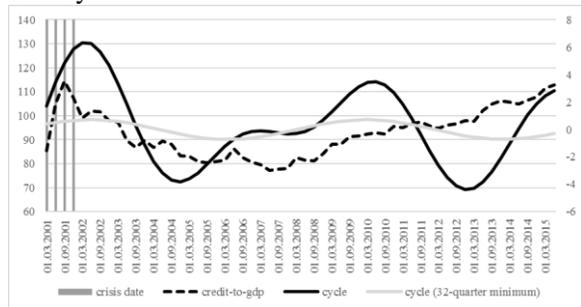
Hungary



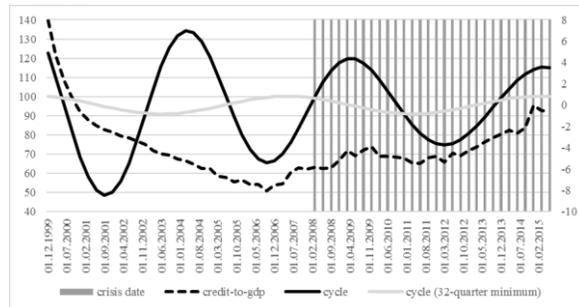
Poland



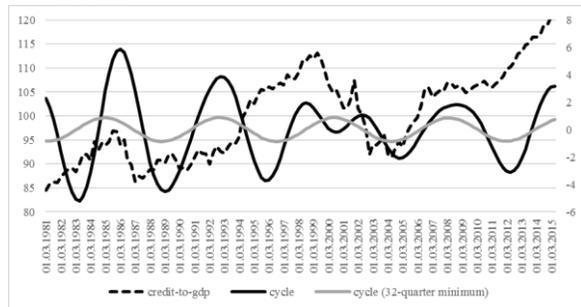
Turkey



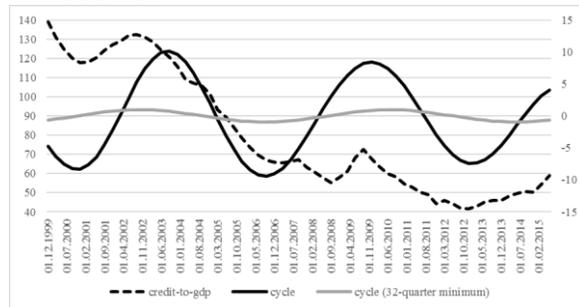
Russia



South Africa



Saudi Arabia



Appendix 2: List of Dependent Variables and Possible Independent Variables

Variables	Description	Source
Dependent Variables		
Financial cycle amplitude	the absolute value of change in the variable in each phase, from a peak to the next trough in case of downturns and from a trough to the next peak in case of upturns.	Own calculation from BIS Credit to the non-financial sector database
Financial cycle duration	The measure of the time takes in each phase.	
Independent variables: Capital flows		
Deviation of Net capital inflows	<ul style="list-style-type: none"> Net capital inflows = Capital inflows by foreigners (CIF)– Capital outflows by domestic agents (COD), all expressed in percent of GDP The deviation is defined as residual from ARMA(1,4) of variables, average over the phase 	Own calculation from IMF Balance of Payments Statistics and IMF International Financial Statistics
Deviation of CIF		
Deviation of COD		
Net capital inflow Surges	<ul style="list-style-type: none"> Definition: the proportion of time that the upside extreme movement of capital inflows occurred during the phase, or $\frac{\text{number of periods of surges or flights in that phase}}{\text{duration of that phase}}$ The periods of surge or flight is the period with deviation exceeds two standard deviations, beginning when it exceeds one standard deviation and ending when it goes back to less than one standard deviation 	
CIF Surges		
COD Flights		
Net capital inflow Stops	<ul style="list-style-type: none"> Definition: the proportion of time that the downside extreme movement of capital inflows occurred during the phase, or $\frac{\text{number of periods of stops or retrenchments in that phase}}{\text{duration of phase}}$ The period of stop or retrenchment is the period deviation falls two standard deviations on downside, beginning when it falls one standard deviation on downside and ending when it goes back to exceed that level 	
CIF Stops		
COD Retrenchments		

Variables		Description	Source
Independent variables: Control variables			
Financial phase		=1 if the phase is financial upturns =0 if the phase is financial downturns	Own calculation from BIS Credit to the non-financial sector database
Financial liberalization	Financial openness	Absolute Value of Total Assets + Absolute Value of Total Liabilities (% of GDP), average over the phase	External Wealth of Nations Dataset (Lane and Milesi Ferreti, 2007) IMF Balance of Payments Statistics, IMF International Financial Statistics
Real economy regime	Trade openness	Export of goods and services + Import of goods and services (% of GDP), average over the phase	IMF International Financial Statistics, World Development Indicators
Global condition	World economic growth	average over the phase	IMF International Financial Statistics
Domestic Dynamics	Domestic Inflation rate	Change in Deflator compared to the same quarter of previous year, average over the phase	IMF International Financial Statistics
Concentration of Banking sector	Assets of the five largest banks	% of total banking assets, average over the phase	Global Financial Development Database
Activities of foreign bank in domestic market	Number of foreign banks	% of number of total banks in the economy, average over the phase	Claessens and van Horen, 2014
Institution and stability	Bank's credit-to-deposit ratio	average over the phase	Global Financial Development Database
Financial depth	Bank's asset-to-GDP ratio	average over the phase	Global Financial Development Database
Bank loan	Bank's credit to GDP ratio	average over the phase	Global Financial Development Database
Financial Integration	Consolidated foreign claims	of BIS reporting banks as % of GDP, average over the phase	BIS Consolidated banking statistics IMF International Financial Statistics

Appendix 3: Correlation Matrix of Dependent and Possible Independent Variables

Table A: Whole Cycle

	Phase's amplitude	Phase's duration	Previous phase's amplitude	Previous phase's duration	Financial openness	Trade openness	World Economic Growth	Domestic Inflation Rate	Assets of the five largest banks	Number of foreign banks	Bank's credit to deposit ratio	Bank's asset-to-GDP ratio	Stock market cap	Bank's credit to GDP ratio	Consolidated foreign claims	Deviation of CIF	Deviation of COD	Deviation of Net capital inflows	Net capital inflow Surges	Net capital inflow Stops	CIF Surges	CIF Stops	COD Flights	COD Retrenchments
Phase's amplitude	1.00																							
Phase's duration	0.14	1.00																						
Previous phase's amplitude	0.86	0.23	1.00																					
Previous phase's duration	0.06	0.33	0.17	1.00																				
Financial openness	0.44	0.04	0.41	0.02	1.00																			
Trade openness	0.12	0.09	0.15	0.10	0.57	1.00																		
World Economic Growth	0.02	-0.04	0.06	0.21	0.02	0.06	1.00																	
Domestic Inflation Rate	0.16	-0.13	0.36	-0.06	-0.02	-0.34	0.12	1.00																
Assets of the five largest banks	-0.01	-0.09	0.00	-0.07	0.32	0.30	0.06	-0.24	1.00															
Number of foreign banks	0.00	-0.13	-0.05	-0.24	0.31	0.18	-0.07	-0.07	0.27	1.00														
Bank's credit to deposit ratio	0.09	-0.02	0.02	0.05	0.26	0.20	0.04	-0.20	-0.07	-0.31	1.00													
Bank's asset-to-GDP ratio	0.06	0.26	0.08	0.16	0.24	0.56	0.03	-0.47	0.14	-0.25	0.51	1.00												
Stock market capitalization	-0.06	0.13	-0.05	0.25	0.18	0.26	0.02	-0.17	0.26	-0.42	0.39	0.46	1.00											
Bank's credit to GDP ratio	0.07	0.21	0.09	0.13	0.29	0.63	0.01	-0.43	0.11	-0.21	0.57	0.94	0.49	1.00										
Consolidated foreign claims	0.23	-0.11	0.09	-0.13	0.78	0.58	-0.03	-0.23	0.28	0.66	0.02	0.14	-0.10	0.17	1.00									
Deviation of CIF	-0.02	0.01	-0.06	0.04	0.67	0.25	0.16	-0.12	0.13	0.39	0.17	-0.03	-0.02	-0.03	0.67	1.00								
Deviation of COD	0.10	0.00	0.08	0.06	0.68	0.20	0.12	-0.06	0.06	0.35	0.11	0.04	-0.08	0.04	0.66	0.85	1.00							
Deviation of Net capital inflows	-0.19	-0.01	-0.22	0.00	0.26	0.18	0.18	-0.13	0.19	0.19	0.16	-0.09	0.10	-0.11	0.31	0.66	0.20	1.00						
Net capital inflow Surges	-0.13	0.10	-0.16	0.09	-0.09	-0.12	-0.01	-0.03	0.03	-0.08	0.01	-0.02	0.18	-0.10	-0.07	0.09	-0.09	0.39	1.00					
Net capital inflow Stops	0.26	0.00	0.12	0.01	0.00	-0.06	0.03	-0.04	-0.11	-0.12	0.01	0.27	-0.03	0.19	0.04	-0.26	0.04	-0.51	0.05	1.00				
CIF Surges	-0.01	0.07	-0.10	0.16	0.26	-0.03	-0.04	-0.13	-0.04	-0.06	0.05	0.01	0.22	-0.09	0.25	0.49	0.45	0.33	0.37	0.09	1.00			
CIF Stops	0.37	0.01	0.23	-0.04	0.13	0.02	-0.18	-0.11	0.06	-0.10	0.11	0.31	0.07	0.31	0.09	-0.30	-0.03	-0.48	-0.04	0.67	-0.10	1.00		
COD Flights	-0.11	-0.09	-0.08	0.09	0.12	0.01	0.15	0.06	-0.02	0.07	-0.14	-0.01	0.07	-0.05	0.19	0.38	0.49	0.11	0.03	0.11	0.51	-0.02	1.00	
COD Retrenchments	-0.05	0.16	-0.04	0.07	-0.01	0.05	-0.26	-0.03	-0.11	-0.12	0.10	0.11	0.06	0.11	-0.09	-0.10	-0.27	0.13	0.19	-0.07	-0.16	0.13	-0.25	1.00

Table B: Upturns

	phase's amplitude	phase's duration	previous phase's amplitude	Previous phase's duration	Financial openness	Trade openness	World Economic Growth	Domestic Inflation Rate	Assets of the five largest banks	Number of foreign banks	Bank's credit to deposit ratio	Bank's asset-to-GDP ratio	Stock market cap	Bank's credit to GDP ratio	Consolidated foreign clamis	Deviation of CIF	Deviation of COD	Deviation of Net capital inflows	Net capital inflow Surges	Net capital inflow Stops	CIF Surges	CIF Stops	COD Flights	COD Retrenchments
Phase's amplitude	1.00																							
Phase's duration	0.09	1.00																						
Previous phase's amplitude	0.88	0.16	1.00																					
Previous phase's duration	0.02	0.61	0.17	1.00																				
Financial openness	0.45	0.05	0.38	-0.06	1.00																			
Trade openness	0.10	0.21	0.14	0.05	0.58	1.00																		
World Economic Growth	-0.18	0.07	-0.02	0.17	-0.16	-0.15	1.00																	
Domestic Inflation Rate	0.28	-0.30	0.37	-0.09	-0.07	-0.48	0.23	1.00																
Assets of the five largest banks	0.04	0.01	0.05	-0.21	0.30	0.10	-0.22	1.00																
Number of foreign banks	0.04	-0.19	0.00	-0.19	0.40	0.26	0.00	-0.06	0.30	1.00														
Bank's credit to deposit ratio	0.12	0.01	0.03	-0.08	0.35	0.28	-0.40	-0.30	-0.06	-0.19	1.00													
Bank's asset-to-GDP ratio	-0.01	0.35	0.04	0.26	0.25	0.63	-0.08	-0.60	0.19	-0.17	0.45	1.00												
Stock market capitalization	0.00	0.33	-0.04	0.13	0.07	0.14	0.06	-0.20	0.17	-0.39	0.46	0.49	1.00											
Bank's credit to GDP ratio	0.01	0.30	0.06	0.22	0.29	0.69	-0.16	-0.55	0.14	-0.12	0.52	0.91	0.52	1.00										
Consolidated foreign clamis	0.24	-0.10	0.13	-0.09	0.85	0.58	-0.10	-0.17	0.28	0.69	0.14	0.14	-0.15	0.15	1.00									
Deviation of CIF	-0.05	-0.02	-0.07	0.01	0.78	0.29	-0.01	-0.07	0.14	0.42	0.24	0.02	-0.03	0.01	0.76	1.00								
Deviation of COD	0.13	-0.05	0.11	0.12	0.78	0.19	-0.08	0.00	0.09	0.40	0.13	0.02	-0.08	0.02	0.73	0.90	1.00							
Deviation of Net capital inflows	-0.34	0.05	-0.33	-0.14	0.25	0.30	0.17	-0.12	0.12	0.15	0.27	0.01	0.14	-0.02	0.32	0.55	0.15	1.00						
Net capital inflow Surges	-0.12	0.16	-0.14	0.07	-0.10	-0.12	0.15	0.02	-0.14	-0.12	0.12	-0.04	0.32	-0.15	-0.09	0.14	0.02	0.42	1.00					
Net capital inflow Stops	0.54	0.05	0.35	0.22	0.07	-0.21	0.15	0.24	0.00	-0.07	-0.13	-0.03	0.12	-0.14	-0.01	-0.10	0.11	-0.33	0.32	1.00				
CIF Surges	-0.06	0.12	-0.09	0.15	0.39	0.05	0.20	-0.03	-0.07	0.01	0.12	0.12	0.23	-0.06	0.34	0.65	0.60	0.40	0.63	0.33	1.00			
CIF Stops	0.64	0.00	0.45	0.05	0.12	-0.18	-0.30	0.14	0.03	-0.06	0.29	0.12	0.10	0.11	-0.03	-0.20	-0.01	-0.42	-0.16	0.51	-0.20	1.00		
COD Flights	0.03	-0.11	-0.04	0.15	0.22	-0.07	0.14	0.23	-0.16	0.04	-0.07	-0.02	0.10	-0.11	0.22	0.42	0.51	0.07	0.26	0.42	0.65	0.01	1.00	
COD Retrenchments	0.05	0.07	0.03	-0.04	0.03	0.19	-0.32	0.02	-0.05	-0.07	0.21	0.18	0.00	0.21	-0.02	-0.11	-0.27	0.18	-0.05	-0.15	-0.26	0.24	-0.30	1.00

Table C: Downturns

	phase's amplitude	phase's duration	previous phase's amplitude	Previous phase's duration	Financial openness	Trade openness	World Economic Growth	Domestic Inflation Rate	Assets of the five largest banks	Number of foreign banks	Bank's credit to deposit ratio	Bank's asset-to-GDP ratio	Stock market cap	Bank's credit to GDP ratio	Consolidated foreign clamis	Deviation of CIF	Deviation of COD	Deviation of Net capital inflows	Net capital inflow Surges	Net capital inflow Stops	CIF Surges	CIF Stops	COD Flights	COD Retrenchments
Phase's amplitude	1.00																							
Phase's duration	0.17	1.00																						
Previous phase's amplitude	0.84	0.29	1.00																					
Previous phase's duration	0.11	0.25	0.17	1.00																				
Financial openness	0.46	0.06	0.48	0.16	1.00																			
Trade openness	0.13	0.04	0.17	0.16	0.61	1.00																		
World Economic Growth	0.14	-0.06	0.15	0.21	0.24	0.18	1.00																	
Domestic Inflation Rate	0.06	-0.07	0.35	-0.03	0.03	-0.24	0.05	1.00																
Assets of the five largest banks	-0.07	-0.15	-0.05	0.12	0.36	0.27	0.00	-0.26	1.00															
Number of foreign banks	-0.03	-0.11	-0.10	-0.31	0.19	0.13	-0.11	-0.09	0.23	1.00														
Bank's credit to deposit ratio	0.06	-0.02	0.00	0.17	0.19	0.14	0.26	-0.14	-0.09	-0.41	1.00													
Bank's asset-to-GDP ratio	0.09	0.25	0.11	0.05	0.26	0.52	0.01	-0.40	0.10	-0.30	0.54	1.00												
Stock market capitalization	-0.11	0.05	-0.07	0.41	0.34	0.36	-0.02	-0.15	0.36	-0.44	0.34	0.45	1.00											
Bank's credit to GDP ratio	0.11	0.19	0.12	0.03	0.34	0.59	0.05	-0.35	0.09	-0.28	0.60	0.95	0.48	1.00										
Consolidated foreign clamis	0.22	-0.14	0.04	-0.19	0.66	0.61	0.05	-0.31	0.29	0.63	-0.08	0.16	-0.04	0.21	1.00									
Deviation of CIF	0.01	0.03	-0.05	0.09	0.49	0.21	0.39	-0.18	0.13	0.36	0.11	-0.08	-0.02	-0.06	0.55	1.00								
Deviation of COD	0.05	0.04	0.03	-0.05	0.45	0.25	0.45	-0.14	0.00	0.29	0.11	0.06	-0.08	0.08	0.56	0.81	1.00							
Deviation of Net capital inflows	-0.06	-0.04	-0.13	0.19	0.30	0.09	0.27	-0.13	0.25	0.23	0.08	-0.16	0.05	-0.17	0.30	0.77	0.29	1.00						
Net capital inflow Surges	-0.12	0.08	-0.19	0.17	-0.06	-0.11	0.01	-0.08	0.23	-0.04	-0.06	0.03	0.04	-0.03	-0.06	0.03	-0.29	0.37	1.00					
Net capital inflow Stops	0.12	0.00	0.00	-0.16	-0.05	0.00	-0.09	-0.20	-0.18	-0.15	0.06	0.39	-0.11	0.33	0.08	-0.40	-0.01	-0.62	-0.10	1.00				
CIF Surges	0.06	0.05	-0.11	0.21	0.03	-0.12	-0.20	-0.26	0.00	-0.17	0.00	-0.07	0.21	-0.12	0.11	0.26	0.15	0.25	-0.01	-0.06	1.00			
CIF Stops	0.22	0.01	0.09	-0.11	0.15	0.13	-0.15	-0.25	0.09	-0.13	0.03	0.41	0.06	0.40	0.19	-0.39	-0.05	-0.52	0.04	0.73	-0.03	1.00		
COD Flights	-0.25	-0.08	-0.11	0.00	-0.02	0.07	0.18	-0.09	0.12	0.09	-0.20	-0.01	0.04	-0.02	0.16	0.33	0.49	0.14	-0.21	-0.06	0.34	-0.04	1.00	
COD Retrenchments	-0.18	0.28	-0.16	0.34	-0.10	-0.13	-0.10	-0.10	-0.20	-0.24	0.01	0.07	0.17	0.04	-0.22	-0.09	-0.26	0.07	0.57	0.01	-0.01	0.05	-0.19	1.00

Appendix 4: Baseline Regressions

The Regressions of Amplitude of Financial Cycles on the Deviation of capital flows

	Whole Sample			Before 2003			Since 2003		
	Model A1	Model A2	Model A3	Model A1.1	Model A2.1	Model A3.1	Model A1.2	Model A2.2	Model A3.2
Constant	-1.369 (1.517)	-0.502 (1.795)	-1.941 (1.839)	-2.268 (2.383)	1.033 (1.762)	-0.615 (2.873)	1.311 (1.619)	1.278 (1.574)	0.721 (2.168)
Previous phase's amplitude	0.724 *** (0.107)	0.698 *** (0.111)	0.66 *** (0.098)	0.837 *** (0.152)	1.091 *** (0.335)	0.755 *** (0.155)	0.559 *** (0.064)	0.565 *** (0.061)	0.584 *** (0.1)
Trade openness	0.011 (0.01)	0.016 * (0.009)	0.012 (0.011)	0.018 *** (0.006)	0.037 *** (0.011)	0.046 *** (0.011)	0.015 (0.02)	0.018 (0.035)	0.031 (0.07)
World Economic Growth	0.517 (0.623)	0.22 (0.645)	0.526 * (0.652)	1.501 (0.941)	0.787 (0.796)	0.874 (1.547)	-0.414 (0.612)	-0.372 (0.575)	-0.363 (0.642)
World Economic Growth X Upturns Dummy	0.381 * (0.204)	0.365 (0.224)	0.536 (0.287)	0.712 ** (0.358)	0.725 *** (0.192)	0.562 * (0.314)	-0.297 (0.201)	-0.294 (0.208)	-0.28 (0.254)
Bank's credit to deposit ratio	0.007 (0.015)	0.007 (0.014)	0.014 (0.016)	-0.024 (0.019)	-0.05 * (0.028)	-0.02 (0.031)	0.028 * (0.015)	0.024 ** (0.011)	0.021 (0.013)
Deviation of Net capital inflows	-0.045 (0.297)			0.002 (0.898)			-0.295 (0.413)		
Deviation of Net capital inflows X Upturns Dummy	1.321 *** (0.446)			1.634 * (0.913)			0.156 (0.326)		
Deviation of CIF	-0.061 (0.202)			-2.662 *** (0.541)			-0.083 (0.42)		
Deviation of CIF X Upturns Dummy	0.800 (0.532)			4.43 *** (1.319)			0.033 (0.203)		
Deviation of COD	-0.185 (0.468)			2.934 *** (0.6)			-0.394 (1.048)		
Deviation of COD X Upturns Dummy	0.388 (0.774)			-1.154 (0.918)			0.255 (0.587)		
Number of Observations	74	73	73	33	33	33	41	40	40
AIC	460.26	454.11	455.34	208.20	199.91	199.94	263.37	256.76	256.62
BIC	478.70	472.44	473.67	220.17	210.39	210.42	277.079	270.269	270.131
Loglikelihood	-222.13	-219.06	-219.67	-96.10	-92.96	-92.97	-123.685	-120.379	-120.31
Linear Combination Test									
Deviation of Net capital inflows + Deviation of Net capital inflows X Upturns Dummy	1.276 ** (0.537)			1.636 ** (0.658)			-0.139 (0.343)		
Deviation of CIF + Deviation of CIF X Upturns Dummy	0.739 (0.494)			1.768 (0.846)			-0.050 (0.258)		
Deviation of COD + Deviation of COD X Upturns Dummy	0.203 (0.442)			1.780 (1.780)			-0.139 (0.480)		

The Regressions of Duration of Financial Cycles on the Deviation of Capital Flows

	Whole Sample			Before 2003			Since 2003		
	Model D1	Model D2	Model D3	Model D1.1	Model D2.1	Model D3.1	Model A1.2	Model A2.2	Model A3.2
Constant	8.735 *** (2.797)	8.968 *** (2.946)	9.104 *** (2.83)	2.694 (8.896)	1.854 (12.408)	3.301 (3.65)	13.368 *** (4.874)	13.926 *** (5.457)	14.081 *** (5.362)
Previous phase's duration	0.363 *** (0.081)	0.336 *** (0.082)	0.339 *** (0.079)	0.331 (0.267)	0.311 (0.378)	0.25 (0.195)	0.251 (0.231)	0.226 (0.268)	0.235 (0.274)
Trade openness	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)	0 (0.009)	0 (0.01)	0.011 (0.037)	0.012 (0.012)	0.011 (0.013)	0.012 (0.012)
World Economic Growth	-0.364 (0.677)	-0.369 (0.698)	-0.426 (0.65)	1.252 (1.925)	1.47 (2.924)	1.182 (0.991)	-1.057 * (0.553)	-1.157 ** (0.586)	-1.223 ** (0.567)
World Economic Growth X Upturns Dummy	0.193 (0.2)	0.199 (0.188)	0.218 (0.193)	0.727 * (0.419)	0.732 * (0.395)	0.519 (0.688)	-0.271 (0.199)	-0.181 (0.257)	-0.163 (0.26)
Bank's credit to deposit ratio	0 (0.008)	0.001 (0.007)	0.001 (0.007)	0 (0.048)	0.003 (0.064)	0.005 (0.016)	-0.003 (0.011)	-0.002 (0.011)	-0.003 (0.011)
Deviation of Net capital inflows	-0.321 (0.284)			-0.23 (0.559)			-0.735 (0.511)		
Deviation of Net capital inflows X Upturns Dummy	0.590 * (0.315)			0.355 (1.143)			0.968 * (0.564)		
Deviation of CIF		-0.062 (0.151)			-0.147 (1.288)			-0.148 (0.157)	
Deviation of CIF X Upturns Dummy		0.068 (0.21)			0.058 (2.285)			0.05 (0.151)	
Deviation of COD			0.025 (0.398)			2.728 (5.194)			-0.18 (0.145)
Deviation of COD X Upturns Dummy			-0.119 (0.382)			-2.744 (4.509)			-0.007 (0.103)
Number of Observations	74	73	73	33	33	33	41	40	40
AIC	531.466	524.573	524.562	243.18	243.18	243.01	303.73	296.85	296.83
BIC	549.898	542.897	542.886	255.15	255.16	254.98	317.441	310.361	310.338
Loglikelihood	-257.733	-254.287	-254.281	-113.59	-113.59	-113.51	-143.866	-140.425	-140.413
Linear Combination Test									
Deviation of Net capital inflows + Deviation of Net capital inflows X Upturns Dummy	0.269 (0.231)			0.125 (0.623)			0.233 (0.365)		
Deviation of CIF + Deviation of CIF X Upturns Dummy		0.006 (0.090)			-0.089 (1.003)			-0.098 (1.000)	
Deviation of COD + Deviation of COD X Upturns Dummy			-0.094 (0.061)			-0.016 (0.885)			-0.187 (0.088)

The Regressions of Financial Cycle's Characteristics on the Frequency of the Episode of Surges and Retrenchments

	Amplitude			Duration		
	Model A4	Model A5	Model A6	Model D4	Model D5	Model D6
Constant	-1.857 (2.18)	0.041 (2.268)	-2.977 (1.825)	9.136 *** (2.939)	9.291 *** (2.937)	9.194 *** (3.208)
Previous phase's amplitude or phase's duration	0.658 *** (0.09)	0.698 *** (0.094)	0.646 *** (0.088)	0.331 *** (0.081)	0.349 *** (0.088)	0.315 *** (0.087)
Trade openness	0.010 (0.011)	0.017 * (0.009)	0.009 (0.012)	0.002 (0.006)	0.003 (0.007)	0.003 (0.007)
World Economic Growth	0.440 (0.705)	0.097 (0.699)	0.808 (0.657)	-0.398 (0.714)	-0.476 (0.738)	-0.44 (0.789)
World Economic Growth X Upturns Dummy	0.609 * (0.342)	0.190 (0.227)	0.500 * (0.287)	0.186 (0.178)	0.14 (0.192)	0.271 (0.187)
Bank's credit to deposit ratio	0.017 (0.015)	0.006 (0.013)	0.017 (0.017)	0.001 (0.007)	0 (0.007)	0.001 (0.007)
Net capital inflow Surges	2.157 (2.141)			1.103 (1.302)		
Net capital inflow Surges X Upturns Dummy	-5.36 (3.774)			0.111 (2.249)		
CIF Surges		-0.167 (3.635)			-0.19 (2.436)	
CIF Surges X Upturns Dummy		7.811 ** (3.949)			1.81 (2.943)	
COD Retrenchments			-0.393 (2.685)			8.667 *** (3.526)
COD Retrenchments X Upturns Dummy			3.912 (2.911)			-8.767 ** (3.824)
Number of Observations	74	72	72	74	72	72
AIC	461.9	446.7	448.1	531.5	517.4	517.3
BIC	480.3	465.0	466.3	550	535.6	535.5
Loglikelihood	-222.9	-215.4	-216	-257.8	-250.7	-250.7
Linear Combination Test						
Net capital inflow Surges X Upturns Dummy + CIF Surges	-3.203 (3.282)			1.214 (2.309)		
CIF Surges + CIF Surges X Upturns Dummy		7.643 (6.270)			1.620 (2.142)	
COD Retrenchments + COD Retrenchments X Upturns Dummy			3.519 * (1.958)			-0.101 (-1.497)

The Regressions of Financial Cycle's Characteristics on the Frequency of the Episode of Stops and Flights

	Amplitude			Duration		
	Model A7	Model A8	Model A9	Model D7	Model D8	Model D9
Constant	-2.211 (1.819)	-3.122 (1.706)	2.198 (1.476)	8.939 *** (2.904)	9.203 *** (3.123)	9.016 *** (2.988)
Previous phase's amplitude or phase's duration	0.638 *** (0.102)	0.627 *** (0.075)	0.636 *** (0.092)	0.352 *** (0.084)	0.342 *** (0.081)	0.37 *** (0.092)
Trade openness	0.01 (0.012)	0.008 (0.011)	0.026 (0.024)	0.002 (0.006)	0.003 (0.007)	0.005 (0.008)
World Economic Growth	0.543 (0.619)	0.873 (0.594)	-0.493 (0.317)	-0.409 (0.704)	-0.454 (0.757)	-0.391 (0.683)
World Economic Growth X Upturns Dummy	0.594 *** (0.296)	0.512 * (0.271)	0.385 (0.527)	0.27 (0.199)	0.22 (0.198)	0.241 (0.233)
Bank's credit to deposit ratio	0.017 (0.015)	0.016 (0.018)	0.014 (0.018)	0 (0.007)	0.001 (0.007)	-0.001 (0.007)
Net capital inflow Stops	5.461 ** (2.278)			1.098 (1.217)		
Net capital inflow Stops X Upturns Dummy	-10.691 *** (4.676)			-3.891 *** (1.569)		
CIF Stops		8.313 ** (3.994)			0.625 (1.06)	
CIF Stops X Upturns Dummy		3.196 (6.331)			-2.267 (2.022)	
COD Flights			-5.427 *** (1.255)			-2.305 (3.802)
COD Flights X Upturns Dummy			0.954 (2.783)			-0.321 (3.626)
Number of Observations	74	72	72	74	72	72
AIC	461.5	447.4	445	531.5	517.4	517.3
BIC	479.9	465.6	463.3	550	535.6	535.5
Loglikelihood	-222.8	-215.7	-214.5	-257.8	-250.7	-250.7
Linear Combination Test						
Net capital inflow Stops X Upturns Dummy	-5.23 (4.458)			-2.793 ** (1.227)		
CIF Stops + CIF Stops X Upturns Dummy		11.509 *** (3.778)			-1.642 (2.155)	
COD Flights + COD Flights X Upturns Dummy			-4.473 ** (1.962)			-2.626 *** (0.713)

Note: The number in parentheses is standard error of coefficient. Meanwhile, *, **, *** denotes 0.10, 0.05, and 0.01 level of significance, respectively.

Appendix 5: Robustness Check Regressions

The Regressions of Amplitude of Financial Cycles on the Deviation of Capital Flows (10 economies)

	Whole Sample			Before 2003			Since 2003		
	Model A1R	Model A2R	Model A3R	Model A1.1R	Model A2.1R	Model A3.1R	Model A1.2R	Model A2.2R	Model A3.2R
Constant	-0.002 (2.704)	0.107 (2.513)	0.165 (2.509)	-1.597 (2.896)	-1.639 (1.625)	-2.138 (0.948)	** 0.935 (1.427)	0.759 (1.52)	-0.623 (2.168)
Previous phase's amplitude	0.609 ▾ (0.166)	*** 0.604 ▾ (0.137)	*** 0.635 ▾ (0.156)	*** 0.583 ▾ (0.159)	*** 0.615 ▾ (0.158)	*** 0.543 ▾ (0.068)	*** ▾ 0.504 (0.135)	*** 0.557 ▾ (0.101)	*** 0.964 ▾ (0.274)
Trade openness	0.022 ▾ (0.015)	0.024 ▾ (0.012)	* 0.024 ▾ (0.012)	0.020 ▾ (0.008)	*** 0.016 ▾ (0.012)	0.041 ▾ (0.01)	*** ▾ 0.032 (0.016)	* 0.042 ▾ (0.038)	0.126 ▾ (0.039)
World Economic Growth	0.125 (0.628)	0.095 (0.665)	0.093 (0.672)	0.978 (0.664)	1.018 (0.847)	1.121 (0.628)	* (0.604)	-0.435 (0.692)	-0.907 (0.427)
World Economic Growth X Upturns Dummy	0.148 (0.157)	0.152 (0.169)	0.143 (0.158)	0.465 (0.189)	** 0.496 (0.231)	** 0.163 (0.204)	-0.24 (0.184)	-0.24 (0.194)	-0.193 (0.165)
Bank's credit to deposit ratio	0.004 ▾ (0.019)	0.003 (0.016)	0.002 (0.016)	▾ -0.013 (0.026)	-0.013 (0.024)	* -0.01 (0.019)	▾ 0.023 (0.021)	* 0.017 (0.015)	** -0.012 (0.02)
Deviation of Net capital inflows	-0.138 (0.224)			-1.378 (1.297)			-0.318 (0.386)		
Deviation of Net capital inflows X Upturns Dummy	0.455 (0.483)			2.162 (1.033)	**		0.015 (0.284)		
Deviation of CIF		-0.021 (0.235)			-0.909 (1.72)			-0.21 (0.532)	
Deviation of CIF X Upturns Dummy		-0.032 (0.126)			1.100 (1.422)			0.086 (0.234)	
Deviation of COD			-0.131 (0.656)			2.224 (0.243)	***		-1.635 (0.46)
Deviation of COD X Upturns Dummy			-0.084 (0.486)			-3.367 (0.712)	***		0.797 (0.313)
Number of Observations	55	54	54	26	26	26	29	28	28
AIC	313.39	306.82	306.66	144.04	144.50	136.20	177.01	170.37	169.22
BIC	329.45	322.73	322.57	150.34	150.79	142.49	187.948	181.027	179.874
Loglikelihood	-148.69	-145.41	-145.33	-67.02	-67.25	-63.10	-80.505	-77.184	-76.608
Linear Combination Test									
Deviation of Net capital inflows	0.317 ▾ (0.438)			0.784 ▾ (0.784)	*		▾ -0.303 (0.493)		
Deviation of CIF + Deviation of CIF X Upturns Dummy		▾ -0.053 (0.206)			▾ 0.191 (0.610)		▾ -0.124 (0.325)		
Deviation of COD + Deviation of COD X Upturns Dummy			▾ -0.215 (0.214)			▾ -1.143 (0.642)	*		▾ -0.838 (0.325)

The Regressions of Duration of Financial Cycles on the Deviation of Capital Flows (10 economies)

	Whole Sample			Before 2003			Since 2003		
	Model D1R	Model D2R	Model D3R	Model D1.1R	Model D2.1R	Model D3.1R	Model A1.2R	Model A2.2R	Model A3.2R
Constant	7.366 *** (2.352)	7.509 *** (2.446)	7.516 *** (2.39)	-1.878 (16.564)	-2.422 (12.826)	6.233 (5.271)	9.710 *** (2.086)	9.539 *** (2.303)	9.674 *** (2.186)
Previous phase's duration	0.408 *** (0.098)	0.405 *** (0.099)	0.411 *** (0.093)	0.221 (0.44)	0.158 (0.365)	0.276 * (0.144)	0.401 (0.077)	0.408 (0.084)	0.398 (0.09)
Trade openness	-0.002 (0.009)	-0.003 (0.007)	-0.002 (0.007)	-0.004 (0.012)	0.013 (0.043)	0.012 (0.015)	0.009 (0.017)	0.007 (0.017)	0.011 (0.018)
World Economic Growth	-0.272 (0.826)	-0.325 (0.849)	-0.37 (0.806)	2.552 (4.348)	3.068 (3.89)	0.517 (1.394)	-0.845 (0.766)	-0.889 (0.862)	-0.961 (0.869)
World Economic Growth X Upturns Dummy	0.132 (0.21)	0.171 (0.206)	0.177 (0.217)	0.557 (0.994)	0.061 (0.619)	-0.1 (0.53)	-0.142 (0.292)	-0.006 (0.346)	0.008 (0.35)
Bank's credit to deposit ratio	0.01 (0.009)	0.01 (0.009)	0.011 (0.009)	0.025 (0.054)	0.026 (0.038)	0.009 * (0.005)	0.008 (0.011)	0.01 (0.012)	0.01 (0.012)
Deviation of Net capital inflows	-0.214 (0.508)			0.883 (1.495)			-0.65 (0.605)		
Deviation of Net capital inflows X Upturns Dummy	0.440 (0.425)			-0.438 (1.769)			0.998 * (0.819)		
Deviation of CIF		0.044 (0.19)			2.79 (3.946)			-0.125 (0.151)	
Deviation of CIF X Upturns Dummy		-0.09 (0.186)			-3.244 (4.151)			0.023 (0.157)	
Deviation of COD			0.075 (0.454)			4.02 *** (1.521)			-0.246 (0.177)
Deviation of COD X Upturns Dummy			-0.18 (0.428)			-4.452 (1.137)			0.042 (0.146)
Number of Observations	55	54	54	26	26	26	29	28	28
AIC	399.315	392.367	392.35	190.33	190.00	189.56	218.64	211.73	211.69
BIC	415.374	408.279	408.262	196.62	196.29	195.85	229.575	222.382	222.342
Loglikelihood	-191.658	-188.184	-188.175	-90.17	-90.00	-89.78	-101.318	-97.862	-97.842
Linear Combination Test									
Deviation of Net capital inflows + Deviation of Net capital inflows X Upturns Dummy	0.226 (0.278)			0.445 (0.445)			0.348 (0.348)		
Deviation of CIF + Deviation of CIF X Upturns Dummy		-0.046 (0.076)			-0.454 (0.471)			-0.102 (1.640)	
Deviation of COD + Deviation of COD X Upturns Dummy			-0.105 (0.097)			-0.432 (0.857)			-0.204 (0.186)

The Regression on the Frequency of the Episodes of Movement of Capital flows, Surges and Retrenchments (10 economies)

	Amplitude			Duration		
	Model A4R	Model A5R	Model A6R	Model D4R	Model D5R	Model D6R
Constant	0.372 (2.627)	-0.078 (2.765)	-0.564 (2.515)	7.529 *** (2.536)	7.425 *** (2.597)	7.078 *** (2.743)
Previous phase's amplitude	0.605 *** (0.127)	0.62 *** (0.146)	0.606 *** (0.137)	0.395 *** (0.101)	0.417 *** (0.112)	0.391 *** (0.111)
Trade openness	0.022 * (0.012)	0.025 ** (0.012)	0.02 * (0.012)	-0.003 (0.007)	-0.003 (0.007)	-0.003 (0.007)
World Economic Growth	0.021 (0.719)	0.172 (0.718)	0.358 (0.678)	-0.303 (0.872)	-0.312 (0.897)	-0.191 (0.953)
World Economic Growth X Upturns Dummy	0.18 (0.163)	0.193 (0.203)	0.144 (0.145)	0.126 (0.179)	0.172 (0.198)	0.175 (0.212)
Bank's credit to deposit ratio	0.003 (0.014)	0.002 (0.016)	0.001 (0.016)	0.01 (0.008)	0.01 (0.009)	0.01 (0.009)
Net capital inflow Surges	2.75 (2.159)			0.643 (1.022)		
Net capital inflow Surges X Upturns Dummy	-3.015 (2.646)			1.256 (3.113)		
CIF Surges		-2.145 *** (0.782)			-1.425 (2.73)	
CIF Surges X Upturns Dummy		-0.62 (1.697)			0.633 (3.097)	
COD Retrenchments			1.023 (4.334)			4.293 (2.999)
COD Retrenchments X Upturns Dummy			4.115 (5.307)			-1.948 (2.454)
Number of Observations	55	53	53	55	53	53
AIC	313.3	299.3	299.2	399.3	385.2	385.2
BIC	329.3	315.0	315	415.4	401.0	401
Loglikelihood	-148.6	-141.6	-141.6	-191.7	-184.6	-184.6
Linear Combination Test						
Net capital inflow Surges + Net capital inflow Surges X Upturns Dummy	-0.265 (2.632)			1.899 (3.140)		
CIF Surges + CIF Surges X Upturns Dummy		-2.765 * (1.609)			-0.792 (0.917)	
COD Retrenchments + COD Retrenchments X Upturns Dummy			5.138 * (2.488)			2.345 (2.256)

The Regression on the Frequency of the Episodes of Movement of Capital flows, Surges and Retrenchments (10 economies)

	Amplitude			Duration		
	Model A7R	Model A8R	Model A9R	Model D7R	Model D8R	Model D9R
Constant	-0.428 (2.756)	-0.503 (2.174)	3.017 *** (1.401)	7.308 *** (2.666)	7.498 *** (2.791)	7.784 *** (2.742)
Previous phase's amplitude	0.523 *** (0.153)	0.623 *** (0.123)	0.634 *** (0.122)	0.409 *** (0.101)	0.399 *** (0.111)	0.46 *** (0.121)
Trade openness	0.027 ** (0.013)	0.019 * (0.011)	0.039 *** (0.01)	-0.003 (0.007)	-0.003 (0.007)	-0.001 (0.006)
World Economic Growth	0.087 (0.681)	0.37 (0.572)	-0.626 *** (0.229)	-0.277 (0.906)	-0.303 (0.937)	-0.229 (0.815)
World Economic Growth X Upturns Dummy	0.194 (0.217)	0.145 (0.155)	-0.058 (0.224)	0.201 (0.229)	0.169 (0.218)	0.022 (0.259)
Bank's credit to deposit ratio	0.009 (0.018)	0 (0.016)	0.001 (0.014)	0.01 (0.009)	0.01 (0.007)	0.006 (0.009)
Net capital inflow Stops	5.561 ** (2.263)			0.788 (2.289)		
Net capital inflow Stops X Upturns Dummy	-4.765 (4.911)			-3.161 (3.11)		
CIF Stops		2.627 (2.324)			2.386 (5.476)	
CIF Stops X Upturns Dummy		8.298 *** (1.579)			-3.245 (6.923)	
COD Flights			-5.411 *** (0.794)			-5.269 * (3.046)
COD Flights X Upturns Dummy			2.603 * (1.573)			3.103 (2.663)
Number of Observations	55	53	53	55	53	53
AIC	313.1	297.2	295.7	399.3	383.2	384.9
BIC	329.2	311	311.5	415.4	397	400.7
Loglikelihood	-148.6	-141.6	-139.9	-191.7	-184.6	-184.5
Linear Combination Test						
Net capital inflow Stops + Net capital inflow Stops X Upturns Dummy	0.796 (5.376)			-2.373 (2.650)		
CIF Stops + CIF Stops X Upturns Dummy		10.925 *** (2.664)			-0.859 (5.517)	
COD Flights + COD Flights X Upturns Dummy			-2.808 *** (0.982)			-2.166 *** (0.604)

The Regressions on the Frequency of the Episodes of Movement of Capital flows

	Amplitude					Duration				
	Model A10	Model A11	Model A12	Model A13	Model A14	Model D10	Model D11	Model D12	Model D13	Model D14
Constant	2.638 (1.562)	-3.213 * (1.805)	-0.674 (2.007)	-0.916 (1.842)	2.209 (1.602)	9.258 *** (3.272)	9.230 *** (3.288)	9.278 *** (3.116)	9.332 *** (3.061)	9.05 *** (3.133)
Previous phase's amplitude or previous phase's duration	0.641 *** (0.094)	0.629 *** (0.08)	0.696 *** (0.096)	0.681 *** (0.089)	0.623 *** (0.089)	0.347 *** (0.098)	0.318 *** (0.087)	0.324 *** (0.094)	0.351 *** (0.087)	0.373 (0.091)
Trade openness	0.025 (0.028)	0.009 (0.011)	0.014 * (0.009)	0.013 (0.009)	0.023 (0.025)	0.006 (0.008)	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)	0.005 (0.008)
World Economic Growth	-0.518 (0.329)	0.926 (0.712)	0.342 (0.662)	0.431 (0.598)	-0.468 (0.346)	-0.461 (0.772)	-0.459 (0.81)	-0.47 (0.793)	-0.496 (0.767)	-0.409 (0.722)
World Economic Growth X Upturns Dummy	0.358 (0.598)	0.508 * (0.276)	0.169 (0.188)	0.196 (0.199)	0.369 (0.527)	0.317 (0.222)	0.278 (0.19)	0.205 (0.182)	0.154 (0.192)	0.251 (0.236)
Bank's credit to deposit ratio	0.012 (0.019)	0.015 (0.02)	0.005 (0.014)	0.005 (0.015)	0.014 (0.018)	-0.001 (0.007)	0.001 (0.007)	0 (0.008)	0 (0.007)	-0.001 (0.007)
COD Retrenchments	-2.834 (2.72)	-1.416 (3.51)	-0.003 (3.012)			8.17 * (4.29)	8.605 ** (3.572)	8.566 ** (3.529)		
COD Retrenchments X Upturns Dummy	-0.108 (5.414)	0.697 (5.733)	4.114 (3.068)			-9.279 ** (4.485)	-8.433 ** (3.877)	-8.269 ** (3.59)		
COD Flights	-5.755 *** (1.252)				-5.378 *** (1.377)	-2.121 (3.611)				-2.289 (3.79)
COD Flights X Upturns Dummy	1.063 (3.145)				1.04 (2.805)	-0.542 (3.365)				-0.317 (3.604)
CIF Stops		8.579 ** (3.562)		7.729 *** (3.809)	6.37 (5.484)		0.422 (0.664)		0.606 (1.059)	0.637 (0.879)
CIF Stops X Upturns Dummy		4.190 (9.172)		4.246 (6.195)	-4.011 (8.835)		-1.943 (1.731)		-1.808 (1.89)	-1.641 (2.051)
CIF Surges			0.067 (3.718)	-0.164 (3.46)				-0.064 (2.611)	-0.213 (2.459)	
CIF Surges X Upturns Dummy			7.646 * (3.929)	7.678 * (4.137)				1.58 (2.99)	1.744 (2.935)	
Number of Observations	72	72	72	72	72	72	72	72	72	72
AIC	448.8	451.4	450.3	449.7	448.8	521.2	521.3	521.3	521.4	521.3
BIC	471.6	474.2	473	472.5	471.6	544	544.1	544.1	544.2	544.1
Loglikelihood	-214.4	-215.7	-215.1	-214.9	-214.4	-250.6	-250.7	-250.7	-250.7	-250.7
Linear Combination Test										
COD Flights + COD Flights X Upturns Dummy	-4.692 ** (2.285)				-6.755 ** (1.943)	-2.663 *** (0.880)				-2.606 *** (0.692)
CIF Stops + CIF Stops X Upturns Dummy		12.769 * (8.359)		11.975 *** (3.458)	2.359 (6.293)					
CIF Surges + CIF Surges X Upturns Dummy			7.713 (6.276)	7.514 (6.247)						
COD Retrenchments + COD Retrenchments X Upturns Dummy	-2.942 (3.806)	-0.719 (4.594)	4.111 * (1.616)			-1.109 (1.691)	0.172 (1.398)	0.297 (1.390)		

Note: The number in parentheses is standard error of coefficient. Meanwhile, *, **, *** denotes 0.10, 0.05, and 0.01 level of significance, respectively.