Doctoral Dissertation

Essays on Financial Crisis

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September 2018

Essays on Financial Crisis

D163376

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A Dissertation Submitted to
the Graduate School for International Development and Cooperation
of Hiroshima University in Partial Fulfillment
of the Requirement for the Degree of
Doctor of Philosophy

September 2018

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Acknowledgements

Pursuing a doctoral degree is a tough journey and it would not have been possible without the support of numerous people. I would like to express my sincere gratitude to all those people who have my journey a joyful one.

First and foremost, I would like to thank my life-coach, my parents who have loved and supported me. I am who I am because of them. I owe it all to them. Many Thanks!

I would also like to thank my supervisor, Dr. Makoto Kakinaka for his tremendous support and constant guidance throughout my PhD study. Without his positivity, patience and encouragement, I would not have made it to the end of this journey. It has been a great pleasure to work with and learn from such a such a kind and compassionate teacher.

In addition, I would like to thank Japan-IMF Scholarship Program for Asia (JISPA) for opening the door and taking me to the academic world and supporting financial resources during the last five years in Japan.

I must also express my profound gratitude to Dr. Masaru Ichihash, Yuichiro Yoshida, Dr. Ching-Yang Lin, Dr. Chun-Hung Kuo and Dr. Yusuke Jinnai for their invaluable input and comments on this study.

I also owe sincere thanks to the faculty and administrative staff of Hiroshima University.

Contents

Abstract

This thesis examines the roles of financial turmoil, which are often captured by extreme capital flow waves and financial crises. Building upon emerging literature, I empirically investigate the policy dimensions adopted by financial regulators in response to volatile capital flows and financial crises, and main drivers of volatile capital flows. In the first essay, I find the evidence that policymakers implement the financial policy reforms following a financial crisis, which confirms the crisis-begets-reform argument. However, such financial policy reform following financial crises generally does not include the strengthening of prudential regulation. In the second essay, I find that macroprudential policies are likely to be tightened after having a period of sudden decrease in capital inflows and controls on capital inflows are likely to be increased following a period of sudden increase in capital inflows. The third essay states that the global uncertainty is the main driver of extreme capital flows waves.

Chapter 1: Introduction

Since the early 1970s, the world economy is extraordinary in terms of the volatility in commodity prices, exchange rates, real estate and stocks, and the frequency and severity of financial crises (Kindleberger and Aliber,2011). Rooting from the two oil shocks in 1973 and 1979, the world economy went into a deep recession in the 1970s and many Latin American countries faced a liquidity crunch since they borrowed against future oil revenue with the debt valued in US dollars. In the wake of Mexico's default in 1982, other Latin American countries defaulted on their debts. As a result, the world economy experienced again a debt crisis in the early 1980s and saw 0.8 per cent decline in the output (Claessens and Kose, 2013), and the 1980s is known as the 'lost decade' of development. At the same time, international capital flows have experienced an unprecedented increase in both their volume and volatility in the 1980s. Following a period of large capital flows, a number of emerging economies in Latin America and Asia experienced a sharp reversal of capital flows in the 1990s, which leaded to the Mexican crisis of 1994-1995 and the East Asian crises in the mid- to late 1990s.

Not only emerging economies but also developed economies experienced financial crises in recent decades as well, from the UK and Nordic countries in the late 1980s to Japan in the 1990s. The recent global financial crisis of 2007–2008 originated from the US subprime mortgage problems has had a widespread impact on the financial and capital markets of countries around the world. This crisis is the worst financial crisis since the Great Depression of the 1930s (Eigner and Umlauft, 2015; Temin, 2010), and it saw a 2 percent decline in world per capita GDP in 2009 (Claessens and Kose, 2013). Subsequently, European debt crisis took place in the European Union from the end of 2009 to 2012, and it had significant adverse effects on international trade and global economy. Some areas in the world economy are still suffering from the lingering effects of the latest crises. Per capita GDP of some advanced economies are still below than it was before the 2008-2009 (Reinhart and Rogoff, 2014).

Therefore, some claim that financial crises have become more frequent over time since financial integration is the major transmission of shocks between economies. According to Bordo et al. (2001), the frequency of crises during the period 1945-1971 was only 38, whereas after 1971, there were between three and four times more financial crises than there were in the first period, and the sudden stop problem has become more severe. Laeven and Valencia (2013) also report that the world experienced 147 banking crises, 217 currency crises, and 67 sovereign debt crises over the period 1970 to 2011. It is visible that the interconnectedness of the global economy gives rise to the several chronologies of incidence and frequency of financial crises. Although steady capital flows are beneficial and help increase investment, volatile capital flows can give rise to systemic economic and financial risks. Some of the financial distress and crises are initiated by large capital flows, which constitute the main source of financial instability (Rodrik, 1998; Aizenman, 2004; Shimpalee and Breuer, 2006). Milesi-Ferretti and Tille (2011) also document that volatile capital flows are the important triggers of local crises.

Therefore, it can be said that financial crises can have domestic or external origins, stem from problems of the private or public sectors, come in different shapes and sizes, and rapidly spread across borders. Immediate and comprehensive policy responses are required to address loss and damage associated with the adverse effects of financial crises and further financial reforms are needed to protect the whole financial sector from future risks and mitigate the financial crises. Understanding the drivers and consequences of macroeconomic volatility and the policy response have become increasingly popular among policy makers, economists and researchers, and they have been the central topics in the empirical and theoretical literature. A number of empirical studies examines which factors drive the volatility of capital flows. For instance, Forbes and Warnock (2012) identify four types of episodes of extreme capital flow movements (surges, stops, flight, and retrenchment) by using the quarterly gross capital flows data from the International Monetary Fund's International Financial Statistics (IFS) and investigate the factors that are associated with these episodes of extreme capital

flows. They find the prominent correlation between capital flow waves and global and contagion factors, but insignificant correlation with domestic factors. Similarly, Calderón and Kubota (2013) and Comelli (2015) also explain the justification for the significant role of global factors in driving extreme capital flows.

At the same time, another group of studies investigate the costs of volatile capital flows, such as financial distress and crises, and output loss. For example, Rodrik (1998) and Aizenman (2004) argue that large capital flows associated with capital account liberalization constitute the main source of financial instability, and Edwards (2004) concludes that they can lead to lower economic growth. In addition, some studies (Bekaert et al., 2005; Kose et al., 2009b) examine how capital flows affect economic growth and conclude that the effects of capital flows on economic growth depend on the form of capital flow. Several studies examine how episodes of volatile capital flows affects real output (Calvo, 1998; Calvo & Reinhart, 2000; Cavallo et al., 2015). Literature on the episodes of extreme capital flows denote sudden stops (sudden declines in capital inflow) and flights (sudden increases in capital outflow) as the types of financial crises.

On the other hand, various works devoted to the identification of financial crises (such as currency, backing, and debt crises) and early warning systems (EWSs) by using some macroeconomic indicators. Among them, some works, e.g., (Reinhart & Rogoff, 2011; Eichengreen et al., 1995; Pescatori & Sy, 2007) define financial crises based on a certain threshold, whereas others, e.g., (Caprio & Klingebiel, 2002; Laeven & Valencia, 2008) identify financial crises based on the authors' judgment or chronological events. While the weak macroeconomic conditions have been denoted as key contributors to financial crises (see, e.g., Cuaresma & Slacik, 2009; Catão & Milesi-Ferretti, 2014), policy makers and financial regulators seek the appropriate policy response and adopt the financial reform with the aim to repair the cracks exposed by the crisis and prevent potential crises in the future. A large body of empirical studies examines whether financial policy reform follows a crisis (or 'crisis

begets reform' hypothesis) and confirms that financial crises can hasten financial reform (see, e.g., Bruno, 1993; Lora & Olivera, 2004; Abiad & Mody, 2005; Waelti, 2015).

For example, Abiad and Mody (2005) create six dimensions of financial policy reform using six measures of financial sector repressiveness, considering 35 economies during the 1973-1996 period and investigate whether financial reforms follow a financial crisis. They conclude that specific types of crises trigger financial reforms and that different types of crises produce different effects. Following their works, many studies also confirm the 'crisis begets reform' hypothesis. Although financial policy reform generally includes both liberalization of the financial system and the strengthening of prudential regulation, the previous studies on the crisis-begets-reform hypothesis have failed to describe whether both financial liberalization and prudential regulation are included during the process of financial policy reform or not. In light of this gap in the literature, this thesis is broadly concerned with policy responses to different types of financial crises and drivers of volatile capital flows. In consists of three essays with particular reference to advanced and emerging economies in the current environment.

In Chapter 2, I empirically investigate the crisis-begets-reform hypothesis argument in the context of financial liberalization and strengthening prudential regulations since financial policy reform includes both polices. In addition, I evaluate these policy issues related to the origins of financial crises and the policy dimensions of financial policy reform by using five types of financial crises data of Reinhart and Rogoff (2011) and the seven individual dimensions of financial policy reform of data of Abiad et al. (2008). Following the empirical framework of Abiad and Mody (2005), I employ the control function (CF) models, motivated by Heckman (1978) and Maddala (1983). The estimated results confirm that the crisis-begets-reform argument in the context of financial liberalization by showing that all types of financial crises promote financial liberalization. However, financial policy reform following financial crises does not generally include the strengthening of prudential regulation.

In Chapter 3, I attempt to discover what types of policy measures, such as macroprudential policies or capital controls, or both policies, are adopted by the policy makers in the face of volatile capital inflows. In order to test whether countries employ macroprudential policies or capital controls following shocks related to volatile capital inflows, following the work of Guidotti et al. (2004), I identify two types of capital inflow episodes (sudden stops and surges) by using annual net capital inflows and gross capital inflows 110 countries during the period from 2000 to 2013. I employ complementary log regression, propensity-score matching (PSM) and inverse-probability-weighted regression adjustment (IPWRA) or doubly robust estimations. The estimated results suggest that sudden slowdown in both net and gross capital inflows (stops) is likely to tighten macroprudential policies, particularly, such capital inflow episodes lead to tighten financial institutions-based policies rather than borrower-based policies. Moreover, sharp increase in net capital inflow (surges) is likely to increase controls on capital inflows.

In Chapter 4, I empirically explore how global and contagion and domestic factors relate to extreme waves of capital flows, including foreign direct investment, portfolio investment, and other investment. In addition, I investigate potential differences in awareness of those factors between advanced and developing economies, since few studies have existed on this issue as well. In the first part of the essay, following the work of Forbes and Warnock (2012), I classify extreme capital flows into four types of episodes (stop, surge, flight, and retrenchment) by using quarterly data on capital inflows and outflows in 57 advanced and developing countries covering the period from 2000 to 2015. The data is obtained from the International Monetary Fund's International Financial Statistics (IFS). I then analyze which factors among global, contagion, and domestic contribute the most to the fluctuations of capital flows. The estimated results state that global factors and contagion factors is are main driver of fluctuation in capital flows, especially intensified global uncertainty generally increases the likelihood of sudden contraction of most types of capital inflows and outflows, and it can decrease the likelihood of sudden expansion of all types of capital outflows. More importantly, global

uncertainty increases the likelihood of sudden contraction of portfolio investment in both advanced and developing economies, while it increases that of foreign direct investment in only advanced economies.

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Chapter 2: Financial crisis and financial policy reform: Crisis origins and policy dimensions

2.1 Introduction

Since approximately the 1970s, economic liberalization has been recognized as an essential part of policy packages. Prior to the 1980s, many countries had exercised a high degree of government intervention in their financial systems, but more recently, and particularly since the 1990s, financial sectors have undergone deregulation or financial liberalization processes. Financial liberalization includes opening up trade to international markets, decreasing government ownership or control of financial sectors, and removing regulatory restrictions placed on financial operations. Many studies suggest that economic and financial liberalization promotes competition, investment, and economic growth (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973; De Haan & Sturm, 2000; Ang & McKibbin, 2007; Kim & Kenny, 2007; Galindo et al., 2007; Hübler et al., 2008; Baltagi et al., 2009). However, financial liberalization can simultaneously foster instability of the financial system or lead to financial crises (Chang & Velasco, 2001; Demirgüç-Kunt & Detragiache, 1998; Kaminsky & Reinhart, 1999).[1]

To complement or remove the threat of financial instability arising from financial liberalization, prudential financial regulation has also attracted significant attention, due in part to the banking regulations included in the Basel Accords. Certain studies, such as Fischer and Reisen (1992) and Mathieson and Rojas-Suarez (1994), argue that weak regulation and lax supervision of financial systems are highly associated with bank failure. In the past, financial regulations emphasized restrictions on financial operations (for example, credit and interest rate controls and entry barriers) to prevent excessive competition in financial sectors and to secure appropriate profits for financial firms. However, as financial liberalization has become more prevalent, the recent trend in financial regulation,

[1] There are also studies on the effects of economic and financial liberalization on other macroeconomic conditions. For example, Bergh and Nilsson (2010) and de Haan and Sturm (2017) suggest that liberalization increases income inequality.

called prudential regulation, has placed more emphasis on financial and macroeconomic stability and on the reduction of significant damage caused by failures of registered financial intermediaries.

Financial policy reform is currently regarded as essential for an economy. Such reform generally includes both liberalization of the financial system and the strengthening of prudential regulation. Financial regulators often adopt such reforms with the aim to produce a more flexible economy to achieve the efficient allocation of financial resources and to prevent potential crises in the future. The broadly shared view is that financial policy reform follows a crisis (or that a crisis triggers financial reform) to repair the cracks exposed by the crisis; this view is called the crisis-begets-reform hypothesis. The term "financial crisis" indicates a situation in which certain financial assets, including a large part of their nominal value, are lost in a heightened sense of urgency. A large body of literature states that financial crises can hasten financial reform (see, e.g., Bruno, 1993; Lora & Olivera, 2004; Abiad & Mody, 2005; Waelti, 2015).

The crucial assumption in past studies is that a financial crisis is treated as an exogenous shock. However, many empirical studies report that macroeconomic conditions affect the likelihood of financial crises (see, e.g., Cuaresma & Slacik, 2009; Bussiere & Fratzscher, 2006; Catão & Milesi-Ferretti, 2014), which would create an endogeneity problem. A primary objective of this study is to re-evaluate the crisis-begets-reform hypothesis, i.e., to investigate whether financial regulators respond to a financial crisis by enacting financial policy reforms and whether they react in a forceful or panicked manner. Unlike past works that assume financial crises are exogenous, we examine this policy issue by addressing possible endogeneity problems with the consideration of how macroeconomic environments determine both financial policy reform and financial crises. To do so, we apply the financial policy reform framework of Abiad and Mody (2005) with endogenous treatment effects models motivated by Heckman (1978) and Maddal (1983). In particular, we estimate the average treatment effect (ATE) of a financial crisis on the financial policy reform process.

In general, the origins of financial crises can be classified into several types (e.g., banking, currency, and sovereign debt crises, and sudden stop episodes) and there are significant differences among them (see, e.g., Laeven & Valencia, 2008, 2013; Reinhart & Rogoff, 2011). Thus, the origin of a financial crisis is an important factor in the relationship between a financial crisis and financial policy reform. Financial regulators may respond differently to financial crises depending on their origins. In addition, determining the policy dimensions adopted by financial regulators in response to financial crises is crucial. Financial policy reform has two main components: financial liberalization and prudential regulation. Financial liberalization itself encompasses various policy dimensions, including capital account controls and banking sector controls. Depending on the observed origin of a financial crisis, financial regulators may adopt different financial policy measures or dimensions.

This study attempts to evaluate these policy issues related to the origins of financial crises and the policy dimensions of financial policy reform. An examination of these issues could provide important policy assessments and guidance regarding the responses of financial regulators to different types of financial crises in a globalized economy. To the best of our knowledge, no extensive empirical study has examined how the origin of a financial crisis relates to financial policy reform and its various dimensions. The insights regarding financial liberalization and prudential regulatory policies implemented in response to different types of financial crises should be explored carefully to thoroughly understand the implications of the crisis-begets-reform hypothesis. One exception may include the work of Waelti (2015), who examines whether crisis origins matter when studying the relationship between financial crises and financial reform but does not account for the presence of endogeneity. Thus, our study attempts to fill this gap in the literature by empirically analyzing the role of financial crisis origins in regulators' choice of financial policy dimensions when implementing financial policy reform. This objective describes an important contribution of this paper to the literature.

To measure the promotion of financial policy reform, we use the aggregate index of financial liberalization, the six individual dimensions of financial liberalization (i.e., capital account restrictions,

credit controls, interest rate controls, entry barriers, state ownership in the banking sector, and securities market policy), and the measure of prudential regulation constructed by Abiad et al. (2008). To capture financial crises, we use the five types of financial crises described by Reinhart and Rogoff (2011): currency, banking, domestic debt, external debt, and inflation crises. We use annual data from 61 countries covering the period from 1975 to 2005. For the robustness checks, we use the three- and five-year non-overlapping interval data of Abiad et al. (2008) and the five-year non-overlapping interval data of Gwartney et al. (2016). Our empirical model controls for several macroeconomic variables, including the credit gap, output gap, and presence of an IMF program, because these variables are expected to be associated with the promotion of financial policy reform or the occurrence of financial crises.

The results in this paper indicate that financial crisis episodes generally operate as catalysts for financial policy reform. More importantly, our results support the crisis-begets-reform argument in the context of financial liberalization. Specifically, we find that financial policy reform mainly involves the promotion of financial liberalization rather than the fortification of prudential regulation, i.e., financial crises tend to promote 'incomplete' financial policy reform. Walter (2003) suggests that financial policy reform often fails to include prudential regulation, which he calls implementation failure, because financial liberalization is easier to implement than prudential regulation due to imperfect technical knowledge, the difficulty of implementing prudential supervision, and the existence of rent-seeking groups that block reforms. Several studies suggest that financial liberalization and prudential regulation are equally important, noting that financial liberalization without prudential regulation leads to a dangerous combination of financial policies that could give rise to financial distress (Mishkin, 2001; Rosenbluth & Schaap, 2003). Thus, prudential regulation should be viewed as a necessary precursor of financial liberalization. Our results are generally robust even when we use the three- and five-year non-overlapping interval data of Abiad et al. (2008) and the five-year non-overlapping interval data of Gwartney et al. (2016) instead of annual data. In addition, our analysis

reveals that financial regulators' choice of policy dimensions in response to financial crises varies depending on crisis origin.

The remainder of the paper is structured as follows. Section 2 provides a selective review of the literature on financial crises, financial policy reform, and the relationship between financial crises and financial policy reform. Section 3 explains the methodology, empirical specification, and data used in this study. Section 4 presents the empirical results and their economic implications, as well as a sensitivity analysis. The final section concludes the paper with a policy discussion.

2.2 Literature review

This section summarizes a selective review of the literature on financial crises, financial policy reform and the relationship between financial crises and financial policy reform. The objective of this review is to highlight certain findings that may help us to better understand the relationship between financial crises and financial policy reform.

2.2.1 Financial crises

Various works devoted to the identification of financial crises and early warning systems (EWSs) endeavor to provide possible policy solutions to mitigate or prevent future crises. Some works define financial crises based on a certain threshold (Reinhart & Rogoff, 2011; Eichengreen et al., 1995; Pescatori & Sy, 2007), whereas others identify financial crises based on the authors' judgment or chronological events (Caprio & Klingebiel, 2002; Laeven & Valencia, 2008, 2013). Recent studies on international financial flows identify episodes of sudden stop and flight as a sign of the deterioration of economic conditions (Calvo et al., 2004; Rothenberg & Warnock, 2011; Cowan et al., 2008; Waelti, 2015). In general, financial crises are classified into several types, namely, currency, banking, domestic debt, external debt, inflation, and capital market crises.

Currency crises are generally identified based on large real or nominal exchange rate depreciation (Frankel & Rose, 1996; Reinhart & Rogoff, 2011) or intensified exchange market pressure (EMP), which is often indicated by changes in the nominal exchange rate and foreign reserves (Eichengreen et al., 1995; Kaminsky et al., 1998). Eichengreen et al. (1995) identify political instability, public budget and current account deficits, monetary growth, and prices as the key determinants of exchange rate devaluation, whereas Frankel and Rose (1996) state that currency crises tend to occur when decreases in foreign direct investment coincide with low levels of foreign reserves and high levels of domestic credit growth. Currency crises often exert negative effects on the labor market, particularly with respect to poor individuals, and cause output, foreign borrowing, and real domestic credit to remain below their previous trends for many years (Baldacci et al., 2002; Hong & Tornell, 2005). Regarding developing countries, the original sin argument describes the inability of these countries to borrow from external economies in their own respective currencies (see Eichengreen & Hausmann, 2005, for a comprehensive review). Firms that borrow foreign currency from abroad experience profit reductions due to significant currency depreciation, which in turn leads to decreased investment and output (Aghion et al., 2004).

Banking crises are primarily identified based on intuitive judgment or chronological events due to the difficulty of empirical identification; consequently, there is no consensus on a precise definition. For example, Caprio and Klingebiel (1996) define a banking crisis as a situation of financial distress wherein a banking system has a negative net worth. Laeven and Valencia (2008) identify systemic banking crises based on several criteria, including significant signs of financial distress in the banking system and significant banking policy intervention measures. Reinhart and Rogoff (2009) identify banking crises based on financial distress and systemic problems without distinguishing between

them.[2] Chaudron and de Haan (2014) compare these three databases on banking crises and report that differences in the methods used to identify and date banking crises may lead to different conclusions.

Many empirical works explore the determinants of banking crises. Although the impact of certain macroeconomic conditions is less clear, most studies show that banking crises are likely to be associated with low levels of economic growth, foreign reserves on the central bank's balance sheet, and liquidity in the banking system, as well as high levels of inflation, public debt, private credit, and credit growth (Demirgüç-Kunt & Detragiache, 1998; Hardy & Pazarbasioglu, 1998; Gourinchas & Obstfeld, 2012; Davis & Karim, 2008). Other studies analyze the effects of banking crises on the macroeconomy. For example, Kaminsky and Reinhart (1999) and Eichengreen and Rose (1998) show that bank distress tends to cause significant declines in output growth and private credit growth and Hutchison and McDill (1999) report that during periods following bank distress, economies are characterized by sharp declines in asset prices and low economic growth. Caprio and Klingebiel (2002) show that significant financial costs prevail after banking crises, and Laeven and Valencia (2008) study data for 129 countries from 1970 to 2009 and estimate that the average cumulative cost for the first four years after a systemic banking crisis is approximately 23 percent of the GDP.

The existing literature on debt crises uses several approaches to define them. Most works identify debt crises based on the concept of a critical value, i.e., whether a particular indicator exceeds some arbitrary level (Detragiache & Spilimbergo, 2001; Pescatori & Sy, 2007), whereas others apply accounting judgment, i.e., whether there are defaults on or restructurings of debt obligations or payment suspensions (Reinhart & Rogoff, 2011). Debt crises are often classified as one of two types: external and domestic. Reinhart and Rogoff (2009) suggest that although defaults on domestic debt are less frequent and are given less attention than defaults on foreign debt, compared with crises based

[2] Reinhart and Rogoff (2009) consider two events to constitute banking crises. The first event, type I (systemic), is characterized by bank runs that lead to the closure, merging or takeover by the public sector of one or more financial institutions. The second event, type II (financial distress), corresponds to a situation without bank runs where the closure, merging, takeover, or large-scale government assistance of an important financial institution marks the start of a string of similar outcomes for other financial institutions (see also Chaudron & de Haan, 2014).

on external default, domestic debt crises typically occur in situations of greater duress. Many empirical studies have examined the determinants and effects of debt crises. Among them, Manasse et al. (2003), Ciarlone and Trebeschi (2005), and Catão and Milesi-Ferretti (2014) reveal that debt crises are likely to occur when countries face high levels of external debt, public debt, and current account deficits and low levels of economic growth and trade openness. Manasse et al. (2003) also find that political uncertainty may be a source of debt crises. Regarding the costs of debt crises, Levy-Yeyati and Panizza (2011) and Furceri and Zdzienicka (2012) posit that debt crises can cause declines in output. Moreover, Furceri and Zdzienicka (2012) report that debt crises are costlier than currency and banking crises because debt crises can cause substantial long-term losses in output levels.

Like other types of financial crises, inflation crises and stock market crashes are identified using the threshold concept. Reinhart and Rogoff (2011), among others, define an inflation crisis as one that occurs when the annual inflation rate exceeds some threshold level and define a stock market crisis as a decline in the return on a given index of stocks below some threshold level. Several empirical studies examine the link between these financial crises and macroeconomic conditions. For example, Han and Mulligan (2002) discuss hyperinflation and public spending and Claessens and Kose (2013) show that inflation crises negatively affect the macroeconomy and note that inflation stabilization takes a long time because of the need to restore public confidence in the national currency.

2.2.2 Financial policy reform

Policy reform is a process of policy changes and includes financial liberalization and prudential regulation. Several studies, such as Bruno and Easterly (1998) and Drazen and Easterly (2001), identify policy reforms either indirectly, by observing changes in macroeconomic variables, or directly, by observing changes in the policy regime, e.g., capital account openness and the exchange rate regime (Waelti, 2015). Many countries have recently adopted a series of financial policy reforms designed to stimulate efficiency in the economy; consequently, financial policy reform has received a great deal

of academic attention. Numerous studies have attempted to construct direct measures of financial policy reform and of certain individual policy dimensions (Williamson & Mahar, 1998; Bandiera et al., 2000; Edison & Warnock, 2003; Laeven, 2003; Clemens & Williamson, 2004; Abiad & Mody, 2005; Abiad et al., 2008; Kaminsky & Schmukler, 2008; Campos & Horváth, 2012; Gwartney et al., 2016). The recent development of comprehensive panel datasets on financial policy reform, including systematic information across countries over time, enables us to empirically analyze the links between financial policy reform and macroeconomic conditions, including financial crises (Bumann et al., 2013; Agnello et al, 2015a, 2015b; Waelti, 2015).

For example, Williamson and Mahar (1998) construct six graded indexes of financial reforms (credit controls, interest rate controls, entry barriers, regulations, privatization, and international capital flows) for 34 economies over the period 1973-1996. Laeven (2003) also identifies six reform measures (interest rate controls, entry barriers, reserve requirements, credit controls, privatization, and prudential regulation) in a study of 13 countries over the period 1988-1998. In addition, Edison and Warnock (2003) measure capital controls for 29 emerging markets during 1989-2000 using monthly stock market capitalization. Kaminsky and Schmukler (2008) construct three indexes of financial reform, namely, domestic banking industry liberalization, capital account liberalization, and domestic stock market liberalization, for 28 countries between 1973 and 2005. Moreover, Gwartney et al. (2016) develop five broad areas of economic freedom (size of the government; the legal system and property rights; soundness of the monetary system; freedom to trade internationally; and regulation) using forty-two distinct variables. Several studies, including Pitlik and Wirth (2003), and de Haan and Sturm (2000, 2017), use the data of Gwartney et al. (2016) relating to economic freedom in the financial sector as an alternative measure of financial policy reform.

Abiad and Mody (2005) create six dimensions of financial policy reform using six measures of financial sector repressiveness (credit controls, interest rate controls, entry barriers, operational regulations, privatization, and capital controls), considering 35 economies during the 1973-1996

period. Abiad et al. (2008) extend the approach developed by Abiad and Mody (2005) by adding indexes of securities market policy and prudential regulation policy. Their dataset is highly comprehensive and internationally comparable and has rather significant advantages over other datasets. First, their dataset has greater country and time coverage than other datasets, encompassing 91 countries and spanning the period from 1973 to 2005. In addition, their reform indicators cover seven specific financial policy reform measures (credit controls, interest rate controls, entry barriers, privatization, international capital flows, securities market policy, and banking supervision) plus an aggregate index.[3] Using their dataset, with its individual dimensions of financial policy reform, we can examine whether the relevant reforms are implemented specifically to address individual financial crises. Only one dimension among the seven indexes, prudential regulation, is coded as a prudential reform toward more government intervention; the other six dimensions are coded as reforms toward financial liberalization.

2.2.3 Financial crises and financial policy reform

Financial crises can damage macroeconomic conditions and sometimes result in severe and long-lasting recessions, leading to calls for reforms in financial sectors to avoid or remedy such crises. It is widely accepted that financial restructuring policies and institutional reforms are needed after a financial crisis. Thus, a solid relationship between financial crises and financial policy reform is expected. In other words, a crisis is an instigator of reform, reflecting the crisis-begets-reform hypothesis (see Drazen, 2011, for a more detailed discussion).

A large body of literature discusses the relationships between crises and policy reform. Historically, many countries have experienced crises and then the regulatory responses to these crises, supporting the view that crises accelerate reforms (Lora & Olivera, 2004). Rodrik (1996) notes that a nation falls into a crisis when its policy fails and thus government reforms are necessary because the

[3] For a more complete description of the construction of the dataset, see Abiad et al. (2008).

previous policy has proven unsuccessful. Bruno (1993) suggests that an economic crisis is essential for a major reform, which rarely occurs without one, and Bates and Krueger (1993) contend that reforms are not needed under good economic conditions and are undertaken more often when economic conditions deteriorate or when new governments assume political power. Asatryan et al. (2017) argue that although a crisis is a potent catalyst for reform, the existence of powerful bureaucrats limits the ability to implement reforms following a crisis. Masciandaro and Romelli (2017) state that financial crises are associated with reforms that increase the involvement of central banks in the supervision of entire financial sectors, and Hallerberg and Scartascini (2017) emphasize the role of banking crises in the timing of tax reforms. Olson (1982) and Drazen and Grilli (1993) emphasize that a crisis must be sufficiently severe to trigger major reform, and Harberger (1993) states that in addition to the depth of a crisis, its duration is a crucial factor in the relation between reform and crisis.

In general, reforms lead to uncertain outcomes, which could encourage preserving the status quo and thus increase the difficulty of implementing reforms (Fernandez & Rodrik, 1991; Przeworski, 1991; Laban & Sturzenegger, 1994a, 1994b). One possible explanation of the crisis-begets-reform argument is that a successful economy creates powerful vested interest groups, which may involve bureaucratic red tape, and such groups do not like reforms; hence, severe economic deterioration is needed to weaken the influence of these special interest groups (Nelson, 1990).[4] Moreover, Tornell (1998) and Drazen (2000) argue that an economic crisis reduces cooperation among different interest groups, which may increase the likelihood of reform.

Recently, several empirical studies have explored the relationships among various types of crises and the dimensions of financial policy reform using comprehensive datasets of financial crises and financial policy reforms, as discussed in the previous subsections. Abiad and Mody (2005) show

[4] Williamson (1994) confirms this explanation by citing specific cases. For example, New Zealand undertook more reforms than Australia because the situation in Australia was less severe. In addition, in 1987, the Brazilian finance minister suggested that his fiscal package was not supported by the president because the crisis was not considered serious.

that specific types of crises trigger financial reforms and that different types of crises produce different effects. Waelti (2015) states that the origin of a crisis is a relevant factor in the nexus between financial crisis and financial reform. Pitlik and Wirth (2003) demonstrate that financial crises promote financial policy reform through financial liberalization. Simmons and Elkins (2004) note that a currency crisis has a significant positive effect on capital account openness. Moreover, Agnello et al. (2015a, 2015b) state that crisis episodes, such as debt, banking, and currency crises, lead to structural reform, including financial reform. Nevertheless, empirical studies that examine how different types of crises relate to prudential regulation or to different dimensions of financial liberalization are relatively scarce.[5]

In addition, several studies report that the ideology of the ruling government, structural features, and financial assistance play critical roles in accelerating financial policy reform. Indeed, a number of studies indicate that right-wing governments are more reform-oriented than left-wing governments (Alesina & Roubini, 1992; Cukierman & Tommasi, 1998; Bortolotti et al., 2004; Bortolotti & Pinotti, 2008; Roberts & Saeed, 2012). Supporting this view, Williamson (1994) shows that right-wing governments introduce most policy reforms. Additionally, structural features, such as the degree of trade and financial openness, can influence the likelihood of financial reforms (Rajan & Zingales, 2003). Likewise, financial assistance, including assistance received from IMF programs, dilutes the effects of financial crises, thereby facilitating the implementation of reforms, as noted by Drazen (2000), Svensson (2000), and Fernández-Arias and Montiel (2001).

2.3 Empirical approach

2.3.1 Methodology

[5] Regarding the different dimensions of financial policy reform, Horvath and Vasko (2016) examine the role of banking crises on financial stability transparency (mainly that of central banks) and find that banking crises have a negative effect on financial stability transparency in a sample restricted to countries in which central banks are obliged to safeguard financial stability. The authors note that banking crises do not affect financial stability transparency globally but that central banks are more reluctant to increase transparency when they are charged legally to safeguard financial stability.

Several alternative procedures can be used to address endogeneity problems in regression models. Some studies utilize instrumental variables (IVs), whereas others adopt the control function (CF) approach. Both approaches produce generally comparable estimates (Robinson, 1989; Vella & Verbeek, 1999). Although IV approaches may seem more attractive, it is often difficult to find an appropriate instrument, i.e., one that is both highly correlated with the treatment conditions and independent of the error term of the outcome regression.[6] In addition, when an endogenous treatment variable is binary, the process of creating an instrument and a binary dependent variable leads to complications in the regression analysis (see Aldrich & Nelson, 1984).

To mitigate the difficulty of applying the IV approach, one possible way is to apply CF models, motivated by Heckman (1974, 1978) and Maddal (1983). In CF models, the variables included in the selection equation should be based on economic grounds (Vella & Verbeek, 1999). In this study, we apply one of the CF models, an endogenous treatment effects model, because our endogenous treatment variable is binary. This model is also called an endogenous binary variable (dummy variable) model, which is a linear potential outcome model that allows for a specific correlation structure between the unobservables that affect the treatment and the unobservables that affect potential outcomes (Heckman, 1978). Maddala (1983) derives full-information maximum likelihood (FIML) and two-step estimation procedures and describes the model as a constrained endogenous-switching model.[7] The advantage of an endogenous treatment effects model is that it corrects for selection bias while estimating treatment effectiveness.

[6] For the IV method, exclusion restrictions are generally difficult to find because they must be exogenous (they do not affect the outcome) and relevant (they affect treatment selection). If the exclusion restrictions affect the outcome, the problem of excessive mean-squared errors arises (Bartels, 1991). If the exclusion restrictions weakly affect selection, the inconsistency problem arises, even in large samples (Bound et al., 1995). See Basinger and Ensley (2010) for a detailed explanation of these issues.

[7] Endogenous treatment effects models can be estimated using a two-step approach or the FIML method. A key feature is that the error terms in the two equations (i.e., the primary regression and selection equations) are distributed bivariate normal. When the assumption of the error terms is satisfied, the FIML method has efficiency advantages (Maddala, 1985). Although the FIML relies heavily on the normality assumption, this study applies the FIML method.

The purpose of estimating endogenous treatment effects models is to determine an ATE. The model is expressed in two equations: a primary regression equation and a selection equation. In our analysis, the financial policy reform and financial crisis models correspond to primary regression and selection equations, respectively. The financial policy reform model, which is of our interest, can be described by

$$Y_{it} = \alpha X_{it} + \gamma FC_{it} + \varepsilon_{it}, \quad (1)$$

where Y_{it} is the measure of the speed of financial policy reform; X_{it} is a set of control variables; FC_{it} is a dummy variable that takes a value of one if country i experiences a financial crisis in period t and a value of zero otherwise and is assumed to stem from an unobservable latent variable FC_{it}^{*}; and ε_{it} is a random component. In the financial crisis model, the latent variable FC_{it}^{*} is linearly dependent on a set of control variables Z_{it} and a random component μ_{it}:

$$FC_{it}^{*} = aZ_{it} + \mu_{it}, \quad (2)$$

where $FC_{it} = 1$ if $FC_{it}^{*} > 0$, and $FC_{it} = 0$ otherwise. In this selection equation, Z_{it} refers to the covariates used to model the treatment assignment, and the error terms ε_{it} and μ_{it} are assumed to be bivariate normal, such that their means are zero, their correlation is ρ, and their variances are σ^2 and one, respectively, i.e., the covariance matrix is $\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$. This study applies the FIML estimation wherein the primary regression and selection equations are estimated simultaneously (Maddala, 1983). The proper endogeneity test is a likelihood ratio or Wald test of the two equations' independence, with the null hypothesis being that the treatment variable is exogenous, i.e., $\rho = 0$. If ρ is close to zero, the treatment variable is exogenous, and the results are biased. In this situation, an endogenous treatment effects model may be inappropriate (Basinger & Ensley, 2010).

Let Y_{it}^{0} denote the outcome or measure of the speed of financial policy reform undertaken by country i if the country does not experience a financial crisis, and let Y_{it}^{1} denote the outcome or measure of the speed of financial policy reform undertaken by country i if the country experiences a financial

crisis, where $Y_{it} = FC_{it} \times Y_{it}^{1} + (1 - FC_{it}) \times Y_{it}^{0}$. Then, the ATE, which is the average difference between the treated potential outcomes and the control potential outcomes, is described by $ATE = E(Y_{it}^{1} - Y_{it}^{0})$.

2.3.2 Empirical specification

This subsection describes the financial policy reform model and the financial crisis model to explain how a financial crisis is associated with financial policy reform in the framework of our endogenous treatment effects model. Our primary regression equation for financial policy reform, which aims to assess how a financial crisis determines the evolution of financial policy reform, follows the empirical framework of Abiad and Mody (2005), who assume that domestic learning, regional learning, different types of shocks, social features, and political factors are related to the promotion of financial policy reform.

As discussed in Abiad and Mody (2005), domestic learning reflects the status quo bias, which implies a dynamic relationship between the level of financial sector reform and subsequent policy changes (initial reforms increase the likelihood of further reforms). Shehzad and De Haan (2009) state that after a country has implemented one reform, the introduction of additional reforms becomes easier. Domestic learning is a nonlinear effect of the existing process of financial liberalization on further reforms and is represented as the function of the existing level of financial policy reform, $DL_{i,t} = FINR_{i,t}(1 - FINR_{i,t})$. $FINR_{i,t}$ is the measure of financial policy reform for country i in year t, and $1-FINR_{i,t}$ captures the gap between the full (desired) and current levels of financial policy reform, where the full level is assumed to be one. In our model, we normalize the measure of financial policy reform to range from zero to one so that the full level of financial policy reform implies $FINR = 1$.[8] It is expected that the coefficient of $DL_{i,t}$ is positive.

[8] Abiad and Mody (2005) model domestic learning by $\alpha(FL^{*} - FL)$, where α is a measure of status quo bias, $FL^{*} = 1$ is the desired level of financial liberalization, and FL is the current level of financial liberalization. A lower α means a

Regional learning reflects regional diffusion and is represented as the function of the regional gap in financial policy reform levels between the country and its regional leader, denoted as $\mathrm{RL_{i,t}} = \mathrm{REGFINR_{i,t}} - \mathrm{FINR_{i,t}}$, where $\mathrm{REGFINR_{i,t}}$ is the financial policy reform level of the regional leader.[9] The idea of regional learning (or diffusion) is that countries within a region will attempt to "catch up" with the highest (or regional leader's) level of financial policy reform within the region.[10] Observing the regional leader's financial policy can reduce uncertainty regarding the costs and benefits of reform, and financial policy reform will be necessary to attract external capital flows under regional competition (Abiad & Mody, 2005). Meseguer (2006) also suggests that the presence of a regional learning process leads to expectations among policy makers of similar changes in their own regions. In this study, all countries are divided into seven regions in accordance with the World Bank region classification (Table 1). In each region, the country with the highest level of financial policy reform is the regional leader.

Our dependent variable in the financial policy reform model (primary regression equation) is the annual change in the measure of financial policy reform ($\Delta\mathrm{FINR_{i,t}}$) rather than its level, which is consistent with the approach taken in previous empirical studies on how financial policy changes over time rather than what it is at a given time. Because financial policy reform is the process of changing and updating existing financial policies, the financial reform literature focuses on how things change

greater status quo bias. Then, they assume that the resistance to reform is described by $\alpha = \theta\mathrm{FL}$, where the status quo bias is the highest when the financial sector is highly regulated or repressed and the bias decreases as liberalization increases, i.e., $\theta > 0$. Accordingly, the domestic learning variable can be rewritten as $\theta\mathrm{FL}(\mathrm{FL}^* - \mathrm{FL}) = \theta\mathrm{FL}(1 - \mathrm{FL})$.

[9] Elhorst et al. (2013) argue that the regional leader matrix in the empirical framework of Abiad and Mody (2005) has several problems: (1) it assumes that a country's financial reform is motivated only by the regional leader's financial liberalization, and it does not consider the influence of countries located outside the region, e.g., important trading partners; (2) it does not test for whether the financial liberalization index has a spatial unit root or whether the process is spatially cointegrated; (3) it does not consider that the financial liberalization level of the regional leader hardly changes over time; and (4) it does not consider time-period effects. Elhorst et al. (2013) employ spatial econometric analysis to mitigate these problems. One motivation for our study is to re-evaluate the relationship between financial crises and financial policy reform (and its policy dimensions) considering possible endogenous issues. Thus, although the spatial econometric approach is a possible analytical method, we apply the CF approach introduced by Heckman (1974, 1978) and Maddal (1983) to address possible endogeneity issues.

[10] The previous literature discusses international policy diffusion in the context of policy formulation (see, e.g., Buera et al., 2011; Volden et al., 2008; Simmons & Elkins, 2004; Callander & Harstad, 2015). In the present study, this argument can be closely related to regional learning or diffusion in our model specification.

over time or on the speed of financial policy reform (ΔFINR). In this study, we consider two major aspects of financial policy reform, financial liberalization and prudential regulation, and then evaluate six dimensions of financial liberalization (capital account restrictions, credit controls, interest rate controls, entry barriers, state ownership in the banking sector, and securities market policy) based on the data of Abiad et al. (2008). Following the empirical works of Abaid and Mody (2005) and Waelti (2015), our financial policy reform equation is as follows:

$$\Delta FINR_{i,t} = \alpha_0 + \alpha_1 DL_{i,t-1} + \alpha_2 RL_{i,t-1} + \alpha_3 CRISIS_{i,t-1} + \sum_k \beta_k X_{k,i,t} + \delta_i + \lambda_t + \varepsilon_{it},$$

where $DL_{i,t-1}$ and $RL_{i,t-1}$ are domestic learning and regional learning (or diffusion), respectively, in country i at time $t-1$; $CRISIS_{i,t-1}$ is a dummy for the financial crisis; $X_{k,i,t}$ are other control variables expected to affect the speed of financial policy reform; δ_i and λ_t are the terms for fixed effects and year-specific effects, respectively; and ε_{it} is the error term. To account for the origins of financial crises or crisis types, this study considers five types of financial crises (currency, banking, external debt, domestic debt, and inflation crises) for the crisis variable (CRISIS). Based in part on the argument that a reform process may take some time to implement, we use one-lagged values for domestic and regional learning variables and the financial crisis variable in an effort to minimize the potential problem of reserve causality (see Drazen, 2009).

Other control variables include the output gap, trade openness and the existence of an IMF program (IMF). The output gap is measured as the cyclical component of the log of real GDP. The cyclical component, which is equivalent to the difference between the log of real GDP and its trend component, is derived by the Hodrick-Prescott (HP) filter. Certain studies, such as Agnello et al., (2015b) show that financial reform is affected by a country's macroeconomic conditions, including recession. Trade openness is measured by the ratio of the sum of exports and imports of goods and services to GDP. Several studies, such as Rajan and Zingales (2003), document the link between trade integration and financial policy liberalization. Controlling for trade openness thus allows us to capture the relation between international economic integration and financial policy reform. In addition, it is

widely acknowledged that the presence of an IMF program can facilitate financial policy reforms. Financial assistance during periods of crisis, which is typically provided through IMF programs, dilutes the macroeconomic effects of financial crises, although this outcome is debatable. The receipt of IMF assistance requires compliance with program conditions, and the IMF is involved in the reform process, which increases the crisis-affected country's efforts to promote reform (Drazen, 2000; Svensson, 2000; Fernández-Arias & Montiel, 2001).

The model also incorporates two political factors, the age of the government and the political orientation of the executive power, following the works of Abiad and Mody (2005) and Waelti (2015). For the age of the government, we include a dummy variable to indicate the first year of a new government or the incumbent (FIRST). As noted by Krueger (1993), reforms are likely to be implemented when a new government comes into power. In addition, the political orientation of the executive power is represented by the ideology of the ruling party (left, right, or center), which is likely to affect the process of national policy formation (De Haan & Sturm, 1994). Thus, the model includes two dummies for left- and right-wing ruling parties (LEFT and RIGHT). Finally, country and year dummies are included to control for country- and year-specific fixed effects.

Regarding the selection equation in this study, we employ a probit model to estimate the financial crisis model:

$$\mathrm{CRISIS}^{*}_{it} = \gamma_0 + \sum_m \gamma_m Z_{m,i,t} + \mu_{it},$$

where CRISIS^{*}_{it} is the latent variable, with $\mathrm{CRISIS}_{it} = 1$ if $\mathrm{CRISIS}^{*}_{it} > 0$ and $\mathrm{CRISIS}_{it} = 0$ otherwise; $Z_{m,i,t}$ is a set of the covariates that are expected to affect the treatment assignment; and μ_{it} is the error term. We estimate each of the five types of financial crisis models (currency, banking, external debt, domestic debt, and inflation crises). The choice of the explanatory variables is motivated by past literature on financial crises. The model includes several covariates, which are three common macroeconomic variables (credit gap, output gap, and trade openness), as well as other macroeconomic variables that depend on the type of financial crisis.

Concerning common covariates, the financial crisis model includes the credit gap and output gap to capture the credit health and overall macroeconomic conditions of a country, respectively. A number of previous studies emphasize the role of credit and explain that financial crises tend to be preceded by rapid expansions of credit (McKinnon & Pill 1997; Kaminsky & Reinhart 1999; Schularick & Taylor, 2012). Many studies discuss the relationship between output and financial crises, and several of them state that higher economic growth is likely to reduce vulnerability to a financial crisis (Cuaresma & Slacik, 2009; Davis & Karim, 2008). The credit and output gaps are defined as the cyclical components of the ratio of credit to GDP and the log of real GDP, respectively, which are derived using the HP filter. In addition, to capture the degree of a country's commercial links to the rest of the world, the model includes trade openness, which is measured by the ratio of the sum of exports and imports to GDP, as a common explanatory variable. Trade integration is expected to be closely related to a country's vulnerability to financial crises. A number of studies suggest that trade openness can reduce the probability of a financial crisis (Ciarlone & Trebeschi, 2005; Cavallo & Frankel, 2008).

Our financial crisis models also include different variables depending on the type of financial crisis. First, we incorporate the inflation rate into the financial crisis models (except for the inflation crisis model) to capture the stability of the macroeconomy and the monetary system. High inflation can be harmful to a country's economy due to its distortional effects. Many studies, including Demirgüç-Kunt and Detragiache (2005) and Evrensel (2008), state that inflation is a determinant of financial crises. Because several developing countries in our sample experience large fluctuations in inflation rates, we use the transformation of the inflation rate, i.e., $\pi/(1+\pi)$, where π is the inflation rate based on the consumer price index. Second, we include the ratio of foreign reserves to external debt in the currency and external debt crisis models. Central banks typically use their foreign reserves to control foreign exchange rates or prevent abrupt currency depreciation by intervening in foreign exchange markets. An economy with a high level of foreign reserves can thus shield itself against

external shocks, such as currency turmoil and associated external debt surges (Obstfeld et al., 2010; Catão & Milesi-Ferretti, 2014). Third, this study includes the ratio of the current account balance to GDP in the currency and domestic debt crisis models. The current account balance reflects the external balance, or the balance between domestic savings and investment in an economy. A current account deficit tends to increase the risk of currency and sovereign debt crises (Cuaresma & Slacík, 2009; Edwards, 1984; Beirne & Fratzscher, 2013).

Fourth, we include the ratio of private sector credit to GDP in the banking crisis model to capture the banking system development of a country. Creane et al. (2004) state that private credit captures the extent of a country's banking system development. Certain studies suggest that a high level of banking system development decreases the probability of a banking crisis (Demirgüç-Kunt & Detragiache, 2005; Davis & Karim, 2008). Fifth, this study controls for an economy's burden of internal indebtedness by including the ratio of public debt to GDP in the banking, domestic debt, and inflation crisis models. A high level of public debt, which often leads to rising interest rates, increases the probability of default or a sovereign debt crisis (Aizenman et al., 2013; Beirne & Fratzscher, 2013). Sixth, we incorporate the ratio of foreign liabilities to GDP in the external debt crisis model to account for external indebtedness. Countries with a high level of external debt are more vulnerable to external debt crises than those with non-debt liabilities (Catão & Milesi-Ferretti, 2014).[11] Finally, we include money supply growth in the inflation crisis model because traditional monetary theory suggests that growth of the money supply is the cause of inflation.

2.3.3 Data

The empirical analysis is based on panel data for 61 advanced and developing countries during the sample period of 1975 to 2005 (Table 1). The data on financial policy reform and its seven multi-

[11] We use the ratio of gross foreign liabilities to GDP as a measure of external debt. Shin (2012) and Reinhart and Rogoff (2010) suggest that gross debt exposure is more relevant than net debt exposure, but Henderson and Rogoff (1982) claim that net foreign assets measures the macroeconomic instability of an economy.

dimensional indexes are obtained from Abiad et al. (2008). Seven dimensions of financial policy reform are included: (1) capital account restrictions, (2) credit controls, (3) interest rate controls, (4) entry barriers, (5) state ownership in the banking sector, (6) securities market policy, and (7) prudential regulations and supervision of the banking industry (see Table 2 for a brief explanation). The first six dimensions measure financial liberalization, whereas the last dimension indicates the degree of bank regulation. Abiad et al. (2008) assign each of the first six dimensions a value between zero and three (zero for full repression, one for partial repression, two for partial liberalization, and three for full liberalization). These researchers also give the last dimension a value between zero and three (zero for no regulation, one for less regulation, two for regulation, and three for high regulation). This study constructs an aggregate index of financial liberalization by summing the measures of the first six dimensions to capture the overall degree of financial liberalization in a country. In addition, we use the index of the seventh dimension, prudential regulation and supervision of the banking industry, as our index of prudential regulation to capture the overall prudential bank regulatory framework. In our empirical analysis, we normalize all indexes to range from zero to one.

In addition, the data on financial crises are obtained from Reinhart and Rogoff (2011). These financial crisis data include a dummy variable that takes the value of one during years with a financial crisis and zero otherwise. This variable includes the five major types of financial crises: (1) currency crisis, (2) banking crisis, (3) domestic debt crisis, (4) external debt crisis, and (5) inflation crisis. Reinhart and Rogoff (2011) define a currency crisis as occurring if the annual depreciation of the domestic currency vis-à-vis the U.S. dollar (or the relevant anchor currency, which historically has been the UK pound, the French franc, or the German mark and is currently the euro) is 15 percent or higher. A banking crisis is said to exist if there are bank runs that lead to the closure, merger or takeover of one or more financial institutions by the public sector or if there are signs of financial distress in the banking system. A domestic debt crisis is coded in the event of a sovereign default to private creditors, debt rescheduling, the freezing of bank deposits and/or forcible conversions of such deposits from

dollars to local currency. An external debt crisis occurs when a country fails to meet a principal or interest payment due date and the rescheduled debt is less favorable than the original obligation. An inflation crisis is generally identified when the annual inflation rate is 20 percent or higher, although for certain countries, an inflation crisis is deemed to occur only when inflation exceeds 40 percent. Table 2 presents a brief description of the definitions and sources of other control variables used in our empirical analysis. Table 3 shows a summary of the statistics for the variables used in this study.

2.4 Empirical results

This section presents the estimated results and discusses their implications for the relationship between financial crises and financial policy reform (financial liberalization and prudential regulation). In addition, we discuss the reaction of each of the seven dimensions of financial policy reform to different types of financial crises. The full sample includes 1,748 observations, including 400 currency crises, 336 banking crises, 82 domestic debt crises, 282 external debt crises, and 341 inflation crises. Tables 4 to 8 present the estimated results of the aggregate index of financial liberalization for currency, banking, domestic debt, external debt, and inflation crises. Tables 9 to 13 show the estimated results for prudential regulation. In each table, panel A shows the estimates of the financial policy reform equation, and panel B shows the probit estimates of the financial crisis equation. The first column presents the results of the ordinary least squares (OLS) estimation, and the other columns show the estimations of the endogenous treatment effects models.[12] The second and third columns display the results of the models without and with the regional learning variable, respectively. Elhorst et al. (2013) note several problems related to spatial spillover or regional learning under the framework of Abiad and Mody (2005).[13] The fourth column presents the estimated results of the models with the variables

[12] The financial policy reform (primary regression) equations are also estimated by the OLS method with country- (fixed) and year-specific effects.

[13] As suggested by Elhorst et al. (2013), the empirical approach of Abiad and Mody (2005) has several problems. Thus, we estimate the models with and without the regional learning variable for the robustness checks.

that were statistically significant in the general model (column 3). Finally, columns 5 and 6 show the estimated results of our general model for the groups of developing (non-OECD) and developed (OECD) countries, respectively.[14] The division of the full sample into these two groups allows us to assess the extent to which their results are similar. For the aggregate index of financial liberalization, the endogeneity tests, or Wald tests, confirm that endogenous treatment effects models can be appropriate for all types of financial crises (Tables 4-8). For prudential regulation, the endogeneity tests suggest that endogenous treatment effects models are appropriate for currency and inflation crises (Tables 9 and 13). However, the tests fail to reach the conventional level of statistical significance (at the 10% level) for banking, domestic debt, and external debt crises, which means that controlling for endogeneity is not supported in these cases, and the OLS estimate may be valid (Table 10-12).[15]

2.4.1 Financial liberalization

The estimation results for the aggregate index of financial liberalization show that the coefficients of the crisis dummies are significantly positive for all types of financial crises, indicating that financial liberalization generally accelerates when an economy faces a financial crisis. This result is more evident in the group of non-OECD or developing countries. As mentioned in Agnello et al. (2015b), institutional frameworks in developing countries are underdeveloped, such that financial crises are likely to reveal their weak institutional capacity and force them to promote further financial liberalization. Our result is consistent with the crisis-begets-reform argument in the crisis-reform literature. For example, Abiad and Mody (2005) observe that balance-of-payment crises spur financial reform. Pitlik and Wirth (2003) agree that severe inflation crises promote financial liberalization, and Bruno and Easterly (1996) state that inflation crises promote policy reform. In a recent study, Waelti (2015) states that a financial crisis, which is defined as a sudden stop in financial flows, begets financial

[14] The estimated results for domestic and external debt crises in OECD countries are not presented because only a small number of domestic and external debt crisis episodes occurred in these countries throughout our sample period.
[15] See Basinger and Ensley (2010).

reform. Agnello et al. (2015a, 2015b) show that financial crises, including external debt and banking crises, are essential triggers of financial reform. Moreover, Asatryan et al. (2017) reveal that economic and financial crises induce administrative reform. The positive effect of banking crises in our estimation contrasts with the results of Abiad and Mody (2005), who show a negative link between banking crises and financial reform.[16]

Regarding the other control variables, the results suggest, first, that domestic and regional learning are positively linked with financial liberalization, which is consistent with the findings in Abiad and Mody (2005), Pitlik (2007), and Waelti (2015). The positive link between domestic learning and financial liberalization confirms that the promotion of financial liberalization decreases the status quo bias, with an inverse U-shaped relationship between the level and speed of financial liberalization. Financial regulators often have incentives to accelerate further financial liberalization once the process of financial liberalization is initiated. The positive coefficients of regional learning indicate that countries' financial regulators are likely to be motivated by the regional leader's financial policy. Observation of the impacts of financial liberalization in the regional leader reduces uncertainty about the consequences of reform in their own countries. Regional competition for external capital flows provides another crucial motivation for financial policy reform, particularly financial liberalization, to attract foreign investors.

Second, the results reveal that the coefficients of IMF programs are significantly positive, particularly in the group of non-OECD countries, regardless of the type of financial crisis. IMF programs tend to encourage or require accelerated financial policy reform. IMF conditions force countries to implement economic and financial policy reforms toward liberalization even during periods of economic repression. In addition, financial assistance, including IMF programs, dilutes the adverse effects of economic repression, thereby facilitating the implementation of reforms (see Drazen,

[16] Regarding the effect of growth crises on financial reform, several empirical studies, including Pitlik and Wirth (2003) and Lora and Olivera (2004), show that crises of output growth promote financial liberalization.

2000; Svensson, 2000; Fernández-Arias & Montiel, 2001). Third, regarding political factors, the coefficients of both left- and right-wing governments are significantly positive for currency, domestic debt, and external debt crises. The relatively large coefficients of right-wing governments compared with those on left-wing governments imply that right-wing governments are more likely to pursue financial liberalization, which is consistent with the argument in the field of political economy (see Williamson, 1994; Bortolotti et al., 2004; Bortolotti & Pinotti, 2008; Roberts & Saeed, 2012; Elinder & Jordahl, 2013). Finally, our analysis fails to show clear evidence of links between financial liberalization and output gaps, trade openness, or government age.

2.4.2 Prudential regulation

Prudential regulation in this study refers to the index of prudential regulation and supervision of the banking sector constructed by Abiad et al. (2008). This index reflects several prudential regulatory frameworks of the banking sector, including the adoption of risk-based capital adequacy ratios pursuant to the Basel Capital Accord, the independence of the banking supervisory agency from the executive power, and the effectiveness of on- and off-site bank examinations.[17] The tests of endogeneity support endogenous treatment effects models for currency and inflation crises. For banking, domestic and external debt crises, the tests fail to show the validity of controlling for endogeneity, indicating that the OLS estimation might be valid. Our results show that most financial crises do not appear to contribute to the strengthening of prudential regulatory frameworks, although banking and inflation crises promote prudential regulation. The finding of a relationship between banking crises and prudential regulation supports the argument of Masciandaro and Romelli (2017),

[17] Certain studies that examine the roles of bank regulation and banking crises at the individual bank level find heterogeneous relationships. For example, Klomp and De Haan (2012) show that the effect of bank regulation and supervision on banking risk is not uniform, and Klomp (2010) reveals that the determinants of banking crises are not uniform. Because our data are at the aggregate level, our analysis cannot capture the relationships among banking crises, financial policy reform, and bank characteristics at the individual bank level, which is one of the drawbacks of our analysis.

who maintain that banking crises trigger supervisory architecture reform by increasing the involvement of central banks in supervision. In addition, the positive relationship between inflation crises and prudential regulation supports the claim of Jácome and Vázquez (2008) that many countries have entered a phase of more prudential macroeconomic frameworks, including increased central bank independence, with the aim of reducing or controlling inflation.[18] When we divide the full sample into OECD and non-OECD groups, the results show that inflation crises trigger the strengthening of prudential regulation in both OECD and non-OECD countries.

With respect to the other control variables, the analysis reveals significantly positive coefficients of regional learning. Similar to the case of financial liberalization, a country's financial regulators are likely to be motivated by the regional leader's prudential regulation. However, the coefficients of domestic learning are generally insignificant, which suggests that in contrast to the case of financial liberalization, the promotion of prudential regulation does not show any clear status quo bias. Moreover, the presence of an IMF program does not play any role in the strengthening of prudential supervisory frameworks. The analysis also shows that left- and/or right-wing governments help to promote prudential regulation, except in cases of external debt crisis.

2.4.3 Financial liberalization and prudential regulation

The previous subsections indicate that all financial crises promote financial liberalization but only banking and inflation crises promote prudential regulation. This finding suggests that in general, financial crises promote financial liberalization without the significant strengthening of prudential regulation. This finding has several important implications for financial policy reform. First, financial liberalization is considered an important driving force for economic recovery and potential long-term growth (De Haan & Sturm, 2000; Ang & McKibbin, 2007). However, financial liberalization without

[18] Cukierman et al. (1992) report a negative relationship between the legal independence of the central bank and inflation. In practice, many countries with high inflation reformed their central bank laws during the 1990s with the objective of attaining and preserving price stability (Jácome & Vázquez, 2008).

effective prudential regulation might give rise to financial fragility or distress and could intensify the risk of subsequent financial crises (Rossi, 1999; Mishkin, 2001; Rosenbluth & Schaap, 2003; Walter, 2003). Financial liberalization alone is insufficient to address the risks and deficiencies arising from financial crises; effective prudential regulation frameworks should also be a part of the policy reform paradigm. Recently, many prudential tools have been proposed in the reforms of financial policies and institutions, especially after the global financial crisis and the subsequent establishment of the new Basel regulatory framework (known as Basel III), which is one of the most significant responses to the crisis (Claessens & Kodres, 2014).

Second, given the argument that financial liberalization should be accompanied by prudential regulation, our results imply that financial crises promote 'incomplete' financial policy reforms, i.e., a financial crisis tends to promote financial liberalization, rather than inducing a panic reaction or a reversal of liberalization, but does not motivate the strengthening of prudential regulation. Financial regulators take advantage of financial crises to promote financial liberalization but often fail to include or simultaneously implement prudential regulation during the process of financial policy reform, which may be characterized as implementation failure (Walter, 2003). Walter (2003) notes that prudential financial supervision is more difficult to implement than liberalization due to imperfect technological knowledge, rent-seeking behaviors, and weak institutional capacity for supervisory procedures and implementation. In addition, financial regulators tend to consider the short-term benefits and costs of financial liberalization and prudential regulation. In particular, these regulators perceive a trade-off for financial regulation, which is designed to reduce the risk of financial crises but could be detrimental to economic growth. Thus, at least in the short term, financial liberalization might be easier to implement than the strengthening of prudential regulation. These arguments signify that financial regulators should carefully evaluate the trade-off between the short- and long-term benefits and costs of financial liberalization and prudential regulation and should choose a combination of the two policy dimensions when implementing financial policy reform.

2.4.4 Individual dimensions of financial liberalization

The previous subsections explain how financial liberalization (the aggregate index of financial liberalization) and prudential regulation relate to financial crises. In particular, we found evidence that clearly supports the crisis-begets-reform hypothesis by confirming that financial liberalization is more intense following financial crises. This subsection evaluates the impact of financial crises on six individual components of financial liberalization. Tables 14-18 show the estimated results for currency, banking, domestic and external debt, and inflation crises. A key finding is that crisis origin is a relevant factor in the crisis-reform relationship in the contexts of different dimensions of financial liberalization. In other words, different types of financial crises may encourage or force financial authorities to react with different policy measures.

First, currency crises promote financial liberalization in the form of interest rate deregulation. Second, banking crises encourage financial regulators to liberalize financial systems by relaxing credit and interest rate controls and entry barriers.[19] Third, domestic debt crises promote privatization of state-owned banks and securities market deregulation. Fourth, external debt crises stimulate financial liberalization through reduced interest rate controls and the promotion of privatization and securities market deregulation. Fifth, inflation crises trigger financial liberalization in the form of relaxed interest rate controls and the promotion of securities market development.[20]

In most countries, the banking sector is more heavily regulated than non-banking sectors. Examples of financial regulations that have been implemented in many countries include interest rate

[19] Horvath and Vasko (2016) find an insignificant effect of banking crises on financial stability transparency at the global level but a significantly negative effect on financial stability transparency for the group of countries that are charged legally to safeguard financial stability. Our study examines the entire picture of financial policy reform, including financial liberalization and prudential regulation, rather than focusing on the transparency of central banks by using the data of Abiad et al. (2008).

[20] The results of the policy dimensions can be reinterpreted as follows: (1) credit controls are reduced as a result of banking crises; (2) interest rate liberalization is more intense following currency, banking, external debt, and inflation crises; (3) regulation of entry barriers decreases following banking crises; (4) privatization is promoted by domestic and external debt crises; and (5) securities market liberalization and development are stimulated by domestic and external debt, and inflation crises.

and credit controls, which are closely related to each other. For example, state-owned banks often provide direct credit to specific sectors through various subsidy schemes, including interest rate subsidies. Another policy measure is the restriction of new entry into the financial sector. Although these regulations help to stabilize the banking system by preventing competition among banks and, particularly in developing countries, by protecting an infant industry being promoted by the government, these regulations also generate economic costs. Buttari (1995) suggests that regulations reduce deposit rates and potential savings, which could lead to poor quality lending and high default rates due to lax screening of potential borrowers. Beck et al. (2006) state that restrictive entry barriers to financial markets increase bank fragility and reduce the efficiency of the banking system, and Sturm and Williams (2004) argue that foreign banks are more efficient than domestic banks and that diversity in bank types is crucial for improved efficiency. Our results show that the deregulation of credit and interest rate controls and a lessening of entry barriers into the banking sector are triggered by financial crises, especially banking crises.

Our analysis also indicates that securities market development and privatization are motivated by domestic and external debt crises. After these types of financial crises, governments tend to meet their financing needs by issuing debt securities in domestic and international markets. Tagkalakis (2013) shows that financial crisis episodes increase the stock of government debt. Because financial crises might cause governments to become more risk averse and long-term debt issuance is less risky due to the reduced likelihood of a rollover crisis (Broner et al., 2013), governments are likely to facilitate long-term debt securities transactions by liberalizing securities markets. Bassanini and Reviglio (2011) state that after financial crises, economies often experience a loss of wealth or investment and that these economies need securities market development to induce a surge in long-term investment and thereby mitigate the adverse impacts of the crisis and increase the growth rate. In addition, governments tend to improve their fiscal balances through privatization, particularly after

financial crises. For example, Wiese (2014) maintains that a debt crisis is one of the main triggers of healthcare financing privatization.

2.4.5 Sensitivity analysis

The previous subsection uses the annual data of Abiad et al. (2008) to measure the speed and policy dimensions of financial policy reform. This subsection conducts robustness checks using three alternative measures of financial policy reform during the same sample period, 1975-2005. We construct the three- and five-year non-overlapping interval (averaged) data of Abiad et al. (2008) to measure financial liberalization and prudential regulation. In addition, following de Haan and Sturm (2017), we measure financial liberalization using the sum of four sub-indices from the five-year non-overlapping interval data for economic freedom (Gwartney et al., 2016) in the financial sector: (1) freedom to own foreign currency bank accounts (3D); (2) black market exchange rates (4C); (3) controls on the movement of capital and people (4D); and (4) credit market regulations (5A).[21] When calculating the financial crisis dummy, we use the value of one if a country experiences a crisis within a three- or five-year interval and zero otherwise.

Tables 19-21 present the results for the effects of financial crises on financial liberalization based on the three- and five-year interval data of Abiad et al. (2008) and the five-year interval data of Gwartney et al. (2016).[22] Tables 22-23 show the results for the effects of financial crises on prudential regulation based on the three- and five-year interval data of Abiad et al. (2008). Each table shows the results of the OLS and endogenous treatment effects estimations. For financial liberalization, the estimated results are consistent with our previous findings based on the annual data of Abiad et al.

[21] The economic freedom database of Gwartney et al. (2016) is used only to estimate models for financial liberalization due to limitations of the data related to prudential regulation. As in the previous subsections, we normalize all indexes to range from zero to one.

[22] The correlations between domestic and regional learning variables are relatively high for the data of Gwartney et al. (2016) but relatively low for the data of Abiad et al. (2008). Thus, we include both domestic and regional learning variables in the models for the data of Abiad et al. (2008) but exclude the regional learning variable from the models for the data of Gwartney et al. (2016).

(2008). Financial liberalization is promoted when an economy faces any type of financial crisis. On the other hand, the analysis presents that only banking crises promote prudential regulation, but other types of financial crises do not relate to prudential regulation. The previous results based on the annual data of Abiad et al. (2008) show the positive link of banking and inflation crises with prudential regulation and the insignificant link of currency, domestic and external debt crises with prudential regulation. For all financial crises except for inflation crises, the results are consistent with our previous findings based on the annual data of Abiad et al. (2008). Prudential regulation is generally insensitive to the incidence of any type of financial crisis.[23]

2.5 Conclusion

In this paper, we examined the policy reactions of financial regulators to financial crises over the period from 1975 to 2005 with consideration of endogeneity problems. The study presents several main conclusions. First, our analysis confirms the crisis-begets-reform argument in the context of financial liberalization. This is particularly true for the group of non-OECD (or developing) countries, which is consistent with the finding of Agnello et al. (2015b). Second, although financial liberalization should be accompanied by prudential regulation, financial policy reform following financial crises generally does not include the strengthening of prudential regulation, i.e., financial crises tend to promote 'incomplete' financial policy reform. As suggested in the works of Mishkin (2001), Rosenbluth and Schaap (2003), and Walter (2003), financial liberalization without sound prudential regulation fails to reduce vulnerability to subsequent financial crises. Third, financial regulators' choice of policy dimensions in response to financial crises varies depending on the crisis origin. When a country faces

[23] We also evaluate how each policy dimension is affected by financial crises using the four components of the economic freedom index (Gwartney et al., 2016), namely, (1) freedom to own foreign currency bank accounts; (2) black market exchange rates; (3) controls on the movement of capital and people; and (4) credit market regulation. The components of the economic freedom index are not consistent with those of Abiad et al. (2008), which makes the comparison of the two data sources generally difficult. Tables 24 and 25 show the results of endogenous treatment effects models. The Wald tests support the validity of endogenous treatment effects models for controls of the movement of capital and people (4D) and credit market regulation (5A). The results indicate that financial crises promote financial liberalization for controls of the movement of capital and people (4D) and credit market regulation (5A).

a specific type of financial crisis, financial regulators should evaluate the short- and long-term benefits and costs of each policy dimension of financial policy reform (both financial liberalization and prudential regulation) and should choose the optimal combination of policy dimensions to maintain financial stability and to mitigate the adverse effects of possible financial disturbances.

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Tables

Table 2.1 List of countries

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa	North America
Australia	Austria	Argentina	Algeria	India	Cote d Ivoire	Canada
China	Belgium	Bolivia	Egypt	Sri Lanka	Ghana	United States
Indonesia	Denmark	Brazil	Morocco		Kenya	
Japan	Finland	Chile	Tunisia		Nigeria	
Korea	France	Colombia			South Africa	
Malaysia	Germany	Costa Rica			Zimbabwe	
New Zealand	Greece	Dominican Rep				
Philippines	Hungary	Ecuador				
Singapore	Ireland	El Salvador				
Thailand	Italy	Guatemala				
	Netherlands	Mexico				
	Norway	Nicaragua				
	Poland	Paraguay				
	Portugal	Peru				
	Romania	Uruguay				
	Russia	Venezuela				
	Spain					
	Sweden					
	Switzerland					
	Turkey					
	United Kingdom					

Table 2.2 Definition and sources of variables

Variable	Definition and construction	Source
Capital account restrictions	Restrictions on international financial convertibility, and the use of multiple exchange rates	Abiad et al. (2008)
Credit controls	Directed credit toward favored sectors, ceilings on credit toward other sectors, and excessively high reserve requirements	Abiad et al. (2008)
Interest rate controls	Government's direct control over interest rates or the existence of floors, ceiling, or interest rate bands	Abiad et al. (2008)
Entry barriers	Licensing requirements, limits to the participation of foreign banks, and restrictions relating to bank specialization or the establishment of universal banks	Abiad et al. (2008)
State ownership	Privatization in the financial sector	Abiad et al. (2008)
Security market	The introduction of medium and long-term government bonds and auctioning of government securities, the establishment of debt and equity markets, and the openness of those securities markets to foreign investors	Abiad et al. (2008)
Aggregate index of financial liberalization	Sum of the measures of the six dimensions of financial liberalization, normalized from 0 to 1	Abiad et al. (2008)
Prudential regulation	Operational restrictions (e.g., on staffing, branching and advertising)	Abiad et al. (2008)
CRISIS	Financial crisis dummies based on the identification of crisis episodes (currency, banking, domestic debt, external debt, and inflation crises)	Reinhart and Rogoff (2011)
Output gap	Difference between the log of actual real GDP and its trend component	Penn World Table 9
Trade openness	Ratio of export plus import to GDP	World Development Indicators
IMF	The presence of IMF program	Reinhart and Rogoff (2011)
FIRST	Dummy variables based on the chief executive has been the first year in office	World Banks' Database of Political Institutions (DPI2012)
LEFT	Dummy variables for left-wing ruling parties	World Banks' Database of Political Institutions (DPI2012)
RIGHT	Dummy variables for right-wing ruling parties	World Banks' Database of Political Institutions (DPI2012)
Credit gap	Difference between the ratio of credit to GDP and its trend component	World Development Indicators
Inflation	Consumer prices (annual %)	World Development Indicators
Foreign exchange reserve to external debt	Ratio of foreign reserves minus gold to total foreign liabilities	Lane and Milesi-Ferretti (2007)
Current account balance to GDP	Ratio of current account balance to GDP	World Development Indicators
Private sector credit to GDP	Ratio of private sector credit to GDP	World Development Indicators
Public debt to GDP	Ratio of public debt to GDP	Abbas et al. (2010)
External debt to GDP	Ratio of total (gross) foreign liabilities to GDP	Lane and Milesi-Ferretti (2007)
Money supply growth	Annual money growth	World Development Indicators

Table 2.3 Descriptive of statistics

Variable	No of observation	Mean	Std deviation	Minimum value	Maximum value
Change of aggregate financial liberalization	1,748	0.019	0.057	-0.333	0.444
Change of prudential regulation	1,748	0.022	0.091	-0.333	0.667
Change of capital account restrictions	1,748	0.017	0.137	-1.000	1.000
Change of credit controls	1,748	0.019	0.115	-0.750	0.750
Change of interest rate controls	1,748	0.025	0.158	-1.000	1.000
Change of entry barriers	1,748	0.022	0.100	-0.667	0.667
Change of state ownership	1,748	0.011	0.099	-1.000	1.000
Change of securities market	1,748	0.019	0.082	-0.333	0.667
Currency crisis	1,748	0.229	0.420	0.000	1.000
Banking crisis	1,748	0.192	0.394	0.000	1.000
Domestic debt crisis	1,748	0.047	0.212	0.000	1.000
External debt crisis	1,748	0.161	0.368	0.000	1.000
Inflation crisis	1,748	0.195	0.396	0.000	1.000
Domestic learning					
Aggregate financial liberalization	1,748	0.150	0.083	0.000	0.250
Prudential regulation	1,748	0.089	0.109	0.000	0.222
Capital account restrictions	1,748	0.101	0.111	0.000	0.222
Credit controls	1,748	0.109	0.109	0.000	0.222
Interest rate controls	1,748	0.041	0.087	0.000	0.222
Entry barriers	1,748	0.086	0.108	0.000	0.222
State ownership	1,748	0.097	0.110	0.000	0.222
Securities market	1,748	0.113	0.111	0.000	0.222
Regional learning					
Aggregate financial liberalization	1,748	0.261	0.261	0.000	0.903
Prudential regulation	1,748	0.250	0.250	0.000	1.000
Capital account restrictions	1,748	0.317	0.317	0.000	1.000
Credit controls	1,748	0.333	0.333	0.000	1.000
Interest rate controls	1,748	0.289	0.289	0.000	1.000
Entry barriers	1,748	0.346	0.346	0.000	1.000
State ownership	1,748	0.481	0.481	0.000	1.000
Securities market	1,748	0.298	0.298	0.000	1.000
Output gap	1,748	0.000	0.048	-0.536	0.290
Trade openness	1,748	63.007	47.294	6.320	422.331
IMF	1,748	0.136	0.342	0.000	1.000
FIRST	1,748	0.208	0.406	0.000	1.000
LEFT	1,748	0.312	0.463	0.000	1.000
RIGHT	1,748	0.332	0.471	0.000	1.000
Credit gap	1,748	-0.027	7.086	-48.618	68.493
Inflation	1,722	0.122	0.156	-0.083	0.992
Foreign exchange reserve to external debt	1,748	0.142	0.184	0.000	2.447
Current account balance to GDP	1,516	-1.675	5.780	-42.894	32.543
Private sector credit to GDP	1,715	50.418	38.588	0.0595	221.289
Public debt to GDP	1,702	0.584	0.648	0.020	20.929
External debt to GDP	1,748	0.893	0.969	0.039	10.846
Money supply growth	1,421	0.169	0.188	-1.391	0.992

Table 2.4 Currency crisis and financial liberalization

	liberalization		Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Financial liberalization	OLS	OLS					
Domestic learning	0.084***	0.005	0.100***	0.085***	0.085***	0.110***	0.154***
	(0.022)	(0.029)	(0.022)	(0.021)	(0.021)	(0.033)	(0.033)
Regional learning	0.113***	0.129***		0.108***	0.108***	0.142***	0.094***
	(0.012)	(0.014)		(0.012)	(0.012)	(0.018)	(0.017)
Output gap	-0.019	0.019	-0.014	-0.006		0.001	-0.072
	(0.026)	(0.043)	(0.026)	(0.025)		(0.030)	(0.063)
Trade openness	0.000	-0.000*	0.000	0.000		-0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
IMF	0.019***	0.008	0.022***	0.019***	0.019***	0.021***	0.012
	(0.005)	(0.008)	(0.005)	(0.004)	(0.004)	(0.005)	(0.011)
FIRST	0.002	0.004	0.002	0.002		0.004	0.000
	(0.004)	(0.006)	(0.004)	(0.004)		(0.005)	(0.004)
LEFT	0.010**	0.016*	0.010*	0.010**	0.010**	0.005	0.008
	(0.005)	(0.009)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)
RIGHT	0.013***	0.016**	0.007	0.012**	0.012**	0.005	0.011
	(0.005)	(0.008)	(0.005)	(0.005)	(0.005)	(0.006)	(0.008)
Currency crisis	0.001	0.012*	0.037***	0.023***	0.023***	0.026***	-0.016
	(0.004)	(0.007)	(0.008)	(0.008)	(0.008)	(0.010)	(0.011)
Panel B: Dependent Variable: Currency crisis							
Credit gap			0.015**	0.017***	0.016***	0.025***	0.009
			(0.006)	(0.006)	(0.006)	(0.008)	(0.012)
Output gap			-2.072***	-2.007***	-2.002***	-1.778***	-4.842**
			(0.633)	(0.644)	(0.638)	(0.682)	(2.372)
Trade openness			-0.001	-0.001		-0.002	-0.006
			(0.001)	(0.001)		(0.001)	(0.004)
Inflation			4.033***	3.996***	4.084***	4.191***	0.777
			(0.300)	(0.304)	(0.294)	(0.367)	(0.865)
Foreign exchange reserve to external debt			-0.916***	-0.869***	-0.945***	-1.175***	-0.543
			(0.331)	(0.332)	(0.327)	(0.395)	(0.926)
Current account balance to GDP			0.003	0.001		0.021**	-0.102***
			(0.008)	(0.008)		(0.008)	(0.024)
Wald test			18.25***	8.61***	9.70***	7.24***	2.01
Observation	1451	1451	1451	1451	1451	943	508

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.5 Banking crisis and financial liberalization

	OLS	Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Financial liberalization						
Domestic learning	0.108***	0.102***	0.098***	0.098***	0.117***	0.137***
	(0.023)	(0.023)	(0.022)	(0.022)	(0.032)	(0.041)
Regional learning	0.112***		0.106***	0.106***	0.130***	0.127***
	(0.012)		(0.012)	(0.012)	(0.016)	(0.022)
Output gap	-0.017	-0.003	0.011		0.001	0.039
	(0.026)	(0.026)	(0.026)		(0.028)	(0.082)
Trade openness	0.000	-0.000	0.000		-0.000	-0.000
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
IMF	0.016***	0.018***	0.015***	0.015***	0.016***	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.014)
FIRST	0.005	0.004	0.004		0.005	0.008
	(0.004)	(0.004)	(0.004)		(0.005)	(0.005)
LEFT	0.008	0.011**	0.008		0.008	0.004
	(0.006)	(0.006)	(0.005)		(0.007)	(0.014)
RIGHT	0.008	0.006	0.007		0.009	0.002
	(0.005)	(0.005)	(0.005)		(0.006)	(0.013)
Banking crisis	-0.007*	0.066***	0.063***	0.064***	0.064***	-0.019
	(0.004)	(0.007)	(0.007)	(0.007)	(0.010)	(0.014)
Panel B: Dependent Variable: Banking crisis						
Credit gap		0.006	0.006		0.000	0.039***
		(0.005)	(0.005)		(0.006)	(0.012)
Output gap		-1.643***	-1.687***	-1.612***	-1.567**	-6.345**
		(0.590)	(0.589)	(0.561)	(0.630)	(2.638)
Trade openness		-0.001	-0.001		-0.002*	-0.013***
		(0.001)	(0.001)		(0.001)	(0.004)
Inflation		0.817***	0.675***	0.768***	0.613***	-0.353
		(0.214)	(0.215)	(0.211)	(0.234)	(0.998)
Private sector credit to GDP		0.002*	0.002*	0.002**	0.006***	-0.003
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Public debt to GDP		0.004***	0.004***	0.004***	0.005***	0.008**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Wald test		112.48***	105.44***	115.93***	51.14***	2.15
Observation	1353	1353	1353	1353	998	355

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.6 Domestic debt crisis and financial liberalization

	OLS	Model	Model	Model	Non-OEDC
Panel A: Dependent Variable: Financial liberalization					
Domestic learning	0.089***	0.103***	0.089***	0.089***	0.119***
	(0.022)	(0.022)	(0.021)	(0.021)	(0.033)
Regional learning	0.116***		0.113***	0.115***	0.145***
	(0.012)		(0.012)	(0.012)	(0.017)
Output gap	-0.014	-0.028	-0.010		-0.005
	(0.025)	(0.025)	(0.025)		(0.029)
Trade openness	0.000	-0.000	-0.000		-0.000
	(0.000)	(0.000)	(0.000)		(0.000)
IMF	0.016***	0.019***	0.016***	0.017***	0.018***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
FIRST	0.003	0.003	0.003		0.005
	(0.004)	(0.004)	(0.004)		(0.005)
LEFT	0.012**	0.012**	0.012**	0.011**	0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
RIGHT	0.014***	0.009*	0.014***	0.014***	0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Domestic debt crisis	-0.010	0.043***	0.028*	0.019	0.038**
	(0.009)	(0.013)	(0.016)	(0.018)	(0.016)
Panel B: Dependent Variable: Domestic debt crisis					
Credit gap		-0.016**	-0.016**	-0.013*	-0.020**
		(0.008)	(0.008)	(0.008)	(0.009)
Output gap		-1.332	-1.292		-1.250
		(0.961)	(0.976)		(0.927)
Trade openness		-0.001	-0.001		-0.002
		(0.002)	(0.002)		(0.002)
Inflation		1.526***	1.511***	1.832***	1.065***
		(0.295)	(0.298)	(0.260)	(0.307)
Public debt to GDP		0.001	0.001		0.001*
		(0.001)	(0.001)		(0.001)
Current account balance to GDP		-0.003	-0.004		0.005
		(0.011)	(0.012)		(0.011)
Wald test		14.16***	6.92***	3.07*	11.94***
Observation	1415	1415	1415	1415	919

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.7 External debt crisis and financial liberalization

	OLS	Model	Model	Model	Non-OEDC
Panel A: Dependent Variable: Financial liberalization					
Domestic learning	0.078***	0.104***	0.081***	0.081***	0.107***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.031)
Regional learning	0.098***		0.093***	0.094***	0.127***
	(0.011)		(0.010)	(0.010)	(0.016)
Output gap	-0.012	-0.011	-0.002		-0.009
	(0.024)	(0.024)	(0.023)		(0.028)
Trade openness	0.000	0.000	0.000		0.000
	(0.000)	(0.000)	(0.000)		(0.000)
IMF	0.018***	0.020***	0.018***	0.018***	0.019***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
FIRST	0.001	0.002	0.001		0.003
	(0.003)	(0.003)	(0.003)		(0.005)
LEFT	0.009*	0.010**	0.009**	0.009**	0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
RIGHT	0.010**	0.008*	0.010**	0.010**	0.007
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
External debt crisis	0.004	0.043***	0.029***	0.026***	0.026**
	(0.005)	(0.009)	(0.009)	(0.009)	(0.011)
Panel B: Dependent Variable: External debt crisis					
Credit gap		-0.008	-0.008		-0.011*
		(0.006)	(0.006)		(0.007)
Output gap		-0.892	-0.844		-0.511
		(0.612)	(0.622)		(0.659)
Trade openness		-0.007***	-0.007***	-0.007***	-0.013***
		(0.002)	(0.002)	(0.002)	(0.002)
Inflation		3.155***	3.167***	3.230***	2.103***
		(0.262)	(0.264)	(0.263)	(0.278)
Foreign exchange reserve to external debt		-1.084***	-1.038***	-1.030***	-1.130***
		(0.342)	(0.345)	(0.346)	(0.367)
External debt to GDP		0.285***	0.288***	0.292***	0.793***
		(0.057)	(0.058)	(0.058)	(0.117)
Wald test		7.76***	8.75***	8.02***	4.33**
Observation	1718	1718	1718	1718	1048

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.8 Inflation crisis and financial liberalization

	OLS	Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Financial liberalization						
Domestic learning	0.093***	0.100***	0.092***	0.092***	0.099***	0.146***
	(0.022)	(0.022)	(0.021)	(0.021)	(0.030)	(0.039)
Regional learning	0.107***		0.106***	0.107***	0.128***	0.124***
	(0.012)		(0.012)	(0.012)	(0.016)	(0.021)
Output gap	-0.008	-0.010	0.002		-0.007	0.084
	(0.025)	(0.026)	(0.025)		(0.028)	(0.079)
Trade openness	0.000	0.000	0.000		-0.000	-0.000
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
IMF	0.015***	0.018***	0.015***	0.015***	0.018***	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.013)
FIRST	0.003	0.003	0.003		0.004	0.008
	(0.004)	(0.004)	(0.004)		(0.005)	(0.005)
LEFT	0.008	0.013**	0.009		0.008	0.005
	(0.006)	(0.006)	(0.005)		(0.007)	(0.014)
RIGHT	0.010**	0.010**	0.011**	0.006	0.011*	0.003
	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)	(0.014)
Inflation crisis	0.007	0.039***	0.029***	0.027***	0.029***	-0.002
	(0.005)	(0.010)	(0.009)	(0.009)	(0.011)	(0.023)
Panel B: Dependent Variable: Inflation crisis						
Credit gap		-0.013**	-0.013**	-0.013**	-0.012*	-0.012
		(0.005)	(0.006)	(0.006)	(0.006)	(0.014)
Output gap		-2.500***	-2.495***	-2.479***	-2.540***	-2.646
		(0.657)	(0.661)	(0.655)	(0.678)	(3.030)
Trade openness		-0.006***	-0.006***	-0.006***	-0.008***	-0.002
		(0.002)	(0.001)	(0.001)	(0.002)	(0.005)
Public debt to GDP		0.002**	0.002**	0.002**	0.002**	-0.010*
		(0.001)	(0.001)	(0.001)	(0.001)	(0.005)
Money supply growth		2.065***	2.084***	2.089***	1.921***	0.365
		(0.208)	(0.209)	(0.209)	(0.228)	(0.789)
Wald test		8.22***	6.69**	6.43**	6.23**	0.32
Observation	1385	1385	1385	1385	1015	370

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.9 Currency crisis and prudential regulation

	OLS	Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Prudential regulation						
Domestic learning	0.005	-0.005	-0.000		-0.236***	0.060
	(0.029)	(0.029)	(0.028)		(0.053)	(0.044)
Regional learning	0.129***		0.130***	0.130***	0.078***	0.249***
	(0.014)		(0.013)	(0.013)	(0.019)	(0.027)
Output gap	0.019	0.018	0.009		-0.001	-0.197
	(0.043)	(0.043)	(0.042)		(0.041)	(0.158)
Trade openness	-0.000*	-0.000	-0.000*	-0.000*	-0.000*	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
IMF	0.008	0.009	0.007		0.011	-0.032
	(0.008)	(0.008)	(0.007)		(0.007)	(0.027)
FIRST	0.004	0.003	0.005		0.006	0.001
	(0.006)	(0.006)	(0.006)		(0.007)	(0.010)
LEFT	0.016*	0.013	0.016*	0.016*	0.016	-0.013
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.017)
RIGHT	0.016**	0.014*	0.017**	0.017**	0.018**	-0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.018)
Currency crisis	0.012*	0.003	-0.004	-0.003	-0.003	0.022
	(0.007)	(0.012)	(0.011)	(0.011)	(0.012)	(0.033)
Panel B: Dependent Variable: Currency crisis						
Credit gap		0.019***	0.019***	0.019***	0.028***	0.006
		(0.006)	(0.006)	(0.006)	(0.008)	(0.012)
Output gap		-1.733***	-1.739***	-1.705***	-1.413**	-4.215*
		(0.652)	(0.651)	(0.649)	(0.685)	(2.325)
Trade openness		-0.002	-0.002		-0.002	-0.006
		(0.001)	(0.001)		(0.001)	(0.004)
Inflation		3.953***	3.958***	4.067***	4.149***	0.884
		(0.309)	(0.309)	(0.298)	(0.371)	(0.861)
Foreign exchange reserve to external debt		-0.931***	-0.947***	-1.044***	-1.297***	-0.468
		(0.342)	(0.343)	(0.336)	(0.406)	(0.930)
Current account balance to GDP		0.001	0.001		0.021**	-0.099***
		(0.008)	(0.008)		(0.009)	(0.024)
Wald test		1.52	3.12*	3.18*	1.82	0.04
Observation	1451	1451	1451	1451	943	508

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.10 Banking crisis and prudential regulation

	OLS	Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Prudential regulation						
Domestic learning	-0.033	-0.060*	-0.034		-0.296***	0.034
	(0.032)	(0.032)	(0.031)		(0.052)	(0.061)
Regional learning	0.116***		0.116***	0.117***	0.063***	0.199***
	(0.014)		(0.013)	(0.013)	(0.019)	(0.031)
Output gap	0.013	0.020	0.012		-0.001	-0.225
	(0.042)	(0.042)	(0.040)		(0.038)	(0.205)
Trade openness	-0.000*	-0.000	-0.000*	-0.000*	-0.000*	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
IMF	0.007	0.009	0.007		0.010	-0.011
	(0.007)	(0.007)	(0.007)		(0.007)	(0.034)
FIRST	0.004	0.002	0.004		0.006	-0.000
	(0.006)	(0.006)	(0.006)		(0.007)	(0.013)
LEFT	0.015	0.014	0.015*	0.014*	0.014	-0.024
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.034)
RIGHT	0.016*	0.015*	0.016**	0.016**	0.013	-0.020
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.033)
Banking crisis	0.014**	0.018	0.010	0.011	0.006	0.030
	(0.006)	(0.015)	(0.015)	(0.015)	(0.015)	(0.052)
Panel B: Dependent Variable: Banking crisis						
Credit gap		0.013**	0.013**	0.013**	0.002	0.040***
		(0.005)	(0.005)	(0.005)	(0.006)	(0.012)
Output gap		-0.870	-0.871		-0.598	-5.196**
		(0.650)	(0.649)		(0.672)	(2.638)
Trade openness		-0.002*	-0.002*	-0.002*	-0.002**	-0.013***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Inflation		0.835***	0.842***	0.863***	0.842***	-0.299
		(0.237)	(0.238)	(0.237)	(0.248)	(1.027)
Private sector credit to GDP		0.002*	0.002*	0.002*	0.007***	-0.004
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Public debt to GDP		0.004***	0.004***	0.004***	0.004***	0.008**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Wald test		0.02	0.12	0.07	0.10	0.26
Observation	1353	1353	1353	1353	998	355

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.11 Domestic debt crisis and prudential regulation

	OLS	Model	Model	Model	Non-OEDC
Panel A: Dependent Variable: Prudential regulation					
Domestic learning	0.006	-0.003	0.005		-0.238***
	(0.030)	(0.030)	(0.029)		(0.054)
Regional learning	0.137***		0.137***	0.138***	0.083***
	(0.014)		(0.014)	(0.014)	(0.020)
Output gap	0.004	0.008	0.002		-0.008
	(0.043)	(0.043)	(0.041)		(0.041)
Trade openness	-0.000*	-0.000	-0.000**	-0.000**	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.008	0.011	0.008		0.013*
	(0.008)	(0.008)	(0.007)		(0.007)
FIRST	0.006	0.004	0.006		0.008
	(0.006)	(0.006)	(0.006)		(0.007)
LEFT	0.016*	0.012	0.016*	0.015*	0.017*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
RIGHT	0.016*	0.013	0.016**	0.016**	0.016*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Domestic debt crisis	-0.007	-0.017	-0.026	-0.026	-0.020
	(0.015)	(0.021)	(0.021)	(0.021)	(0.022)
Panel B: Dependent Variable: Domestic debt crisis					
Credit gap		-0.013*	-0.013*	-0.012	-0.015*
		(0.008)	(0.008)	(0.008)	(0.009)
Output gap		-0.763	-0.772		-0.673
		(0.968)	(0.969)		(0.935)
Trade openness		-0.001	-0.001		-0.002
		(0.002)	(0.002)		(0.002)
Inflation		1.541***	1.551***	1.807***	1.147***
		(0.290)	(0.290)	(0.257)	(0.307)
Public debt to GDP		0.001	0.001		0.001
		(0.001)	(0.001)		(0.001)
Current account balance to GDP		-0.010	-0.010		-0.002
		(0.011)	(0.011)		(0.011)
Wald test		1.31	1.51	1.56	0.58
Observation	1415	1415	1415	1415	919

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.12 External debt crisis and prudential regulation

	OLS	Model	Model	Model	Non-OEDC
Panel A: Dependent Variable: Prudential regulation					
Domestic learning	-0.007	-0.014	-0.012		-0.248***
	(0.027)	(0.028)	(0.027)		(0.049)
Regional learning	0.121***		0.121***	0.120***	0.071***
	(0.012)		(0.012)	(0.012)	(0.018)
Output gap	0.011	0.005	0.005		-0.012
	(0.039)	(0.040)	(0.038)		(0.037)
Trade openness	-0.000	-0.000	-0.000		-0.000*
	(0.000)	(0.000)	(0.000)		(0.000)
IMF	0.009	0.010	0.009		0.010
	(0.007)	(0.007)	(0.007)		(0.006)
FIRST	0.003	0.002	0.003		0.005
	(0.006)	(0.006)	(0.005)		(0.006)
LEFT	0.007	0.007	0.007		0.011
	(0.008)	(0.008)	(0.008)		(0.009)
RIGHT	0.009	0.008	0.008		0.015*
	(0.007)	(0.007)	(0.007)		(0.008)
External debt crisis	-0.002	-0.009	-0.014	-0.011	-0.007
	(0.008)	(0.014)	(0.013)	(0.013)	(0.015)
Panel B: Dependent Variable: External debt crisis					
Credit gap		-0.005	-0.005		-0.010
		(0.006)	(0.006)		(0.007)
Output gap		-0.637	-0.642		-0.230
		(0.630)	(0.630)		(0.657)
Trade openness		-0.007***	-0.007***	-0.007***	-0.013***
		(0.002)	(0.002)	(0.002)	(0.002)
Inflation		3.143***	3.148***	3.186***	2.060***
		(0.266)	(0.266)	(0.265)	(0.280)
Foreign exchange reserve to external debt		-1.031***	-1.048***	-1.036***	-1.157***
		(0.350)	(0.351)	(0.350)	(0.375)
External debt to GDP		0.285***	0.279***	0.283***	0.804***
		(0.060)	(0.060)	(0.060)	(0.118)
Wald test		0.60	1.43	1.05	1.23
Observation	1718	1718	1718	1718	1048

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.13 Inflation crisis and prudential regulation

	OLS	Model	Model	Model	Non-OEDC	OECD
Panel A: Dependent Variable: Prudential regulation						
Domestic learning	-0.019	-0.028	-0.008		-0.265***	0.045
	(0.032)	(0.029)	(0.029)		(0.048)	(0.056)
Regional learning	0.118***		0.106***	0.105***	0.052***	0.198***
	(0.013)		(0.012)	(0.012)	(0.017)	(0.030)
Output gap	-0.004	0.055	0.052		0.033	-0.192
	(0.041)	(0.041)	(0.040)		(0.037)	(0.196)
Trade openness	-0.000*	0.000	-0.000		-0.000	-0.001
	(0.000)	(0.000)	(0.000)		(0.000)	(0.001)
IMF	0.008	0.008	0.007		0.009	-0.021
	(0.007)	(0.006)	(0.006)		(0.006)	(0.031)
FIRST	0.004	0.002	0.003		0.006	-0.004
	(0.006)	(0.006)	(0.006)		(0.006)	(0.013)
LEFT	0.013	0.013	0.013		0.014*	-0.034
	(0.009)	(0.008)	(0.008)		(0.008)	(0.033)
RIGHT	0.015*	0.015*	0.015**	0.007	0.015**	-0.029
	(0.008)	(0.008)	(0.007)	(0.006)	(0.007)	(0.033)
Inflation crisis	-0.006	0.118***	0.115***	0.114***	0.099***	0.171***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.033)
Panel B: Dependent Variable: Inflation crisis						
Credit gap		0.000	0.000		-0.001	-0.012
		(0.004)	(0.004)		(0.005)	(0.012)
Output gap		-1.911***	-1.943***	-1.642***	-1.915***	-2.261
		(0.547)	(0.544)	(0.495)	(0.567)	(2.526)
Trade openness		-0.004***	-0.004***	-0.004***	-0.006***	0.001
		(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Public debt to GDP		0.002*	0.001*	0.001*	0.001*	-0.004
		(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Money supply growth		1.429***	1.408***	1.402***	1.380***	0.671
		(0.177)	(0.178)	(0.177)	(0.194)	(0.694)
Wald test		398.48***	377.30***	382.91***	261.90***	41.32***
Observation	1385	1385	1385	1385	1015	370

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.14 Currency crisis and individual dimension of financial liberalization

	Aggregate index of financial liberalization	Capital account restrictions	Credit controls	Interest rate controls	Entry barriers	State ownership	Security markets
Panel A: Dependent Variable: Financial liberalization							
Domestic learning	0.085***	0.013	0.059	0.252***	0.077***	0.043	0.012
	(0.021)	(0.039)	(0.036)	(0.055)	(0.028)	(0.036)	(0.024)
Regional learning	0.108***	0.190***	0.141***	0.175***	0.115***	0.140***	0.134***
	(0.012)	(0.016)	(0.013)	(0.016)	(0.013)	(0.014)	(0.013)
Output gap	-0.006	0.012	0.004	0.068	0.037	-0.049	-0.069*
	(0.025)	(0.063)	(0.053)	(0.067)	(0.045)	(0.048)	(0.040)
Trade openness	0.000	-0.001*	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.019***	0.027**	0.007	0.037***	0.039***	0.004	0.001
	(0.004)	(0.011)	(0.009)	(0.012)	(0.008)	(0.008)	(0.007)
FIRST	0.002	0.010	0.006	-0.006	0.006	-0.008	0.004
	(0.004)	(0.009)	(0.008)	(0.009)	(0.006)	(0.007)	(0.005)
LEFT	0.010**	0.010	0.015	0.019	0.005	0.010	0.003
	(0.005)	(0.013)	(0.011)	(0.014)	(0.009)	(0.010)	(0.008)
RIGHT	0.012**	0.003	0.020**	0.017	0.020**	0.023***	0.006
	(0.005)	(0.012)	(0.010)	(0.012)	(0.008)	(0.009)	(0.007)
Currency crisis	0.023***	0.015	0.029	0.093***	-0.011	-0.012	0.021
	(0.008)	(0.022)	(0.019)	(0.025)	(0.013)	(0.017)	(0.025)
Panel B: Dependent Variable: Currency crisis							
Credit gap	0.017***	0.020***	0.020***	0.016***	0.020***	0.020***	0.018***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Output gap	-2.007***	-1.781***	-1.719***	-2.038***	-1.740***	-1.731***	-1.846***
	(0.644)	(0.658)	(0.648)	(0.622)	(0.654)	(0.654)	(0.659)
Trade openness	-0.001	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	3.996***	3.953***	4.014***	3.883***	3.959***	3.963***	3.965***
	(0.304)	(0.309)	(0.310)	(0.293)	(0.309)	(0.309)	(0.307)
Foreign exchange reserve to external debt	-0.869***	-0.900***	-0.917***	-0.727**	-0.937***	-0.911***	-0.878***
	(0.332)	(0.338)	(0.341)	(0.321)	(0.341)	(0.340)	(0.337)
Current account balance to GDP	0.001	0.001	0.000	0.001	0.001	0.001	0.000
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
	0.017***	0.020***	0.020***	0.016***	0.020***	0.020***	0.018***
Wald test	8.61***	0.38	2.82*	16.57***	0.80	0.00	0.59
Observation	1451	1451	1451	1451	1451	1451	1451

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.15 Banking crisis and individual dimension of financial liberalization

	Aggregate index of financial liberalization	Capital account restrictions	Credit controls	Interest rate controls	Entry barriers	State ownership	Security markets
Panel A: Dependent Variable: Financial liberalization							
Domestic learning	0.098***	0.019	0.027	0.198***	0.090***	0.004	0.027
	(0.022)	(0.041)	(0.039)	(0.057)	(0.028)	(0.036)	(0.024)
Regional learning	0.106***	0.174***	0.133***	0.176***	0.101***	0.108***	0.122***
	(0.012)	(0.016)	(0.013)	(0.016)	(0.012)	(0.014)	(0.012)
Output gap	0.011	0.047	0.021	0.054	0.057	-0.025	-0.073**
	(0.026)	(0.064)	(0.054)	(0.069)	(0.045)	(0.045)	(0.037)
Trade openness	0.000	-0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.015***	0.018*	0.010	0.023**	0.037***	-0.003	0.006
	(0.004)	(0.011)	(0.009)	(0.011)	(0.007)	(0.008)	(0.006)
FIRST	0.004	0.020**	0.004	-0.001	0.004	-0.006	0.004
	(0.004)	(0.010)	(0.008)	(0.010)	(0.007)	(0.007)	(0.006)
LEFT	0.008	-0.001	0.021*	0.015	0.002	0.017*	-0.008
	(0.005)	(0.014)	(0.011)	(0.015)	(0.009)	(0.010)	(0.008)
RIGHT	0.007	-0.008	0.018*	0.018	0.011	0.020**	-0.003
	(0.005)	(0.013)	(0.010)	(0.013)	(0.009)	(0.009)	(0.007)
Banking crisis	0.063***	-0.008	0.109***	0.163***	0.132***	-0.016	0.001
	(0.007)	(0.031)	(0.020)	(0.016)	(0.008)	(0.019)	(0.025)
Panel B: Dependent Variable: Banking crisis							
Credit gap	0.006	0.013**	0.011**	0.010**	0.008*	0.015***	0.013**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)	(0.006)
Output gap	-1.687***	-0.873	-1.237**	-1.321**	0.036	-0.823	-0.888
	(0.589)	(0.654)	(0.617)	(0.583)	(0.539)	(0.645)	(0.673)
Trade openness	-0.001	-0.002*	-0.002*	-0.001	-0.001	-0.002*	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.675***	0.832***	0.671***	0.689***	0.365*	0.835***	0.840***
	(0.215)	(0.238)	(0.231)	(0.213)	(0.199)	(0.237)	(0.246)
Private sector credit to GDP	0.002*	0.002*	0.002*	0.002	0.001	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Public debt to GDP	0.004***	0.004***	0.004***	0.004***	0.003***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Wald test	105.44***	0.00	30.32***	141.16***	327.84***	0.96	0.00
Observation	1353	1353	1353	1353	1353	1353	1353

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.16 Domestic debt crisis and individual dimension of financial liberalization

	Aggregate index of financial liberalization	Capital account restrictions	Credit controls	Interest rate controls	Entry barriers	State ownership	Security markets
Panel A: Dependent Variable: Financial liberalization							
Domestic learning	0.089***	0.008	0.060*	0.298***	0.080***	0.025	0.028
	(0.021)	(0.040)	(0.037)	(0.054)	(0.029)	(0.035)	(0.024)
Regional learning	0.113***	0.191***	0.145***	0.169***	0.115***	0.122***	0.118***
	(0.012)	(0.016)	(0.013)	(0.016)	(0.013)	(0.014)	(0.013)
Output gap	-0.010	0.018	-0.006	0.033	0.038	-0.006	-0.075**
	(0.025)	(0.061)	(0.053)	(0.064)	(0.044)	(0.045)	(0.037)
Trade openness	-0.000	-0.000*	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.016***	0.022**	0.007	0.028**	0.040***	-0.006	0.002
	(0.004)	(0.011)	(0.009)	(0.011)	(0.008)	(0.008)	(0.006)
FIRST	0.003	0.011	0.008	-0.002	0.005	-0.005	0.001
	(0.004)	(0.009)	(0.008)	(0.009)	(0.007)	(0.007)	(0.005)
LEFT	0.012**	0.011	0.018	0.022	0.008	0.013	0.001
	(0.005)	(0.013)	(0.011)	(0.014)	(0.009)	(0.009)	(0.008)
RIGHT	0.014***	0.002	0.021**	0.025**	0.022***	0.023***	0.008
	(0.005)	(0.012)	(0.010)	(0.012)	(0.009)	(0.009)	(0.007)
Domestic debt crisis	0.028*	-0.045	0.054	0.064	-0.008	0.074***	0.123***
	(0.016)	(0.036)	(0.035)	(0.040)	(0.025)	(0.020)	(0.012)
Panel B: Dependent Variable: Domestic debt crisis							
Credit gap	-0.016**	-0.012	-0.013*	-0.012	-0.012	-0.022***	-0.021***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Output gap	-1.292	-0.735	-0.838	-0.963	-0.744	-1.799*	-0.959
	(0.976)	(0.969)	(0.944)	(0.977)	(0.972)	(0.951)	(0.859)
Trade openness	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Inflation	1.511***	1.534***	1.479***	1.557***	1.537***	1.183***	1.230***
	(0.298)	(0.291)	(0.295)	(0.292)	(0.291)	(0.296)	(0.247)
Public debt to GDP	0.001	0.001	0.001	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Current account balance to GDP	-0.004	-0.009	-0.005	-0.008	-0.010	-0.009	-0.005
	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
Wald test	6.92***	0.00	6.50**	2.70	0.02	32.56***	174.10***
Observation	1415	1415	1415	1415	1415	1415	1415

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.17 External debt crisis and individual dimension of financial liberalization

	Aggregate index of financial liberalization	Capital account restrictions	Credit controls	Interest rate controls	Entry barriers	State ownership	Security markets
Panel A: Dependent Variable: Financial liberalization							
Domestic learning	0.081***	0.020	0.044	0.199***	0.081***	0.045	0.026
	(0.019)	(0.035)	(0.032)	(0.049)	(0.026)	(0.031)	(0.021)
Regional learning	0.093***	0.177***	0.132***	0.182***	0.112***	0.112***	0.110***
	(0.010)	(0.014)	(0.012)	(0.014)	(0.011)	(0.012)	(0.011)
Output gap	-0.002	0.022	0.005	0.041	0.041	-0.025	-0.032
	(0.023)	(0.057)	(0.048)	(0.063)	(0.041)	(0.042)	(0.034)
Trade openness	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.018***	0.025**	0.012	0.026**	0.037***	0.002	0.002
	(0.004)	(0.010)	(0.009)	(0.011)	(0.007)	(0.007)	(0.006)
FIRST	0.001	0.010	0.006	-0.005	0.003	-0.007	0.003
	(0.003)	(0.008)	(0.007)	(0.009)	(0.006)	(0.006)	(0.005)
LEFT	0.009**	0.006	0.016	0.014	0.009	0.011	0.002
	(0.005)	(0.011)	(0.010)	(0.013)	(0.008)	(0.008)	(0.007)
RIGHT	0.010**	-0.002	0.018**	0.017	0.018**	0.020***	0.005
	(0.004)	(0.011)	(0.009)	(0.012)	(0.008)	(0.008)	(0.006)
External debt crisis	0.029***	-0.023	0.025	0.067***	-0.005	0.030**	0.075***
	(0.009)	(0.020)	(0.021)	(0.025)	(0.014)	(0.015)	(0.011)
Panel B: Dependent Variable: External debt crisis							
Credit gap	-0.008	-0.005	-0.005	-0.006	-0.005	-0.005	-0.011**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
Output gap	-0.844	-0.646	-0.717	-0.725	-0.640	-0.632	-1.103*
	(0.622)	(0.633)	(0.624)	(0.630)	(0.632)	(0.631)	(0.573)
Trade openness	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Inflation	3.167***	3.152***	3.182***	3.166***	3.149***	3.151***	2.897***
	(0.264)	(0.267)	(0.265)	(0.263)	(0.267)	(0.267)	(0.255)
Foreign exchange reserve to external debt	-1.038***	-1.022***	-1.013***	-0.998***	-1.026***	-1.025***	-0.740**
	(0.345)	(0.350)	(0.348)	(0.351)	(0.351)	(0.350)	(0.309)
External debt to GDP	0.288***	0.286***	0.287***	0.283***	0.286***	0.285***	0.276***
	(0.058)	(0.060)	(0.059)	(0.059)	(0.060)	(0.060)	(0.053)
Wald test	9.52***	0.08	4.07**	3.89**	0.04	0.03	53.59***
Observation	1718	1718	1718	1718	1718	1718	1718

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.18 Inflation crisis and individual dimension of financial liberalization

	Aggregate index of financial liberalization	Capital account restrictions	Credit controls	Interest rate controls	Entry barriers	State ownership	Security markets
Panel A: Dependent Variable: Financial liberalization							
Domestic learning	0.092***	0.026	0.033	0.214***	0.071**	0.021	0.026
	(0.021)	(0.039)	(0.037)	(0.056)	(0.028)	(0.034)	(0.023)
Regional learning	0.106***	0.167***	0.137***	0.193***	0.109***	0.107***	0.111***
	(0.012)	(0.015)	(0.013)	(0.016)	(0.012)	(0.013)	(0.012)
Output gap	0.002	0.063	0.002	0.024	0.028	-0.005	-0.035
	(0.025)	(0.063)	(0.052)	(0.070)	(0.045)	(0.045)	(0.036)
Trade openness	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.015***	0.019*	0.010	0.024**	0.035***	-0.002	0.005
	(0.004)	(0.011)	(0.009)	(0.012)	(0.008)	(0.008)	(0.006)
FIRST	0.003	0.015	0.006	-0.002	0.003	-0.007	0.000
	(0.004)	(0.009)	(0.008)	(0.011)	(0.007)	(0.007)	(0.005)
LEFT	0.009	-0.000	0.019*	0.012	0.005	0.016*	-0.005
	(0.005)	(0.014)	(0.011)	(0.015)	(0.010)	(0.010)	(0.008)
RIGHT	0.011**	-0.006	0.020*	0.025*	0.018**	0.021**	0.001
	(0.005)	(0.012)	(0.010)	(0.014)	(0.009)	(0.009)	(0.007)
Inflation crisis	0.029***	0.029	0.018	0.065*	0.011	0.031	0.072***
	(0.009)	(0.024)	(0.020)	(0.034)	(0.026)	(0.019)	(0.011)
Panel B: Dependent Variable: Inflation crisis							
Credit gap	-0.013**	-0.010*	-0.010*	-0.011**	-0.010*	-0.013**	-0.017***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
Output gap	-2.495***	-2.304***	-2.271***	-2.380***	-2.212***	-2.344***	-2.360***
	(0.661)	(0.661)	(0.665)	(0.661)	(0.667)	(0.662)	(0.623)
Trade openness	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Public debt to GDP	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Money supply growth	2.084***	2.086***	2.071***	2.057***	2.078***	2.070***	1.727***
	(0.209)	(0.211)	(0.212)	(0.211)	(0.213)	(0.212)	(0.207)
Wald test	6.64**	1.35	0.13	2.81*	0.24	3.31*	54.60***
Observation	1385	1385	1385	1385	1385	1385	1385

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.19 Financial crisis and financial liberalization

	Three-year interval data of Abiad et al. (2008)									
	Currency crisis		Banking crisis		Domestic debt crisis		External debt crisis		Inflation crisis	
Panel A: Dependent Variable: Financial liberalization	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE
Domestic learning	-0.026	-0.039	-0.038	-0.045	-0.037	-0.038	-0.018	-0.008	-0.005	-0.018
	(0.066)	(0.065)	(0.060)	(0.059)	(0.066)	(0.065)	(0.061)	(0.060)	(0.068)	(0.067)
Regional learning	0.134***	0.119***	0.147***	0.139***	0.142***	0.133***	0.148***	0.136***	0.153***	0.145***
	(0.025)	(0.025)	(0.023)	(0.023)	(0.025)	(0.025)	(0.023)	(0.023)	(0.026)	(0.026)
Output gap	0.030***	0.239	0.044***	0.284	0.020	0.378*	0.030**	0.391**	0.007	0.480**
	(0.011)	(0.198)	(0.010)	(0.181)	(0.018)	(0.193)	(0.012)	(0.181)	(0.011)	(0.196)
Trade openness	0.356*	0.000*	0.404**	0.000**	0.435**	0.000	0.399**	0.000*	0.540***	0.000*
	(0.196)	(0.000)	(0.181)	(0.000)	(0.195)	(0.000)	(0.182)	(0.000)	(0.195)	(0.000)
IMF	0.000	0.012	0.000	0.012	0.000	0.025	0.000	0.011	0.000	0.023
	(0.000)	(0.023)	(0.000)	(0.021)	(0.000)	(0.022)	(0.000)	(0.022)	(0.000)	(0.022)
FIRST	0.030	-0.069***	0.019	-0.060***	0.028	-0.072***	0.017	-0.059***	0.029	-0.063***
	(0.023)	(0.022)	(0.021)	(0.020)	(0.023)	(0.022)	(0.022)	(0.020)	(0.022)	(0.023)
LEFT	-0.072***	0.017	-0.063***	0.025**	-0.074***	0.019	-0.062***	0.021*	-0.064***	0.016
	(0.022)	(0.013)	(0.020)	(0.012)	(0.022)	(0.013)	(0.020)	(0.013)	(0.024)	(0.014)
RIGHT	0.015	0.021	0.025**	0.026**	0.016	0.029**	0.019	0.024*	0.014	0.023*
	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)	(0.013)	(0.012)	(0.014)	(0.013)
Financial crisis	0.027**	0.107***	0.029**	0.161***	0.028**	0.101***	0.026**	0.087***	0.024*	0.081***
	(0.013)	(0.023)	(0.012)	(0.023)	(0.013)	(0.029)	(0.012)	(0.022)	(0.014)	(0.029)
Panel B: Dependent Variable: Financial crisis										
Credit gap		-0.000		0.006		-0.016		-0.015		-0.023*
		(0.013)		(0.011)		(0.018)		(0.015)		(0.013)
Output gap		-6.689***		-3.333*		-4.768		1.989		-3.490*
		(2.227)		(1.949)		(3.048)		(2.298)		(2.110)
Trade openness		-0.000		-0.003**		-0.001		-0.008***		-0.004**
		(0.002)		(0.001)		(0.003)		(0.003)		(0.002)
Inflation		4.441***		1.627***		2.950***		3.937***		
		(0.599)		(0.394)		(0.491)		(0.508)		
Foreign exchange reserve to external debt		-1.445***						-0.452		
		(0.509)						(0.452)		
Current account to GDP		0.002				0.016				
		(0.012)				(0.018)				
Private sector credit to GDP				0.002						
				(0.002)						
Public debt to GDP				0.007***		0.003				0.005***
				(0.002)		(0.003)				(0.002)
External debt to GDP								0.470***		
								(0.127)		
Money supply growth										2.488***
										(0.465)
Wald test		11.63***		16.70***		9.43***		8.96***		6.34**
Observation	490	490	550	550	488	488	554	554	455	455

Notes: (1) Columns in OLS and ETE show the results of the estimations of the OLS and endogenous treatment effects models, respectively. (2) *, **, and *** show the significance at 10%, 5%, and 1%, respectively.

Table 2.20 Financial crisis and financial liberalization

	Five-year interval data of Abiad et al. (2008)									
	Currency crisis		Banking crisis		Domestic debt crisis		External debt crisis		Inflation crisis	
Panel A: Dependent Variable: Financial liberalization	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE
Domestic learning	0.307***	0.279***	0.263***	0.245***	0.311***	0.309***	0.256***	0.265***	0.302***	0.276***
	(0.091)	(0.088)	(0.085)	(0.084)	(0.091)	(0.089)	(0.084)	(0.082)	(0.098)	(0.096)
Regional learning	0.243***	0.229***	0.264***	0.247***	0.252***	0.245***	0.262***	0.251***	0.258***	0.251***
	(0.035)	(0.033)	(0.033)	(0.032)	(0.035)	(0.034)	(0.032)	(0.032)	(0.037)	(0.036)
Output gap	0.226	0.206	0.265	0.233	0.204	0.198	0.293*	0.294*	0.178	0.128
	(0.170)	(0.170)	(0.167)	(0.166)	(0.171)	(0.168)	(0.166)	(0.163)	(0.181)	(0.179)
Trade openness	0.000	0.000	-0.000	0.000	-0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.040	0.008	0.035	0.020	0.046	0.039	0.022	0.005	0.031	0.021
	(0.038)	(0.036)	(0.036)	(0.036)	(0.038)	(0.037)	(0.037)	(0.037)	(0.040)	(0.039)
FIRST	-0.097**	-0.089**	-0.086**	-0.069*	-0.105**	-0.103**	-0.079*	-0.076*	-0.084	-0.079
	(0.045)	(0.043)	(0.042)	(0.042)	(0.045)	(0.044)	(0.042)	(0.041)	(0.053)	(0.051)
LEFT	0.003	0.004	0.008	0.006	0.003	0.004	0.009	0.009	0.010	0.011
	(0.019)	(0.019)	(0.019)	(0.018)	(0.020)	(0.019)	(0.019)	(0.018)	(0.021)	(0.020)
RIGHT	0.036*	0.019	0.029	0.027	0.031	0.032*	0.033*	0.028	0.031	0.030
	(0.020)	(0.019)	(0.018)	(0.018)	(0.019)	(0.019)	(0.018)	(0.018)	(0.021)	(0.020)
Financial crisis	0.029**	0.134***	0.019	0.133***	0.012	0.071*	0.038**	0.090***	0.021	0.105***
	(0.015)	(0.027)	(0.014)	(0.031)	(0.023)	(0.040)	(0.016)	(0.033)	(0.016)	(0.040)
Panel B: Dependent Variable: Financial crisis										
Credit gap		0.018		0.028		0.003		-0.000		-0.019
		(0.019)		(0.020)		(0.033)		(0.023)		(0.020)
Output gap		-3.787**		-5.020***		-3.217		-1.363		-3.499*
		(1.749)		(1.880)		(2.831)		(1.920)		(1.830)
Trade openness		-0.001		-0.003		-0.000		-0.005		-0.005*
		(0.002)		(0.002)		(0.004)		(0.004)		(0.003)
Inflation		3.968***		1.979***		2.893***		4.204***		
		(0.767)		(0.562)		(0.634)		(0.785)		
Foreign exchange reserve to external debt		-1.933***						-1.545*		
		(0.688)						(0.889)		
Current account to GDP		0.012				-0.003				
		(0.019)				(0.031)				
Private sector credit to GDP				0.001						
				(0.002)						
Public debt to GDP				0.005**		0.001				0.008***
				(0.002)		(0.003)				(0.003)
External debt to GDP								0.474**		
								(0.214)		
Money supply growth										2.527***
										(0.733)
Wald test		10.02***		10.11***		2.85*		3.16*		3.65*
Observation	248	248	281	281	248	248	281	281	234	234

Notes: (1) Columns in OLS and ETE show the results of the estimations of the OLS and endogenous treatment effects models, respectively. (2) *, **, and *** show the significance at 10%, 5%, and 1%, respectively.

Table 2.21 Financial crisis and financial liberalization

	Five-year interval data of Gwartney et al. (2016)									
	Currency crisis		Banking crisis		Domestic debt crisis		External debt crisis		Inflation crisis	
Panel A: Dependent Variable: Financial liberalization	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE
Domestic learning	0.447***	0.425***	0.473***	0.445***	0.470***	0.459***	0.470***	0.469***	0.392***	0.360***
	(0.111)	(0.104)	(0.100)	(0.098)	(0.107)	(0.105)	(0.101)	(0.099)	(0.120)	(0.113)
Output gap	-0.448**	-0.643***	-0.444**	-0.515**	-0.427**	-0.428**	-0.431**	-0.460**	-0.494**	-0.629***
	(0.210)	(0.226)	(0.200)	(0.206)	(0.205)	(0.202)	(0.201)	(0.201)	(0.218)	(0.205)
Trade openness	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.089*	0.021	0.071	0.049	0.067	0.059	0.075*	0.043	0.088*	0.053
	(0.047)	(0.044)	(0.044)	(0.043)	(0.046)	(0.045)	(0.045)	(0.045)	(0.049)	(0.046)
FIRST	-0.072	-0.089*	-0.049	-0.044	-0.066	-0.065	-0.047	-0.048	-0.089	-0.088
	(0.054)	(0.051)	(0.050)	(0.048)	(0.053)	(0.052)	(0.050)	(0.049)	(0.064)	(0.060)
LEFT	0.028	0.022	0.040*	0.041*	0.029	0.031	0.038*	0.037*	0.034	0.028
	(0.024)	(0.023)	(0.023)	(0.022)	(0.024)	(0.023)	(0.023)	(0.022)	(0.025)	(0.024)
RIGHT	0.045*	0.020	0.044*	0.039*	0.040*	0.041*	0.044*	0.037*	0.053**	0.046*
	(0.024)	(0.023)	(0.022)	(0.022)	(0.024)	(0.023)	(0.023)	(0.022)	(0.026)	(0.024)
Financial crisis	0.022	0.191***	0.025	0.168***	0.094***	0.160***	0.011	0.102***	0.023	0.194***
	(0.018)	(0.029)	(0.016)	(0.033)	(0.028)	(0.040)	(0.019)	(0.034)	(0.019)	(0.039)
Panel B: Dependent Variable: Financial crisis										
Credit gap		0.000		0.016		0.002		-0.008		-0.023
		(0.017)		(0.019)		(0.033)		(0.022)		(0.018)
Output gap		-4.050***		-4.276**		-3.273		-1.569		-3.274**
		(1.552)		(1.844)		(2.880)		(1.888)		(1.561)
Trade openness		-0.002		-0.002		0.000		-0.006		-0.006*
		(0.002)		(0.002)		(0.004)		(0.004)		(0.003)
Inflation		3.520***		2.229***		3.070***		4.083***		
		(0.683)		(0.571)		(0.645)		(0.726)		
Foreign exchange reserve to external debt		-1.064*						-1.325		
		(0.571)						(0.883)		
Current account to GDP		0.013				-0.020				
		(0.016)				(0.031)				
Private sector credit to GDP				0.001						
				(0.002)						
Public debt to GDP				0.004*		0.001				0.005**
				(0.002)		(0.003)				(0.002)
External debt to GDP								0.459**		
								(0.206)		
Money supply growth										2.406***
										(0.607)
Wald test		16.76***		11.95***		4.33**		9.69***		14.07***
Observation	248	248	281	281	248	248	281	281	234	234

Notes: (1) Columns in OLS and ETE show the results of the estimations of the OLS and endogenous treatment effects models, respectively. (2) *, **, and *** show the significance at 10%, 5%, and 1%, respectively.

Table 2.22 Financial crisis and prudential regulation

	Three-year interval data of Abiad et al. (2008)									
	Currency crisis		Banking crisis		Domestic debt crisis		External debt crisis		Inflation crisis	
Panel A: Dependent Variable: Prudential regulation	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE
Domestic learning	-0.076	-0.066	-0.077	-0.077	-0.074	-0.080	-0.047	-0.043	-0.026	-0.019
	(0.068)	(0.068)	(0.062)	(0.062)	(0.068)	(0.068)	(0.063)	(0.063)	(0.066)	(0.066)
Regional learning	0.114***	0.112***	0.104***	0.102***	0.114***	0.116***	0.126***	0.125***	0.164***	0.161***
	(0.028)	(0.027)	(0.025)	(0.025)	(0.028)	(0.028)	(0.026)	(0.026)	(0.027)	(0.027)
Output gap	-0.180	-0.213	-0.203	-0.294	-0.174	-0.142	-0.124	-0.122	0.073	0.031
	(0.264)	(0.265)	(0.243)	(0.244)	(0.264)	(0.265)	(0.245)	(0.243)	(0.241)	(0.242)
Trade openness	0.000	0.000	0.000*	0.000**	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	-0.006	-0.013	-0.025	-0.033	-0.008	-0.006	-0.012	-0.013	-0.003	-0.009
	(0.031)	(0.031)	(0.029)	(0.028)	(0.031)	(0.031)	(0.030)	(0.030)	(0.028)	(0.028)
FIRST	-0.053*	-0.054*	-0.038	-0.038	-0.053*	-0.054*	-0.042	-0.041	-0.037	-0.037
	(0.030)	(0.030)	(0.027)	(0.027)	(0.030)	(0.030)	(0.028)	(0.028)	(0.030)	(0.029)
LEFT	0.038**	0.039**	0.042**	0.043**	0.038**	0.037**	0.035**	0.035**	0.039**	0.040**
	(0.018)	(0.018)	(0.017)	(0.017)	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
RIGHT	0.046**	0.044**	0.044***	0.042***	0.045**	0.046**	0.043**	0.042**	0.037**	0.035**
	(0.018)	(0.018)	(0.016)	(0.016)	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Financial crisis	-0.001	0.025	0.078***	0.186***	0.012	-0.034	0.009	0.024	-0.002	0.066
	(0.014)	(0.034)	(0.014)	(0.055)	(0.025)	(0.067)	(0.016)	(0.044)	(0.014)	(0.058)
Panel B: Dependent Variable: Financial crisis										
Credit gap		0.014		0.021*		-0.010		-0.007		-0.012
		(0.014)		(0.012)		(0.019)		(0.015)		(0.014)
Output gap		-7.168***		-4.044*		-4.136		2.541		-3.325
		(2.338)		(2.098)		(3.199)		(2.391)		(2.168)
Trade openness		-0.001		-0.003**		-0.001		-0.009***		-0.004**
		(0.002)		(0.001)		(0.003)		(0.003)		(0.002)
Inflation		4.542***		1.265***		2.822***		3.935***		
		(0.630)		(0.468)		(0.492)		(0.528)		
Foreign exchange reserve to external debt		-1.081**						-0.188		
		(0.492)						(0.444)		
Current account to GDP		0.006				0.013				
		(0.013)				(0.020)				
Private sector credit to GDP				0.001						
				(0.002)						
Public debt to GDP				0.006***		0.002				0.004**
				(0.002)		(0.002)				(0.002)
External debt to GDP								0.488***		
								(0.133)		
Money supply growth										2.665***
										(0.522)
Wald test		0.77		2.45		0.42		0.15		1.63
Observation	490	490	550	550	488	488	554	554	455	455

Notes: (1) Columns in OLS and ETE show the results of the estimations of the OLS and endogenous treatment effects models, respectively. (2) *, **, and *** show the significance at 10%, 5%, and 1%, respectively.

Table 2.23 Financial crisis and prudential regulation

	Five-year interval data of Abiad et al. (2008)									
	Currency crisis		Banking crisis		Domestic debt crisis		External debt crisis		Inflation crisis	
Panel A: Dependent Variable: Prudential regulation	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE	OLS	ETE
Domestic learning	0.268***	0.275***	0.242***	0.244***	0.276***	0.273***	0.265***	0.274***	0.270***	0.271***
	(0.092)	(0.091)	(0.087)	(0.086)	(0.092)	(0.091)	(0.087)	(0.086)	(0.095)	(0.093)
Regional learning	0.271***	0.267***	0.271***	0.270***	0.271***	0.272***	0.282***	0.276***	0.286***	0.285***
	(0.038)	(0.038)	(0.036)	(0.036)	(0.038)	(0.038)	(0.036)	(0.037)	(0.039)	(0.038)
Output gap	-0.011	-0.014	-0.016	-0.017	0.004	0.002	-0.011	0.000	-0.017	-0.022
	(0.219)	(0.215)	(0.213)	(0.209)	(0.219)	(0.214)	(0.215)	(0.212)	(0.216)	(0.212)
Trade openness	-0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	-0.013	-0.021	-0.038	-0.040	-0.014	-0.012	-0.016	-0.030	-0.038	-0.040
	(0.050)	(0.051)	(0.048)	(0.048)	(0.050)	(0.050)	(0.049)	(0.053)	(0.048)	(0.049)
FIRST	-0.070	-0.069	-0.067	-0.066	-0.067	-0.067	-0.071	-0.068	-0.082	-0.082
	(0.058)	(0.056)	(0.054)	(0.053)	(0.058)	(0.057)	(0.055)	(0.054)	(0.064)	(0.062)
LEFT	0.075***	0.075***	0.068***	0.068***	0.075***	0.075***	0.062**	0.062***	0.081***	0.081***
	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.025)
RIGHT	0.085***	0.083***	0.074***	0.074***	0.090***	0.090***	0.072***	0.068***	0.084***	0.084***
	(0.025)	(0.025)	(0.024)	(0.023)	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.025)
Financial crisis	-0.024	-0.001	0.036**	0.050	-0.021	-0.037	-0.008	0.033	0.012	0.026
	(0.019)	(0.045)	(0.018)	(0.066)	(0.030)	(0.072)	(0.020)	(0.067)	(0.019)	(0.061)
Panel B: Dependent Variable: Financial crisis										
Credit gap		0.041*		0.051**		0.013		0.006		-0.012
		(0.022)		(0.021)		(0.033)		(0.024)		(0.022)
Output gap		-2.906		-3.409*		-2.341		-0.650		-2.355
		(2.049)		(2.013)		(2.963)		(1.988)		(1.964)
Trade openness		-0.001		-0.003		0.000		-0.006		-0.004*
		(0.002)		(0.002)		(0.004)		(0.005)		(0.003)
Inflation		4.731***		1.768***		3.006***		4.530***		
		(0.940)		(0.665)		(0.650)		(0.825)		
Foreign exchange reserve to external debt		-1.105						-1.337		
		(0.731)						(0.954)		
Current account to GDP		0.003				-0.014				
		(0.022)				(0.032)				
Private sector credit to GDP				0.000						
				(0.003)						
Public debt to GDP				0.003		-0.000				0.006**
				(0.002)		(0.003)				(0.003)
External debt to GDP								0.490**		
								(0.224)		
Money supply growth										3.253***
										(0.724)
Wald test		0.29		0.05		0.05		0.59		0.06
Observation	248	248	281	281	248	248	281	281	234	234

Notes: (1) Columns in OLS and ETE show the results of the estimations of the OLS and endogenous treatment effects models, respectively. (2) *, **, and *** show the significance at 10%, 5%, and 1%, respectively.

Table 2.24 Financial crisis and individual dimension of financial liberalization (Gwartney et al., 2016)

	Freedom to own foreign currency bank accounts (3D)					Black market exchange rates (4C)				
	Currency crisis	Banking crisis	Domestic debt crisis	External debt crisis	Inflation crisis	Currency crisis	Banking crisis	Domestic debt crisis	External debt crisis	Inflation crisis
Panel A: Dependent Variable: Financial liberalization										
Domestic learning	0.524**	0.439**	0.472**	0.436**	0.466**	0.186	0.304	0.284	0.246	0.031
	(0.224)	(0.205)	(0.222)	(0.203)	(0.228)	(0.234)	(0.220)	(0.230)	(0.222)	(0.249)
Output gap	-0.320	-0.279	-0.255	-0.299	-0.360	-1.132**	-1.028***	-0.977**	-0.967**	-1.174***
	(0.485)	(0.467)	(0.485)	(0.465)	(0.479)	(0.452)	(0.393)	(0.417)	(0.388)	(0.451)
Trade openness	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	0.231**	0.175*	0.173	0.189*	0.218**	-0.006	0.089	0.073	0.078	0.084
	(0.116)	(0.105)	(0.110)	(0.109)	(0.108)	(0.092)	(0.087)	(0.094)	(0.088)	(0.101)
FIRST	-0.059	0.007	-0.046	-0.004	-0.181	-0.227**	-0.160*	-0.172	-0.151	-0.167
	(0.126)	(0.117)	(0.126)	(0.116)	(0.138)	(0.106)	(0.097)	(0.108)	(0.097)	(0.130)
LEFT	0.016	0.031	0.020	0.022	0.021	0.069	0.088**	0.086*	0.086**	0.079
	(0.056)	(0.053)	(0.056)	(0.052)	(0.055)	(0.047)	(0.044)	(0.048)	(0.044)	(0.052)
RIGHT	0.064	0.058	0.067	0.039	0.091*	0.026	0.051	0.052	0.059	0.059
	(0.057)	(0.051)	(0.056)	(0.052)	(0.055)	(0.048)	(0.043)	(0.048)	(0.043)	(0.052)
Financial crisis	-0.096	-0.051	0.102	-0.001	0.107	0.379***	0.184*	0.213**	0.118*	0.160
	(0.125)	(0.127)	(0.131)	(0.110)	(0.143)	(0.062)	(0.096)	(0.088)	(0.062)	(0.106)
Panel B: Dependent Variable: Financial crisis										
Credit gap	0.045*	0.058**	0.009	-0.003	-0.023	0.023	0.048**	0.015	0.005	-0.010
	(0.024)	(0.023)	(0.033)	(0.025)	(0.022)	(0.018)	(0.021)	(0.033)	(0.024)	(0.022)
Output gap	-2.665	-3.197	-2.356	-0.718	-2.581	-2.448	-3.522*	-2.693	-0.466	-2.527
	(2.168)	(2.033)	(2.906)	(1.997)	(1.902)	(1.649)	(1.991)	(2.964)	(2.017)	(1.945)
Trade openness	-0.001	-0.003	0.000	-0.005	-0.004*	-0.002	-0.003	0.000	-0.005	-0.004*
	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)
Inflation	4.762***	1.774***	2.980***	4.522***		4.249***	1.952***	3.006***	4.601***	
	(0.935)	(0.626)	(0.655)	(0.791)		(0.765)	(0.609)	(0.652)	(0.768)	
Foreign exchange reserve to external debt	-1.166			-1.266		-1.269**			-1.371	
	(0.736)			(0.937)		(0.621)			(0.953)	
Current account to GDP	0.004		-0.015			0.006		-0.019		
	(0.022)		(0.031)			(0.018)		(0.032)		
Private sector credit to GDP		0.000					0.000			
		(0.002)					(0.002)			
Public debt to GDP		0.003	-0.000		0.005**		0.003	-0.000		0.006**
		(0.002)	(0.003)		(0.003)		(0.002)	(0.003)		(0.003)
External debt to GDP				0.441**					0.455**	
				(0.219)					(0.224)	
Money supply growth					2.998***					3.240***
					(0.786)					(0.713)
Wald test	0.17	0.38	0.30	0.65	1.89	12.09***	2.70	0.26	0.84	1.00
Observation	248	281	248	281	234	248	281	248	281	234

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 2.25 Financial crisis and individual dimension of financial liberalization (Gwartney et al., 2016)

	Controls of the movement of capital and people (4D)					Credit market regulations (5A)				
	Currency crisis	Banking crisis	Domestic debt crisis	External debt crisis	Inflation crisis	Currency crisis	Banking crisis	Domestic debt crisis	External debt crisis	Inflation crisis
Panel A: Dependent Variable: Financial liberalization										
Domestic learning	-0.068	-0.015	-0.064	0.073	-0.075	0.177*	0.291***	0.309***	0.284***	0.189
	(0.139)	(0.130)	(0.141)	(0.124)	(0.133)	(0.107)	(0.102)	(0.111)	(0.103)	(0.116)
Output gap	-0.558*	-0.627**	-0.483	-0.651**	-0.675**	-0.215	-0.161	-0.111	-0.084	-0.291
	(0.317)	(0.302)	(0.305)	(0.301)	(0.297)	(0.209)	(0.200)	(0.197)	(0.192)	(0.195)
Trade openness	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IMF	-0.002	0.014	0.033	-0.022	0.042	-0.023	0.001	0.015	-0.022	0.005
	(0.067)	(0.064)	(0.066)	(0.063)	(0.064)	(0.043)	(0.041)	(0.045)	(0.042)	(0.043)
FIRST	0.036	0.030	0.026	0.031	0.059	-0.076	-0.046	-0.067	-0.051	-0.080
	(0.077)	(0.072)	(0.078)	(0.070)	(0.086)	(0.048)	(0.046)	(0.051)	(0.046)	(0.058)
LEFT	-0.000	0.015	0.004	0.010	0.032	0.010	0.014	0.006	0.020	0.021
	(0.035)	(0.033)	(0.035)	(0.031)	(0.034)	(0.022)	(0.020)	(0.023)	(0.021)	(0.023)
RIGHT	-0.009	-0.003	0.017	-0.010	0.010	-0.020	-0.005	-0.008	-0.006	-0.003
	(0.035)	(0.031)	(0.034)	(0.031)	(0.034)	(0.022)	(0.021)	(0.023)	(0.021)	(0.023)
Financial crisis	0.247***	0.251***	0.284***	0.250***	0.281***	0.204***	0.192***	0.180***	0.164***	0.237***
	(0.049)	(0.049)	(0.057)	(0.043)	(0.053)	(0.025)	(0.024)	(0.035)	(0.027)	(0.029)
Panel B: Dependent Variable: Financial crisis										
Credit gap	0.010	0.021	-0.018	-0.016	-0.027	0.016	0.012	0.002	-0.000	-0.009
	(0.019)	(0.018)	(0.030)	(0.019)	(0.018)	(0.018)	(0.017)	(0.032)	(0.022)	(0.018)
Output gap	-4.983***	-5.472***	-4.720*	-3.518**	-4.503***	-3.364**	-3.992**	-3.753	-1.818	-2.619*
	(1.797)	(1.763)	(2.580)	(1.615)	(1.602)	(1.640)	(1.582)	(2.777)	(1.771)	(1.495)
Trade openness	-0.001	-0.002	0.001	-0.002	-0.005*	-0.001	-0.001	0.000	-0.003	-0.004
	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)
Inflation	3.798***	2.018***	2.963***	3.590***		4.095***	2.874***	3.307***	4.345***	
	(0.759)	(0.524)	(0.582)	(0.585)		(0.581)	(0.559)	(0.621)	(0.620)	
Foreign exchange reserve to external debt	-1.065*			-1.190*		-0.567			-1.196	
	(0.589)			(0.717)		(0.587)			(0.895)	
Current account to GDP	-0.010		-0.025			-0.003		0.017		
	(0.019)		(0.029)			(0.018)		(0.031)		
Private sector credit to GDP		-0.000					0.002			
		(0.002)					(0.002)			
Public debt to GDP		0.002	0.000		0.006**		0.003**	0.003		0.006***
		(0.002)	(0.002)		(0.002)		(0.001)	(0.002)		(0.002)
External debt to GDP				0.239					0.314*	
				(0.156)					(0.182)	
Money supply growth					2.635***					2.493***
					(0.556)					(0.513)
Wald test	11.47***	15.55***	11.18***	19.26***	17.10***	24.38***	31.97***	11.58***	16.79***	23.73***
Observation	248	281	248	281	234	248	281	248	281	234

*Significant at 10%
**Significant at 5%
***Significant at 1%

Chapter 3: Extreme capital inflow waves: Macroprudential policy or capital flow management?

Abstract: Following the IMF's institutional view of capital flows, this paper investigates links between extreme capital inflow waves and the use of macroprudential policy measures (MPMs) and capital flow management measures (CFMs). The analysis suggests that (i) sharp decreases in capital inflows (sudden stops) encourage regulators to tighten MPMs; (ii) the tightening of MPMs following sudden stops tends to target financial institutions rather than borrowers; (iii) sharp increases in capital inflows (surges) lead to the tightening of CFMs; and (iv) large and volatile capital inflows tend to promote the upgrading of MPMs and CFMs as financial policy reforms, particularly after the global financial crisis (GFC). These findings confirm that since the GFC, countries' practices are consistent with the recommendation of the IMF's institutional view wherein the use of MPMs is relevant to limiting the systemic risks to the financial system of sudden stops and CFMs are appropriate during surges that could increase risks to financial stability in future. Our results are robust to the exclusion of the GFC period and the use of gross capital flows, as well as to controls for contagion effects and addressing possible endogeneity problems.

Keywords: Extreme capital inflow waves; Macroprudential policy; Capital flow management.

3.1 Introduction

Prior to the 2008-2009 Global Financial Crisis (GFC), it was commonly acknowledged that financial integration could offer various benefits, including the more efficient allocation of capital across countries, better consumption smoothing through international risk sharing, enhanced macroeconomic and financial discipline, and higher investment and output growth. Supporters of financial globalization also argue that the cross-border movement of capital allows individual and institutional investors to diversify risks and foster technology transfer.[24] On the other hand, another body of literature criticizes financial globalization and notes the costs and risks associated with global financial integration, including the high probability of financial turmoil, contagion effects, and market segmentation between those who are able to participate in the global financial system and those who must rely on their domestic financial sector.[25]

The recent GFC and its consequences have led to the reconsideration of the implications of financial globalization and the existing financial regulatory framework, since the weaknesses of the current regulatory framework have been highlighted. Some studies argue that the existing financial regulatory framework is not sufficient to protect the stability of the financial system as a whole (Borio, 2003; Knight, 2006), since financial stability was mainly considered from a microprudential perspective that aimed to protect individual financial institutions. Thus, in the wake of the GFC, financial regulators have sought to determine the causes of crises as well as to identify policy tools to prevent future financial system crises. The United Nations Conference on Trade and Development (UNCTAD) emphasizes both regulatory weaknesses at the international and national levels and

[24] Many studies also show benefits of financial globalization. Kose et al. (2009) state that international financial integration improves risk diversification and capital allocation efficiency, thereby promoting productivity growth. Moreover, Fischer (1998) claims that openness to capital movements enables developing economies to transition from lower- to middle-income status, and Chinn and Ito (2006) and Calderón and Kubota (2009) suggest that access to international capital markets enhances the depth and scope of domestic financial markets.

[25] Bordo et al. (2010) argue that a greater amount of foreign debt is associated with an increased risk of financial crises and leads to significant permanent output losses. In addition, Gourinchas and Jeanne (2013) show a negative relationship between capitals flows and economic growth.

corporate governance weaknesses as the causes of the GFC in the UNCTAD 2010 report on corporate governance in the wake of the financial crisis.

The International Monetary Fund (IMF) also states in its 2012 Institutional View (IV) that capital account liberalization is not always optimal and, under certain conditions, capital controls on inflows and outflows can be appropriate to prevent and mitigate financial instability. In addition, the IMF has proposed regulatory frameworks, highlighting two possible approaches: macroprudential policy measures (MPMs) and capital flow management (CFMs). Although these two types of policy measures are often perceived as similar, the IMF (2012) emphasizes that their primary objectives do not necessarily overlap: MPMs can help mitigate systemic financial risks and improve the capacity of financial systems to safely intermediate cross-border flows and increase countries' resilience to aggregate shocks, including the risks associated with capital flows, whereas CFMs can help enhance financial stability in the face of extreme and volatile capital flows. The IMF's IV report further emphasizes that although MPMs can be used to enhance risk management capabilities, a more comprehensive discussion is still required to evaluate the usefulness of CFMs in managing the various financial risks arising from international capital flows.

In addition, the Basel Committee on Banking Supervision developed a new Basel regulatory framework, known as Basel III, which focuses primarily on strengthening macroprudential regulation. The establishment of Basel III reflects one of the most significant responses to recent crises (Claessens & Kodres, 2014). With the support of the IMF and the establishment of Basel III, since the GFC, academic researchers and financial regulators have proposed uses of MPMs and CFMs for crisis resolution. Thus, the term 'macroprudential' has become popular since the recent GFC, although it was first introduced by the Bank of England in 1979 (Kahou & Lehar, 2017; Maes, 2009). Macroprudential policy frameworks are now a focus of discussions about financial reform issues in most countries. In addition to MPMs, financial regulators have paid more attention to the need for capital flow controls than they had in the past due to the argument that extreme capital flow waves

have unfavorable effects. A number of emerging market economies have recently employed CFMs to smooth capital inflows (Ahmed & Zlate, 2014).

The purpose of this paper is to empirically test whether countries employ MPMs or CFMs following shocks related to volatile capital inflows. Two types of extreme capital inflow waves can occur: sharp declines in capital inflows (sudden stops) and sharp increases in capital inflows (surges). In this paper, we attempt to evaluate the following questions: (i) Do episodes of extreme capital inflows promote MPMs or CFMs? (ii) Are there any differences in the focuses of these policies in the pre- and post-GFC periods? Examining these questions could help determine whether countries have upgraded their macroprudential polices to address the systemic financial risks arising from large and volatile capital flows and whether they have increased controls on capital inflows in response to inflow surges to safeguard financial stability, as recommended in the IMF's policy advice on capital controls and macroprudential policies based on its IV. In addition, this examination enables us to consider differences in financial regulators' behaviors toward such policies before and after the GFC.

In empirically testing whether countries are likely to tighten MPMs or CFMs after experiencing episodes of extreme capital inflows, this study uses information on macroprudential policy measures constructed by Cerutti et al. (2017) and information on capital control measures from Fernández et al. (2016) for over 110 countries during the period from 2000 to 2013. First, we estimate a complementary logarithmic model as our base model, assuming that all types of capital inflow episodes are treated as exogenous economic shocks. The results indicate that sudden declines in net capital inflows (sudden stops) are likely to encourage financial regulators to tighten MPMs, whereas the association between sharp increases in capital inflows (surges) and the upgrading of MPMs is unclear. Given that sudden stops are considered a form of financial crisis, the positive relationship we identify between the occurrence of sudden stops and the tightening of MPMs would support the crises-beget-reforms arguments of Abiad and Mody (2005), Agnello et al. (2015), and Hlaing and Kakinaka (2018). Moreover, such sudden stops lead to tighter MPMs targeting financial institutions or lenders rather

than borrowers. In contrast, our results show that sharp increases in net capital inflows (surges) are likely to upgrade CFMs, although the association between episodes of capital inflows and CFMs is less significant.

The significant positive correlations between the occurrence of stop episodes and the tightening of macroprudential policies suggest that an economy facing reversals of capital inflows tends to upgrade its macroprudential policies to strengthen the resilience of the financial system so that it can withstand adverse capital flows shocks. In contrast, the non-significant associations between the occurrence of surge episodes and the tightening of MPMs confirm that MPMs will not be upgraded in the face of sharp increases in capital inflows because MPMs are not generally designed to limit capital flows. Concerning CFMs, the positive correlations between the incidence of surge episodes and the upgrading of CFMs indicate that an economy facing sharp increases in capital inflows upgrades its capital control measures to manage the risks associated with such high volatility. Therefore, our findings have confirmed that countries' current practices are consistent with the IMF's recommendations in light of the institutional view, where MPMs are relevant to limiting systemic risks in the whole financial system and CFMs are appropriate under circumstances of capital inflow surges that will raise the risks of prospective financial instability.

A group of studies has suggested that the existing micro-based financial regulatory framework is suspect and not strong enough to insure financial stability of the system as a whole because financial crises were infrequent before the GFC (Davis, 1999; Crockett, 2000; Borio, 2003; Knight, 2006). Nevertheless, financial regulators have mainly employed micro-based frameworks and have not emphasized reliable macro-based policy measures. However, the GFC reminded financial regulators worldwide of the need to emphasize macro-based frameworks, which have moved to the center given the reconsideration of financial policy reforms (Schoenmaker & Wierts, 2016; Kahou & Lehar, 2017; Fendoğlu, 2017). To empirically test and compare the importance of the GFC in relation to MPMs and CFMs, we divide the sample into pre- and post-GFC periods. Our analysis indicates that the upgrading

of MPMs and CFMs is more pronounced after the GFC period. MPMs and CFMs were not generally included in financial policy reforms following large and volatile capital inflows before the GFC, although the use of MPMs and CFMs has become much more common in the wake of the GFC. Our results confirm the arguments of Kahou and Lehar (2017) and Fendoğlu (2017) that financial stability was not considered from macroprudential perceptive prior to the GFC, and the GFC reminded financial regulators of the importance of the adoption of macroprudential policies with capital flow controls to achieve financial stability.

To confirm the empirical validity of our baseline results, this study conducts several robustness checks. First, we use gross capital inflows instead of net capital flows, since the literature emphasizes the importance of gross capital flows (Forbes & Warnock, 2012). Second, we consider contagion or bandwagon effects because the probability of changing financial policies can be connected to international convergence among peer countries (Abiad & Mody, 2005; Masciandaro et al., 2008; Masciandaro & Romelli, 2018). We use two indicators to proxy for the role of peer pressure in the diffusion of tightening MPMs and CFMs. Third, we mitigate the concern that our results are driven by the influence of the GFC by excluding and dummying out the years of the GFC (2008 and 2009). Finally, we use matching methods to mimic randomization with regard to the assignment of the treatment because the baseline regression may suffer from endogeneity problems. For example, some studies state that the likelihood of capital flow episodes is driven by various macroeconomic factors (Forbes & Warnock, 2012; Calderón & Kubota, 2013; Passari & Rey, 2015), which would induce endogeneity problems. Selection bias can occur since countries which experience capital inflow episodes tend to have different characteristics from those which do not. For example, our estimated results for the first-stage probit regressions show that countries with higher credit growth rate are less likely to experience sudden stop episodes and more likely to experience surge episodes. To address this issue, we re-estimate our models using matching methods, such as propensity score matching

(PSM) and inverse probability weighted regression adjustment (IPWRA). The sensitivity analysis qualitatively confirms the robustness of our baseline results.

The remainder of this paper is organized as follows. Section 2 reviews the literature related to international capital flows, macroprudential policy measures, and capital flow management. Section 3 describes the methodology used to identify capital flow episodes, the data, and the empirical specification. Section 4 presents the estimated results and discusses the economic and policy implications of our findings. Section 5 presents some robustness checks. The final section concludes.

3.2 Literature review

After the 2008-2009 GFC, economists and policymakers have been more supportive of macroprudential policies and capital control measures to improve the capacity to safely intermediate international capital flows and address their related systematic risks to financial systems. International organizations, such as the IMF and the BIS, and a large number of empirical studies have explored the relationships among macroprudential policies, capital controls, financial stability, and international capital flows. As noted by the IMF (2011, 2012), MPMs are required to address the stability of the financial system as a whole, and CFMs can be useful for mitigating the risks of capital flows. Although these policy measures are often perceived as similar, their primary objectives do not necessarily overlap (IMF, 2012). MPMs are tools that are primarily designed to mitigate systematic financial risks, improve resilience to large and volatile capital flows, and maintain financial system stability. On the other hand, CFMs encompass administrative, tax, and prudential tools that are designed to influence capital flows and are generally grouped into residency-based and other CFMs (Ibrahim & Keller, 2012).[26]

[26] Residency-based CFMs include a variety of measures that discriminate on the basis of residency, often called capital controls, including taxes on flows from non-residents, while other CFMs are measures that do not discriminate on the basis of residency, including limits on foreign currency borrowing and currency specific reserve requirements (Ibrahim & Keller, 2012).

3.2.1 Measures of macroprudential policy and capital flow management

Information on the actual use of macroprudential policies is limited. Most countries did not generally adopt explicit macroprudential policy frameworks before the GFC, and some countries have started paying more attention to the use of such policies since the GFC. Lim et al. (2011) construct 10 macroprudential instruments (caps on loan-to-value amounts, caps on debt-to-income ratios, caps on foreign currency lending, ceilings on credit or credit growth, limits on net open currency positions/currency mismatches, limits on maturity mismatches, reserve requirements, countercyclical capital requirements, time-varying/dynamic provisioning, and restrictions on profit distributions) for 49 countries over the period from 2000 to 2010. Ostry et al. (2012) identify two capital control measures and four prudential measures for 51 emerging markets over the period from 1995 to 2008. In addition, Kuttner and Shim (2013) construct a macroprudential policy measure using three categories (changes in various forms of reserve requirements, targeted credit policy measures, and housing-related tax policy measures) for 57 advanced and emerging market economies over the period from 1980 Q1 to 2011 Q4. Crowe et al. (2013) use capital requirements, dynamic provisioning (the practice of increasing banks' loan loss provisions during the upswing phase of the cycle), and loan-to-value (LTV) and/or debt-to-income (DTI) ratios as three sets of macroprudential measures in their analysis covering 40 countries during the period from 2000 to 2009.

From 2013-2014, the IMF's Monetary and Capital Department carried out the Global Macroprudential Policy Instruments (GMPI) Survey of the participating countries' financial authorities. They crossed-check the GMPI Survey with other surveys (Kuttner & Shim, 2013; Crowe et al., 2013). Most recent studies construct macroprudential measures employing information from the IMF's GMPI Survey (Cerutti et al., 2016; Cizel et al., 2016; Fendoğlu, 2017; Cerutti et al., 2017). Cerutti et al. (2016) construct five types of prudential instruments (capital buffers, interbank exposure limits, concentration limits, loan-to-value ratio limits, and reserve requirements) for 64 countries over the period 2000Q1 through 2014Q4. Cizel et al. (2016) construct quantity-based (limits on interbank

and foreign currency exposure) and price-based (dynamic provisioning requirements and taxes on financial institutions) macroprudential policy measures for advanced economies and emerging markets over the period from 2000 to 2013. Fendoğlu (2017) categorizes borrower- and financial institution–related measures for 18 major emerging market economies over the period from 2000Q1 to 2013Q2. Cerutti et al. (2017) group borrower-based and financial institution–based macroprudential policy indexes using 12 categories of macroprudential tools for 119 countries over the period from 2000 to 2013. Among these studies, Cerutti et al. (2017) provide the most comprehensive database because it covers a wider sample of countries, a longer sample period, and many macroprudential policy tools.

Most studies that create panel datasets of capital flow controls use de jure information, de facto indicators of capital account restrictions, or hybrid indicators combining the former two measures. For example, a stream of the literature constructs panel datasets of capital flow controls with a focus on de jure information from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (Grilli & Milesi-Ferretti, 1995; Quinn, 1997; Chinn & Ito, 2006). Grilli and Milesi-Ferretti (1995) construct a capital control index for 61 developed and developing countries over the period from 1960 to 1989, and Quinn (1997) creates a capital control index covering 64 countries over the period from 1958 to 1989. Chinn and Ito (2006) build capital control measures for 108 countries over the period from 1980 to 2000, and they updated their index in 2015 to cover 182 countries over the period from 1970 to 2015. Although these studies provide panel datasets covering long periods and/or broad country coverage, the informational content of these measures has many limitations because of the structure of the AREAER (Quinn et al., 2011).

Another group of studies constructs de jure measures of capital control (Bekaert et al., 2005; Lane & Milesi-Ferretti, 2007). Bekaert et al. (2005) build simple capital control indexes for 95 countries over the period from 1980 to 2006 by assigning a value of zero prior to the date of liberalization and one afterwards. Lane and Milesi-Ferretti (2007) construct a capital control database for 145 countries over the period from 1970 to 2004 by using external assets and liabilities. In addition,

several empirical works construct hybrid measures combining de jure information and de facto indicators of capital account restrictions (Schindler, 2009; Klein, 2012; Fernández et al., 2016). Schindler (2009) constructs a panel dataset for 91 countries over the period from 1995 to 2005, and Klein (2012) extends Schindler's (2009) dataset by including the period from 2006 to 2010, but this change limits coverage to 44 countries. Fernández et al. (2016) describe a new dataset of capital control restrictions on both inflows and outflows of 10 categories of assets (equities, bonds, money market instruments, collective investments, derivatives, commercial credits, financial credits, guaranties and sureties, direct investments, and real estate) for 100 countries over the period from 1995 to 2013 by extending Schindler's (2009) methodology. Fernández et al. (2016) provide the most comprehensive dataset covering a wide range of countries and a longer time period.

3.2.2 Related literature

With support from a series of IMF reports (2011, 2012) and Basel III, theoretical and empirical studies have been conducted on macroprudential policies and capital control management since the crucial event of the GFC. The main objectives of employing macroprudential policies are to mitigate business cycles, discipline large financial institutions, and control the risks arising from market failures and key externalities, such as externalities related to strategic complementarities, fire sales, and interconnectedness or contagion (Cerutti et al., 2017).

A strand of the literature has studied the role of macroprudential policies in addressing volatile capital flows, mitigating financial risks, and promoting financial stability, while another group of studies considers the links between macroprudential policies and developments in credit and leverage.

Lim et al. (2011) evaluate the effectiveness of macroprudential instruments and report that many macroprudential instruments could be effective in mitigating systemic risk. Dell'Ariccia et al. (2012) assess the effectiveness of macroeconomic and macroprudential policies in reducing the risk of a crisis or in limiting its consequences, and they conclude that macroprudential tools are effective in

alleviating the incidence of credit booms and decreasing the probability that booms end badly. Claessens et al. (2013) analyze the role of macroprudential policies in limiting the vulnerabilities of individual banks and thereby the overall banking system, and they conclude that countries are likely to benefit from greater use of macroprudential policies to mitigate risks in their banking systems. Crowe et al. (2013) explore the effects of macroprudential policies on real estate booms and busts and find that macroprudential policies, such as limits on loan-to-value ratios, appear to best control a boom.

Moreover, Zhang and Zoli (2016) suggest that macroprudential instruments help control housing price growth, credit growth, and bank leverage in Asia. Cerutti et al. (2017) also conclude that macroprudential policies are generally associated with reductions in credit growth, but a weaker association is observed in more developed and financially open economies. After studying the role of macroprudential policies in the risk-taking behaviors of banks, Altunbas et al. (2018) conclude that macroprudential tools are effective in modifying such risk-taking, and these policies seem more effective during a tightening phase than during an easing phase. However, the effectiveness of macroprudential policy tools in achieving their specific objectives, such as increasing the resilience of the financial system or taming financial booms and busts, still need to be examined. Macroprudential measures have become popular since the GFC. However, due to a lack of clear evidence about their effectiveness, policymakers are still a long way from knowing how to use them reliably (Blanchard et al., 2013).

Although capital inflow controls have been viewed as economic distortions and as sources of slow economic growth in the early 1990s, the recent GFC has favorably altered this view of capital inflow controls. One strand of the literature has examined the efficacy of capital flow controls. Farhi and Werning (2014) investigate the role of capital controls and suggest that optimal capital controls lean against the wind and help smooth out capital flows. Devereux and Yetman (2014) study the transmission of shocks that cause liquidity traps across countries and show that the existence of capital controls can help restore monetary policy effectiveness when the nominal interest rate reaches the zero

lower bound in a global liquidity trap context. Benigno et al. (2016) conclude that prudential capital controls, prudential regulations that take the form of capital controls, are beneficial for financial stability. Davis and Presno (2017) investigate the interaction between capital account management and optimal monetary policy in the context of a small open economy and conclude that capital controls allow monetary policy to focus less on the foreign interest rate and more on domestic variables such as inflation. In contrast, another strand of the literature has cast doubts on the effectiveness of capital controls. Magud et al. (2011) state that although capital controls make monetary policy more independent, change the composition of capital flows, and reduce real exchange rate pressures, the reliability of this evidence depends on the circumstances. Other papers, such as those by Forbes (2007), Kokenyne and Baba (2011), and Klein (2012), find limited effects of capital controls on monetary policy, capital flow volumes, and macroeconomic variables. Capital controls have long been employed to mitigate risks originating from volatile capital flows, and academicians and policymakers have discussed the roles of capital controls repeatedly. Nonetheless, the effects of capital controls are still controversial (Blanchard et al., 2013).

In addition, a growing body of literature focuses on both macroprudential policies and capital controls. For example, Ostry et al. (2012) state that macroprudential polices and capital flow management policies should be considered simultaneously and in an integrated manner. In addition, they argue that both policies can help reduce the financial stability risks associated with large capital inflows and enhance economic resilience during busts. Forbes et al. (2015) assess the impacts of capital controls and macroprudential measures and suggest that macroprudential measures significantly reduce financial fragility but that capital controls are ineffective in accomplishing most of their stated goals, except for reducing financial vulnerability. Korinek and Sandri (2016) state that employing both macroprudential policies and capital controls is optimal to mitigate the contractionary effects of exchange rate devaluation, because macroprudential polices can reduce the amount and riskiness of financial liabilities and capital controls can decrease net capital inflows. In general, MPMs and CFMs

have become popular and widely used around the world, and many works have been devoted to exploring their effectiveness since the GFC. However, the discussion of which policies are most effective in promoting financial stability, strengthening the resilience of the financial system, and controlling capital flows is still controversial. Although many studies have evaluated the consequences of capital controls and/or macroprudential policies, to the best of our knowledge, no empirical studies have discussed the determinants of financial policy reforms related to two important policy dimensions (MPMs and CFMs), which is the focus of this study.

With significant progress in financial globalization, cross-border banking and other capital flows have remarkably increased over time. Although normal capital flows may confer economic benefits, extreme capital flows can impose substantial economic costs and risks. Policy makers attempt to identify the causes and consequences of extreme capital flow waves (sudden stops and surges). For instance, studies find that surges in capital inflows have been associated with subsequent sudden stops or reversals in capital inflows (Calvo, 1998; Calvo & Reinhart,2000), and sudden stops are associated with currency depreciation, slower growth, and higher interest rates (Edwards, 2005; Freund & Warnock, 2007). At the same time, a group of studies states that push (external) factors are the main drivers of extreme capital flow waves (Forbes & Warnock, 2012; Calderón & Kubota, 2013; Passari & Rey, 2015).

After examining the causes and consequences of extreme capital flow waves, policymakers attempt to identify the best policy responses to such flows. Following the GFC, volatile capital flows were present in emerging Asian countries, and central banks in this region have intervened in their currency markets to mitigate the unfavorable impacts of volatile capital flows (Caporale et al., 2017). Financial policy reform is also a core dimension of the policy response to volatile capital flows, since its general objectives are to achieve a more flexible economy with an efficient allocation of financial resources, to enhance the resilience of the financial system, and to prevent crises in the future. Depending on the observed economic and financial conditions, regulators adopt different financial policy measures. For

example, in the crisis-begets-reform argument, different types of financial crises may produce different outcomes and encourage financial authorities to react with different policy measures (Abiad & Mody, 2005; Waelti, 2015; Hlaing & Kakinaka, 2018).[27] Likewise, policymakers might react differently to the different conditions of extreme capital flow movements (sudden stops and surges). A careful examination of how extreme capital flow waves influence policy behaviors related to MPMs and CFMs can provide important policy assessments and guidance in a globalized economy. However, no empirical studies have discussed such crucial policy issues, particularly related to MPMs and CFMs.

3.3 Empirical approach

This section first defines two types of extreme capital flow waves based on marked decreases and increases in capital inflows. Then, we present the methodology and data used in this study.

3.3.1 Defining capital inflow episodes

The identification of extreme capital flow waves or events, called capital flow episodes, was initiated by Calvo (1998) who defines a sudden stop as a marked slowdown in net capital inflows. Following his work, many works define episodes of extreme capital flow movements using either net inflows (Calvo et al., 2004; Guidotti et al., 2004) or gross flows (Forbes & Warnock, 2012). This paper defines extreme capital flow waves following Guidotti et al. (2004). We use net capital inflows to identify two types of capital flow episodes (sudden stops and surges). We denote the net capital inflows of country i in period t (year) as $\mathrm{nkif}_{i,t} = \mathrm{kif}_{i,t} - \mathrm{kof}_{i,t}$, where $\mathrm{kif}_{i,t}$and $\mathrm{kof}_{i,t}$ represent gross capital inflows and gross capital outflows, respectively, in country i in period t. Next, we calculate the year-over-year change in the capital inflows of country i in period t as $\Delta\mathrm{nkf}_{i,t} = \mathrm{nkf}_{i,t} - \mathrm{nkf}_{i,t-1}$, where $\mathrm{nkf}_{i,t}$

[27] Abiad and Mody (2005) observe that balance-of-payment crises promote financial liberalization, whereas banking crises set liberalization back. Waelti (2015) provides the evidence that a sudden flight triggers the liberalization of capital account restrictions, and a sudden stop promotes prudential regulation. Hlaing and Kakinaka (2018) show that of the five types of financial crises (currency, banking, domestic debt, external debt, and inflation crises), only banking and inflation crises promote prudential regulation.

represents net capital inflows. Then, the year-over-year change in capital inflows is normalized by a country's GDP as $\Delta NKF_{it} = \Delta nkf_{i,t}/Y_{i,t}$. A capital inflow episode takes place whenever the following two conditions are met: (i) $\Delta NKF_{it} < \mu(\Delta NKF_{it}) - \sigma(\Delta NKF_{it})$ or $\Delta NKF_{it} > \mu(\Delta NKF_{it}) + \sigma(\Delta NKF_{it})$, where μ and σ represent the sample mean and standard deviation of ΔNKF_{it}, respectively, and (ii) $\Delta NKF_{it} < -0.05$. In other word, a potential sudden stop (surge) is identified as a period during which the annual change in capital inflows (ΔNKF_{it}) falls below (rises above) the mean minus (plus) one standard deviation of ΔNKF_{it}. Among potential episodes, a change in capital inflows that is greater than 5% of GDP is defined as a capital inflow episode. By following this approach, we calculate two types of episodes: (i) sudden stops (sharp decreases in capital inflows) and (ii) surges (sharp increases in capital inflows).

3.3.2 Methodology and data

The objective of this paper is to assess whether the upgrading of MPMs or CFMs has been followed by a sharp decrease and increase of capital inflows (sudden stops and surges). Based on the previous literature, including work by Forbes and Warnock (2012) and Masciandaro and Romelli (2018), we estimate the following empirical equation for MPMs and CFMs considering the linkages between capital inflow episodes and macroeconomic variables:

$$Prob(P_{i,t} = 1) = F(\beta EPS_{i,t-1} + \gamma X_{i,t-1}), \quad (1)$$

where $P_{i,t}$ is a dummy variable that takes the value one if country i tightens policy (MPMs or CFMs) in year t and zero otherwise;[28] EPS is an episode dummy variable that takes the value one if country i experiences an episode (sudden stop or surges); and X is a vector of variables that are likely to be related to the probability of upgrading policy (MPMs or CFMs). We lag all independent variables so that any changes in MPMs or CFMs occur after the variable is measured.

[28] We focus only on the tightening of MPMs and CFMs because the cases that countries reduce MPMs and CFMs measures are rare in our dataset.

Since observations of tightening MPMs and CFMs are rare in our analysis (90 percent of the sample is zeros), an appropriate methodology with which to estimate equation (1) is the complementary logarithmic, or cloglog, framework, which is based on cumulative distribution function $F(\cdot)$ of the extreme value distribution:

$$F(z) = 1 - \exp[-\exp(z)]. \quad (2)$$

This function is asymmetric, unlike logit and probit models, and approaches zero slowly and one quickly. We cluster the standard errors by country in each of the empirical models to allow for the relaxation of the assumption of independence between observations in the data. We also include year dummies to control for time-specific effects.

Concerning MPMs, we use data from Cerutti et al. (2017). Using the IMF's GMPI Survey data, they construct two main measures: borrower-based and financial institution–based measures. Specifically, borrower-based measure includes two instruments: (i) caps on the loan-to-value ratio and (ii) the debt-to-income ratio. Financial institution–based measures includes ten instruments: (i) time-varying/dynamic loan loss provisioning, (ii) general countercyclical capital buffers/requirements, (iii) leverage ratio, (iv) capital surcharges on SIFIs, (v) limits on interbank exposure, (vi) concentration limits, (vii) limits on foreign currency loans, (viii) reserve requirement ratios and/or countercyclical reserve requirements, (ix) limits on domestic currency loans, and (x) levies/taxes on financial institutions. They also construct an aggregate macroprudential policy index (MPI) by summing the 12 policy instruments to capture the overall degree of macroprudential policy in a country. For our analysis, we first use an aggregate index of macroprudential policies to evaluate the relationship between capital inflow episodes and the tightening of overall macroprudential tools. We then use borrower-based and financial institution–based policies to verify which sector financial regulators target, because the aggregate index represents a rough approximation and different measures may differ in nature. We use annual changes in the aggregate index of macroprudential policies and its two dimensions by setting the index to one if policies are tightened and zero otherwise.

Concerning CFMs, we use information on capital control indicators from Fernández et al. (2016). They construct a measure of CFMs using both de jure information and de facto indicators of capital account restrictions. For de jure information, they draw on the IMF's AREAER. For de facto indicators, they account for the properties of capital controls on inflows and outflows based on 10 asset/direction categories: (i) equities, (ii) bonds (debt instruments with maturities greater than 1 year), (iii) money market instruments (debt instruments with maturities of 1 year or less), (iv) collective investments, (v) derivatives, (vi) commercial credits, (vii) financial credits, (viii) guaranties and sureties, (ix) direct investment, and (x) real estate. Then, they construct the overall level of capital control by using the average of capital inflow and outflow control measures. For our analysis, we use controls on capital inflows as CFMs since we focus on the analysis of extreme capital inflow waves. We use annual changes in the capital inflow control index by setting the value to one if the control is upgraded and zero otherwise.

To examine the relationship between extreme capital inflow waves and the probability of tightening MPMs or CFMs, this study considers two types of capital inflow episodes, (i) sharp declines in capital inflows (sudden stops) and (ii) sharp increases in capital inflows (surges), as explained in the previous subsection. To identify capital inflow episodes, yearly net capital inflow data are collected from the International Financial Statistics of the International Monetary Fund (IFS-IMF). In addition, we include a vector of control variables that are likely to be related to the tightening of MPMs and CFMs. First, we include U.S. stock volatility and globalization indexes, which are captured by the VXO volatility index of the Chicago Board Options Exchange and the overall KOF globalization index of Dreher (2006), respectively, in the model to control for common changes in global uncertainty and the overall level of a country's integration into the global economy. Second, we account for the level of central bank independence and proxy for distributional conflict by including the measure of central bank independence developed by Garriga (2016) and the fractionalization index from the World Bank's Database of Political Institutions, respectively. Third, the model controls for different

intervention strategies by incorporating the percent change in foreign exchange reserves to GDP. Fourth, we include three measures of macroeconomic conditions (the inflation rate, the percent change in private credit relative to GDP, and the real GDP growth rate) to account for inflation risk, credit growth, and output growth. The data on the percent change in foreign exchange reserves to GDP and the measures of macroeconomic conditions are obtained from the World Development Indicators (WDI). Finally, we include the level of MPMs or CFMs in the previous period in the model to account for the possibility that financial regulators' decisions to upgrade MPMs and CFMs depend on the present level of these policies. We use one-period lagged values for all independent variables in an effort to minimize the potential problem of reverse causality. Table 1 presents brief definitions and data sources for the variables used in our empirical analysis, and Table 2 shows the incidence of MPM and CFM tightening.

3.4 Empirical results

This section presents the results of estimating equation (1) to examine whether extreme capital inflow waves lead to the tightening of MPMs and CFMs and to discuss possible policy implications related to the crisis-begets-reform argument of Abiad and Mody (2013) and the IMF's recent macroprudential policy suggestions. Tables 3-5 presents the results of the MPM equations for each episode of sudden stops and surges, where Table 3 corresponds to aggregate MPMs, and Tables 4 and 5 correspond to financial institution–based MPMs and borrower-based MPMs, respectively. Table 6 presents the results of the CFM equations for each episode of sudden stops and surges. Columns (1) and (2) in each table present the baseline regression, which includes only capital inflow episodes (sudden stops or surges). Columns (3) and (4) include macroeconomic variables as controls, and column (5) includes both types of capital inflow episodes and macroeconomic variables. In addition, we divide the entire period into two sub-samples: the pre-GFC period ranging from 2000 to 2008 and the post-GFC period ranging from 2009 to 2013. The estimated results are described in columns 6-11 of each table.

3.4.1 Macroprudential policy measures

The estimation results for overall macroprudential policy shown in Table 3 show that the coefficients on sudden stop episodes are significant and positive, indicating that incidences of sudden decreases in capital inflows are likely to tighten overall macroprudential polices. Regarding financial institution–based and borrower-based macroprudential policies, the estimation results in Tables 4 and 5 show that the coefficients on episodes of sudden stops are significant and positive for financial intuition–targeted instruments, whereas the results are less clear for borrower-targeted instruments. Our results for policy responses are consistent with the arguments in some previous studies. Neagu and Racaru (2013) suggest that capital inflow stops put systemic pressure on the financial system, and Fendoğlu (2017) states that a stringent macroprudential policy stance is effective in reducing the impacts of capital inflows on credit cycles. Aysan et al. (2015) also emphasize the role of financial institution–based macroprudential policy in helping to reduce the impact of capital flows on domestic credit. Given these arguments, financial regulators facing sudden stops in capital inflows tend to upgrade macroprudential policy, particularly financial institution–based macroprudential policy. In addition, since sudden stops can be regarded as one type of financial crisis, the finding of a positive relationship between sudden stop episodes and the tightening of macroprudential policies supports the crisis-begets-reform argument in the crisis-reform literature (Abiad & Mody, 2005; Agnello et al., 2015; Hlaing & Kakinaka, 2018).

To evaluate whether the 2008-2009 GFC induces significant changes in policy responses to extreme capital inflow waves, we divide the full sample into pre- and post-GFC periods. The results related to overall MPMs and financial institution–based MPMs in Tables 3 and 4 indicate that the coefficients on sudden stops are non-significant during the pre-GFC period but significant and positive during the post-GFC period. The results for borrower-based MPMs in Table 5 reveal that the coefficients on sudden stops are non-significant during both pre- and post-GFC periods.

Macroprudential policy was insensitive to sudden stops in capital inflows before the GFC, but the incidence of sudden stops has encouraged financial regulators to upgrade macroprudential policy, particularly financial institution–targeted instruments rather than borrower-targeted ones, in a more pronounced manner since the GFC. On the other hand, the results in Tables 3-5 show that the coefficients on surges are non-significant in all models, irrespective of the subsample period, so surges in capital inflows do not promote the upgrading of macroprudential policy during either pre- or post-GFC periods.

With respect to other control variables in the models of overall MPMs and financial institution– and borrower-targeted MPMs, the analysis reveals that the GFC represents an important turning point in policy reforms such that macroprudential policy during the post-GFC period generally became more sensitive to macroeconomic environments and institutional conditions compared to that during the pre-GFC period. As shown in Tables 3-5, during the post-GFC period, the upgrading of financial institution–targeted MPMs is positively associated with central bank independence and the ratio of credit to GDP, and it is negatively correlated with global uncertainty. In addition, the upgrading of borrower-targeted MPMs is positively associated with globalization and the growth rate during the post-GFC period. On the other hand, the upgrading of financial institution–targeted MPMs and the ratio of foreign exchange reserves to GDP are positively correlated during the pre-GFC period while the correlation appears to diminish during the post-GFC period.

3.4.2 Capital flow management

The estimations for the link between capital inflow episodes and upgrading of CFMs in Table 6 show that the coefficients of surge episodes are significant and positive, although at the 10 percent level. The results indicate that financial regulators are likely to strengthen controls on capital inflows after experiencing capital inflow surges. Several studies reveal that surge episodes can raise macroeconomic challenges and financial stability concerns. For example, Calvo (1998) and Calvo and Reinhart (2000)

state that sudden stops or reversals in capital inflows often follow surges in capital inflows. Powell and Tavella (2012) also reveal that capital inflow surges are associated with subsequent banking crises or recessions. However, Ostry et al. (2012) and Fernández et al. (2013) suggest that capital controls promote financial stability and improve macroeconomic adjustment in economies. The IMF has also released an official statement endorsing the use of capital controls to manage the risks associated with inflow surges or disruptive outflows. Thus, our positive association between surges and upgrading CFMs coincides with the argument that policy makers may use capital controls in a precautionary capacity to mitigate the risks of financial and macroeconomic instability in the future.

Similar to the MPM case, to evaluate whether the 2008-2009 GFC causes significant changes in policy responses of CFMs to extreme capital inflow waves, we divide the full sample into pre- and post-GFC periods. The results in Table 6 indicate that the coefficients on surges are non-significant during the pre-GFC period but significant and positive during the post-GFC period. Although capital control policy was insensitive to surges in capital inflows before the GFC, the incidence of surge episodes has encouraged financial regulators to tighten controls over capital inflows in the aftermath of the GFC. On the other hand, Table 6 indicates that the coefficients on sudden stops are non-significant in all models irrespective of the subsample periods, so sudden stops of capital inflows do not promote the tightening of capital controls during either pre- or post-GFC periods. Regarding the other control variables, the analysis reveals that the inflation rate is positively linked with upgrading CFMs, which is consistent with the findings of Forbes et al. (2015). Although there is no association between CFM upgrading and global uncertainty during the pre-GFC period, the coefficient on global uncertainty becomes significant and negative during the post-GFC period. Moreover, the upgrading of CFMs is negatively associated with globalization during the pre-GFC period, although there is no association between them during the post-GFC period.

3.4.3 Macroprudential policy measures and capital flow management

The previous subsections indicate that the incidence of sudden stop episodes is positively associated with the tightening of macroprudential policies, whereas occurrences of surge episodes are positively related with the upgrading of controls on capital inflows. Financial regulators use macroprudential polices after experiencing sudden decreases in capital inflows, and they use capital control polices in the face of sudden increases in capital inflows. These findings have several important implications for the international finance literature. First, the IMF (2013) notes that macroprudential polices do not seek to affect the strength of capital flows; rather, their main objectives are to create buffers and reduce the systemic risks associated with capital flow reversals. Our results are consistent with the IMF's policy advice that financial regulators employ macroprudential polices to address capital flow reversals, which can put systemic pressure on the financial system (Neagu & Racaru, 2013). However, macroprudential polices are not employed to slow down capital inflows during capital flow bonanzas.

Second, given the crisis-begets-reform argument, our results confirm that financial crisis promotes macroprudential policy reform since sudden stops are regarded as a type of financial crisis. In the aftermath of a financial crisis, governments implement financial regulatory reforms, which mainly include the tightening of macroprudential policies, to increase the resilience of their financial systems. Third, the IMF's institutional view of capital flows states that macroeconomic policies including monetary, fiscal, and exchange rate policies should be employed in order to address the risks arising from capital inflow surges since such episodes can fuel macroeconomic and financial instability. When room for macroeconomic policy adjustment is limited, CFMs might be useful for supporting macroeconomic policy adjustment and safeguarding financial system stability (IMF, 2017). Our results state that financial regulators' current practices are consistent with the IMF's recommendation that capital control policies should be employed to address capital flow bonanzas, which could contribute to systemic risks in the financial sector (Calvo, 1998; Calvo & Reinhart, 2000; Powell & Tavella, 2012). The findings on the relationship between MPMs and sudden stops as well as on the nexus between CFMs and surges are consistent with IMF policy recommendations for countries experiencing

large and volatile capital flows based in the institutional view. Moreover, our study has confirmed that awareness of the need to use macroprudential and capital control policies has been highlighted, particularly since the critical event of the GFC.

3.5 Robustness checks

In this subsection, we perform a series of robustness checks by (i) dummying out and excluding the GFC period, (ii) using gross capital inflows instead of net capital flows, (iii) incorporating contagion effects, and (iv) employing matching methods to address possible endogeneity problems.

3.5.1 Dummying out and excluding the GFC period

Given the crisis-begets-reform hypothesis, the GFC could provide an environment favorable to financial policy reforms, since financial regulators have to repair the cracks exposed by the crisis or prevent future crises. It has been widely acknowledged that compared with other cases of extreme capital flow waves, the effects of the GFC were more substantial and prevailed across many countries. Thus, our results could be driven by the GFC period. To mitigate this concern, we exclude observations during GFC (2008 and 2009) from our sample. Alternatively, we dummy out the years of the GFC (2008 and 2009) by including a dummy variable that equals one for years of the GFC and zero otherwise. Table 7 presents the results. Even after losing some observations during the GFC period or controlling for the GFC periods with the dummy variables, the analysis shows that sudden stops promote the upgrading of MPMs and surges promote the upgrading of CFMs, although these results are less significant. These results are qualitatively similar to those of our main results and confirm that they are not seriously driven by the GFC period.

3.5.2 Using gross capital inflows

Although capital flow episodes have traditionally been identified using the net capital inflows in the literature, recent papers have shifted to using gross capital flows (Milesi-Ferretti et al., 2011; Forbes & Warnock, 2012). Several studies state that shocks to capital flows are driven by the decisions of domestic or foreign investors who may have different features of foreign investment. Although our primary objective is not to capture distinctions in the behaviors of domestic and foreign investors, it is worth using gross capital inflows instead of net capital flows as a robustness check. The results in Table 8 show the non-significant coefficients on sudden stops and surges during the pre-GFC period. However, the estimation reveals a positive link between stop episodes and tightening MPMs during the post-GFC period. In addition, the robustness check shows a positive link between surge episodes and upgrading CFMs during the post-GFC period, although the estimated coefficient is less significant. These results generally coincide with our previous results, so our findings are robust to replacing net capital inflows with gross capital inflows.

3.5.3 Incorporating contagion effects

The probability of changing financial policies is connected to international convergence among peer countries that learn from and follow the policy changes implemented by their peers. Some empirical studies also stress the importance of international convergence in institutional design (Abiad & Mody, 2005; Persson & Tabellini, 2009; Masciandaro et al., 2008; Masciandaro & Romelli, 2018). Abiad and Mody (2005) build a measure of regional learning or diffusion that focuses on the idea that countries within a region will attempt to catch up to the highest (or regional leader's) level of financial policy reform within the region. Persson and Tabellini (2009) also propose a measure of a country's closeness to democracy with respect to its neighboring countries. Recently, Masciandaro and Romelli (2018) use the weighted average of the supervisory architecture among neighbors to explain institutional similarities among countries. Thus, we consider peer, contagion, or bandwagon effects in this

robustness check. This study uses two indicators to proxy for the role played by peer pressure in the diffusion of tightened macroprudential policies and controls on capital inflows.

The first measure of peer effects is based on spatial spillover effects among countries. Following the work of Masciandaro and Romelli (2018), we construct a measure of geographical contagion based on spatial spillover (peer) effects among countries. Specifically, the measure of the geographical contagion is calculated as the absolute value of the difference in the policy index (MPMs or CFMs) between a country and its peers:

$$\text{Peers}(\rho)_{i,t} = \left|\sum_{i \neq j}(\text{Policy}_{it} - \text{Policy}_{jt})\varpi(\rho)_t^{j,i}\right|,$$

where Policy_{it} and Policy_{jt} are the levels of MPMs or CFMs, respectively, in base country i and its peer country j at year t, and $\varpi(\rho)_t^{j,i}$ is a declining function of the standardized distance between i and j. The weights $\varpi(\rho)_t^{j,i}$ are obtained from the inverse distance matrix between paired countries and are zero for countries outside the assumed radius ρ. Closer countries are assigned higher weights based on the inverse distance matrix. We follow the works of Elhorst et al. (2013) and Masciandaro and Romelli (2018) and assume a 3000-km radius ρ for the distance. We obtain the geographical distance data from the CEPII database. As the second measure of peer effects, we build a measure of continental contagion for country i at year t, which is computed as the share of countries that upgrade MPMs or CFMs in year t and are located on the same continent as country i.

Table 9 presents the results of the models with contagion effects (geographical and continent contagion). The results related to the links between sudden stops and surges and the upgrading of MPMs (CFMs) are robust to the inclusion of contagion measures. Sudden stop episodes promote the upgrading of MPMs, particularly after the GFC, while surge episodes promote the upgrading of CFMs, particularly after the GFC. This implies that our baseline findings are robust after accounting for these contagion effects. In addition, the analysis suggests that countries face international pressure to tighten their MPMs and CFMs, which provides clear evidence of contagion effects. The results reveal that MPMs are sensitive to geographical contagion, while CFMs are sensitive to continental contagion.

These findings of the existence of contagion across countries are in line with previous studies, such as those by Masciandaro et al. (2008) and Masciandaro and Romelli (2018), that show the contagion effects of central bank and financial supervision reforms. Shorter distances between a country and its geographical peers and higher shares of countries upgrading their policies on the same continent encourage countries to tighten their MPMs and CFMs.

3.5.4 Addressing possible endogeneity problems

The fourth and final robustness check considers alternative econometric approaches to our baseline regression. Our baseline analysis focused on the probability of tightening policies without considering endogeneity issues. However, there is some concern that capital inflow episodes are not random because macroeconomic conditions can also affect the likelihood of experiencing capital inflow episodes, which could induce endogeneity problems. For example, a body of literature argues that extreme fluctuation in capital flows is mainly driven by global and domestic factors (Forbes & Warnock, 2012; Calderón & Kubota, 2013; Passari & Rey, 2015). Therefore, the characteristics of individual countries may affect treatments and outcomes such that selection bias could exist in our analysis. Countries that experience capital inflow episodes can be different from those that do not, which could induce selection bias or 'non-random assignment.'[29] For example, credit growth may significantly be related to the occurrence of capital inflow episodes, and countries with intensified globalization may experience capital inflow episodes. To overcome these econometric challenges, we employ propensity-score matching (PSM) and inverse-probability-weighted regression adjustment (IPWRA) or doubly robust estimations. We assume capital inflow episodes (sudden stops and surges) as the treatment, where countries experiencing episodes are included in the treatment group, whereas countries that are not experiencing episodes are included in the control group.

[29] Persson (2001) provides evidence of how the PSM method can overturn standard cross-country regression results of the effect of currency union on trade when countries which adopt a common currency are systemically different from those which do not.

To test for significant effects of capital inflow episodes on the likelihood of upgrading MPMs and CFMs, we calculate the average treatment effect on the treated (ATT) for each episode instead of calculating the average treatment effect (ATE) because the ATT works better than the ATE when the treatment assignment mechanism is not random. Following Imbens and Wooldridge (2009), the ATT is calculated by comparing the average value of the outcome variable for treated observations with that for the respective control observations:

$$\mathrm{ATT} = \mathrm{E}[\mathrm{Y}_1|\mathrm{D}=1] - \mathrm{E}[\mathrm{Y}_0|\mathrm{D}=1],$$

where D is a dummy for capital inflow episodes (sudden stops or surges); Y_1 and Y_0 are potential outcomes (upgrading MPMs or CFMs) for countries that experience episodes and do not experience the episodes, respectively (two counterfactual situations); $\mathrm{Y}_0|\mathrm{D}=1$ is the value of the outcome of interest that would have been observed if the country had not experienced the episode (counterfactual outcome); and $\mathrm{Y}_1|\mathrm{D}=1$ is the value of the outcome that is actually observed in the same country. A crucial problem concerns the difficulty of estimating the ATT because the counterfactual outcome is the unobservable value of $\mathrm{E}[\mathrm{Y}_0|\mathrm{D}=1]$. When the occurrence of capital inflow episodes is random, the average outcome of units not exposed to treatment, $\mathrm{E}[\mathrm{Y}_0|\mathrm{D}=1]$, is a proper substitute, so the ATT can be estimated from differences in the sample means of the outcome variables of the treatment and control groups. However, the incidence of capital inflow episodes, i.e., selection into treatment, can be endogenous.

In non-experimental analyses, treatment assignment is not random (De Janvry et al., 2010; Heckman & Vytlacil, 2007). In the absence of random assignment, observed and unobserved characteristics of individual countries may affect treatments and outcomes such that selection bias persists. The idea behind matching methods is to mimic randomization with regard to the assignment of the treatment. The unobserved counterfactual outcome is imputed by matching treated units with untreated units that are as similar as possible with regard to all pretreatment characteristics that are associated with selection into treatment and affect the outcome of interest. Realizations of the outcome

measure for these matches are used as an empirical proxy for the unobserved counterfactual. The estimate of the ATT based on matching is defined as:

$$\mathrm{ATT(x)} = \mathrm{E}[\mathrm{Y_1}|\mathrm{D} = 1, \mathrm{X} = \mathrm{x}] - \mathrm{E}[\mathrm{Y_0}|\mathrm{D} = 0, \mathrm{X} = \mathrm{x}],$$

where x is a vector of relevant pretreatment characteristics or covariates that are expected to be related to capital flow episodes, $\mathrm{E}[\mathrm{Y_1}|\mathrm{D} = 1, \mathrm{X} = \mathrm{x}]$ is the expected outcome for units that received treatment, and $\mathrm{E}[\mathrm{Y_0}|\mathrm{D} = 0, \mathrm{X} = \mathrm{x}]$ is the expected outcome for the treated units' best matches.

In this robustness check, the covariates include the same control variables used in the baseline models in the previous section, namely, one-period lagged values of the VXO volatility index, overall KOF globalization index values, central bank independence, fractionalization index, percent change in foreign exchange reserves to GDP, inflation rate, percent change in private credit relative to GDP, real GDP growth rate, and MPM or CFM levels. We first estimate the ATT by applying the propensity score matching (PSM) method, which could reduce selection bias by creating comparable counterfactual outcomes for treated units. Once the treated units are matched, PSM assumes no systematic differences in unobservable characteristics between treated and untreated units. Given the estimated propensity scores $\mathrm{P(x)}$ under the main assumptions, i.e., conditional independence, independent and identically distributed observations, and common support assumptions, the ATT can be computed as:[30]

$$\mathrm{ATT} = \mathrm{E}[\mathrm{Y_1}|\mathrm{D} = 1, \mathrm{P(x)}] - \mathrm{E}[\mathrm{Y_0}|\mathrm{D} = 0, \mathrm{P(x)}].$$

[30] The first assumption is the conditional independence assumption (CIA) or confoundedness; i.e., after controlling for observed covariates, the potential outcomes are independent of the treatment assignment. This assumption states that no unobservable variable affects both the likelihood of treatment and the outcome of interest, after conditioning on covariates. CIA is a strong assumption, and it does not consider any unobservable differences. The second assumption is independent and identically distributed observations, which requires that the potential outcomes and treatment status of each individual are independent of the potential outcomes and treatment status of all other individuals in the sample. The third assumption is the common support or overlap condition, which suggests that every observation comes with a positive probability of being treated and control. There are several statistical tests that can be employed to assess the accuracy of the matching, i.e., the mean value of covariates between treatment and control groups should be similar after matching or whether the algorithm removes any significant differences between the treated and control groups. This balancing property aims to ensure that treatment is independent of unit characteristics after conditioning on the observed covariates (Heinrich et al., 2010). We employ two balancing property tests to evaluate the common support condition and independence assumption.

This study first applies PSM using the nearest neighbor and calculates the ATT for capital inflow episodes.

However, the ATT estimated from PSM can still suffer from bias in the presence of misspecification of the propensity score model (Robins et al., 2007; Wooldridge, 2007, 2010). One potential remedy for such a problem is to apply IPWRA estimation methods (Imbens & Wooldridge, 2009). IPWRA estimators use weighted regression coefficients to compute the averages of treatment-level predicted outcomes, where the weights are the estimated inverse probabilities of treatment.[31] Unlike PSM, IPWRA has a doubly robust property that ensures consistent results, as it allows the outcome and the treatment model to account for misspecification. PSM will provide inconsistent estimates if the treatment model is misspecified. On the other hand, with IPWRA, if the treatment model is misspecified, the estimates of the treatment effect can still be consistent as long as the outcome model is not misspecified. In addition, if the treatment model is not misspecified, IPWRA can provide consistent estimates even when the outcome model is misspecified. That is, IPWRA estimates are consistent in the presence of misspecification of the treatment or outcome model but not both (Imbens & Wooldridge, 2009; Wooldridge, 2010).

In addition to the misspecification issue, IPWRA improves on PSM in two ways. First, the outcome model includes controls for the observation's baseline characteristics. Both IPWRA and PSM need to meet the conditional independence assumption, which states that no unobservable variable affects both the likelihood of treatment and the outcome of interest, after conditioning on the covariates. Since IPWRA includes more covariates in the outcome model than PSM, which includes only the covariates in the treatment model, this assumption is more likely to hold with IPWRA than with PSM. Second, unlike PSM, which compares each treatment observation to control observations that have similar likelihoods of being treated in a restrictive way, IPWRA implicitly compares every unit to

[31] As with any method of estimating treatment effects, IPWRA requires several assumptions, such as the conditional independence, independent and identically distributed observations, and overlap assumptions.

every other while placing higher weights on observations that have a similar likelihood of being treated and lower weights on observations that are dissimilar. To estimate the treatment effects with IPWRA, we first estimate the parameters of the treatment model and derive inverse-probability weights. By using the estimated inverse-probability weights, we fit weighted regression outcome models for each treatment level and obtain treatment-specific predicted outcomes for each subject. Finally, we compute the means of the treatment-specific predicted outcomes so that the contrasts of these outcomes provide the estimates of the ATT.

This robustness check estimates the ATTs on the basis of four different specifications on sudden stop or surge episodes of net capital inflows (treatment) or on the upgrading of MPMs or CFMs (outcomes) for the full sample and the two subsamples of the pre- and post-GFC periods. The first specification (model 1) is the same as in the previous section, and the outcome variable is a dummy that equals one if the country upgrades MPMs (CFMs) in current period and zero otherwise. The treatment variable is a dummy that equals one if the country experiences a capital flow episode in the previous period and zero otherwise. This specification examines relatively short-term policy reactions to capital inflow episodes. For the second specification (model 2), we use the same treatment variable used in model 1 but modify the outcome variable by assigning the value one if the country upgrades MPMs (CFMs) in the two years following the current period. By doing so, we evaluate longer-term policy reactions to capital inflow episodes compared with model 1. Moreover, following the work of Forbes et al. (2015), we consider a third specification (model 3) with the same outcome variable used in model 1 by accounting for an exclusion window for 1 year before and 1 year after an episode of capital inflow (treatment) during which a country is not used as a control observation even if it does not experience an episode during these years. The fourth specification (model 4) considers the same specification as model 3 but extends the exclusion window to 2 years before and 2 years after an episode. Forbes et al. (2015) suggest that such an exclusion window prevents countries that recently experienced or are about to experience an episode from being used as a control observation and

prevents matching treated observations for one country with control observations for the same country at slightly different points in time.

Table 10 reports the results of PSM and IPWRA for the four specifications (models 1-4).[32] The results indicate that the coefficients on sudden stops and surges are generally insignificant for both MPMs and CFMs for the pre-GFC subsample. However, for the post-GFC subsample, the coefficients on sudden stops are significant and positive for MPMs, and those on surges are significant and positive for CFMs. These results are consistent with our baseline findings that sudden stop episodes promote the upgrading of MPMs, whereas surge episodes promote the tightening of CFMs, particularly after the GFC. Thus, our findings hold after considering possible endogeneity issues.

3.6 Conclusion

An extensive body of literature has examined the relationship between extreme capital flow waves and capital controls. In addition to capital control policies, the role of macroprudential policies in response to extreme capital flow waves has attracted considerable attention among financial regulators and researchers, particularly since the 2008-2009 GFC. It is generally accepted that the primary objective of macroprudential policies is to limit systemic financial risks, and the primary purpose of capital controls is to limit large fluctuations in capital flows. However, no previous studies have investigated the crucial relationships among volatile capital inflows, macroprudential policies, and capital control policies. In this paper, we have assessed policy responses to extreme capital inflow waves in

[32]We first estimate a probit regression for the probability of having capital inflow episodes to obtain a distribution of propensity scores in order to match treated and control observations. Tables A1 and A2 in the appendix present the estimated results of the first-stage probit regressions for model 1. We perform two formal tests to assess if propensity score matching is valid. First, the common support condition (also known as the overlap test) is performed. The test result confirms that for each set of observable characteristics in X_i, we have a positive probability that a country observation is treated and untreated (i.e., $0 < p(X_i) < 1$), which indicates that all treated observations are on-support for upgrading MPMs and CMFs over the full sample as well as the pre- and post-GFC subsamples. Second, we perform the balancing tests. Tables A3-A5 report the test results of model 1 for the full sample and the two subsamples of the pre-GFC and post-GFC periods, respectively. The results indicate that there are significant differences between the treated and unmatched control groups, which would highlight the importance of selection bias. However, there are no longer significant differences between the treated and matched control groups, so that the PSM method would remove the selection bias.

macroprudential policy measure and capital flow management contexts, which are closely related to the IMF's institutional view, using panel data for 110 countries over the period 2000-2013.

The paper has presented four important results. First, countries are likely to tighten overall MPMs after experiencing sudden cessations in net capital inflows (sudden stops). Second, concerning financial regulators' targeting decisions, the incidence of such sudden stops encourages policymakers to target financial institutions rather than borrowers. Third, financial regulators are likely to upgrade CFMs only in the face of surges in net capital inflows. Fourth, our results have confirmed that MPMs and CFMs were not included in financial policy reforms following large and volatile capital inflows before the GFC but have become much more common in the wake of the GFC. Therefore, our findings are consistent with the argument that after the GFC, countries' practices are consistent with the IMF's recommendations on institutional view in which the use of MPMs can help limit systemic risks to the whole financial system after a period of sudden stops and CFMs can be appropriate in the face of surges that could lead to risks to financial stability in future.

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Tables

Table 3.1. Definitions and sources of variables

Variable	Definition and construction	Source
Sudden stops	A sharp decrease in capital inflows	Author's calculations with data from International Financial Statistics of the International Monetary Fund (IFS-IMF)
Surges	A sharp increase in capital inflows	
Macroprudential policy measures (MPMs)	Sum of the measures of the 12 instruments of macroprudential policy index (MPI)	Cerutti et al. (2017)
Capital flow management (CFMs)	Sum of the measures of the 10 asset categories of controls on capital inflows	Fernández et al. (2016)
Global uncertainty	Chicago Board Options Exchange, VXO volatility index	Federal Reserve Economic Data
Globalization	Overall KOF globalization index	Dreher (2006)
Central bank independence	The measure for central bank independence	Garriga (2016)
Fractionalization	Total fractionalization index	World Bank's Database of Political Institutions (DPI2012)
Private sector credit to GDP (% change)	Ratio of private sector credit to GDP	World Development Indicators
Foreign exchange reserve to GDP (% change)	Ratio of total reserves minus gold to GDP	World Development Indicators
Real GDP growth	Annual growth rate of real GDP (constant 2010 US$)	World Development Indicators
Inflation rate	Consumer prices (annual %)	World Development Indicators

Table 3.2. Macroprudential policy and capital control measures

country	MPMs (+)	CFMs (+)	country	MPMs (+)	CFMs (+)	country	MPMs (+)	CFMs (+)
Albania	1	0	Finland	1	2	Nepal	2	0
Algeria	2	3	France	1	0	Netherlands	2	0
Angola	2	2	Georgia	2	1	New Zealand	1	0
Argentina	2	8	Germany	1	1	Norway	2	2
Armenia	0	0	Ghana	1	2	Pakistan	3	4
Australia	0	1	Haiti	2	0	Paraguay	0	2
Austria	2	1	Honduras	2	0	Peru	2	1
Azerbaijan	3	0	Hong Kong	0	1	Philippines	1	3
Bahamas	2	0	Hungary	2	1	Poland	1	1
Bahrain	0	3	Iceland	1	2	Portugal	2	4
Bangladesh	1	2	India	1	1	Romania	3	2
Belarus	0	0	Indonesia	2	3	Russian Federation	0	3
Belgium	0	0	Ireland	0	0	Saudi Arabia	1	2
Belize	0	0	Israel	4	2	Singapore	2	0
Bhutan	0	0	Italy	0	0	Slovakia	1	0
Bosnia-Herzegovina	0	0	Jamaica	2	4	Slovenia	0	2
Botswana	0	0	Japan	0	0	Solomon Islands	1	0
Brazil	0	4	Jordan	2	0	South Africa	1	2
Brunei	2	0	Kazakhstan	1	4	South Korea	4	2
Bulgaria	3	0	Kenya	0	0	Spain	0	1
Burundi	0	0	Kuwait	1	1	Sri Lanka	0	0
Cambodia	0	0	Kyrgyz Republic	3	5	St. Kitts and Nevis	1	0
Canada	1	0	Lao PDR	0	0	Sudan	1	0
Cape Verde	0	0	Latvia	2	0	Sweden	1	1
Chile	0	2	Lebanon	2	3	Switzerland	3	0
China	5	0	Lesotho	1	0	Tajikistan	1	0
Colombia	1	4	Lithuania	1	0	Thailand	2	3
Costa Rica	1	2	Macedonia	0	0	The Gambia	1	0
Croatia	1	0	Malawi	0	0	Tonga	0	0
Cyprus	1	3	Malaysia	0	3	Trinidad and Tobago	1	0
Czech Republic	0	1	Malta	0	0	Tunisia	0	0
Dominican Republic	2	3	Mauritius	0	1	Turkey	4	4
Ecuador	3	1	Mexico	1	2	Uganda	2	0
El Salvador	0	1	Moldova	1	4	Ukraine	4	1
Estonia	0	0	Mongolia	2	0	United Kingdom	0	1
Ethiopia	0	4	Morocco	0	0	United States	1	0
Fiji	0	0	Mozambique	1	0			

Notes: "+" denotes the addition or tightening of measures.

Table 3.3. Tightening of MPMs and extreme capital inflow waves

	Full sample					Before GFC			After GFC		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sudden stop in net flows	0.814***		0.838***		0.868***	0.764*		0.770*	0.789***		0.854***
	(0.217)		(0.257)		(0.265)	(0.441)		(0.454)	(0.265)		(0.264)
Surge in net flows		-0.009		0.007	0.150		-0.088	0.032		0.209	0.354
		(0.259)		(0.284)	(0.289)		(0.393)	(0.404)		(0.395)	(0.403)
Macroprudential regulation			0.004	0.003	0.007	0.099	0.091	0.100	-0.098	-0.095	-0.092
			(0.067)	(0.071)	(0.068)	(0.095)	(0.097)	(0.097)	(0.109)	(0.109)	(0.110)
Global uncertainty			-0.033	-0.019	-0.031	-0.020	-0.014	-0.020	-0.082**	-0.076**	-0.083**
			(0.045)	(0.044)	(0.045)	(0.053)	(0.050)	(0.052)	(0.036)	(0.036)	(0.036)
Globalization			0.009	0.011	0.009	-0.003	-0.000	-0.003	0.035***	0.037***	0.035***
			(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
Central bank independence			1.230*	1.052	1.226*	0.511	0.237	0.511	2.390*	2.589*	2.381*
			(0.691)	(0.690)	(0.692)	(0.906)	(0.849)	(0.905)	(1.371)	(1.372)	(1.336)
Fractionalization			-0.383	-0.443	-0.365	-0.409	-0.531	-0.403	-0.001	-0.012	0.024
			(0.630)	(0.685)	(0.642)	(0.732)	(0.820)	(0.758)	(1.125)	(1.121)	(1.125)
Private credit to GDP (% change)			1.455**	1.179	1.394*	1.081	0.859	1.066	3.325***	2.984**	3.135**
			(0.722)	(0.719)	(0.717)	(0.976)	(0.969)	(0.937)	(1.209)	(1.255)	(1.238)
Foreign exchange reserve to GDP (% change)			0.735***	0.725***	0.724***	0.732***	0.715***	0.730**	0.026	-0.041	-0.007
			(0.230)	(0.222)	(0.233)	(0.280)	(0.271)	(0.285)	(0.396)	(0.385)	(0.390)
Real GDP growth			0.044	0.040	0.044	0.013	0.014	0.013	0.111**	0.112**	0.109**
			(0.030)	(0.031)	(0.030)	(0.045)	(0.047)	(0.045)	(0.050)	(0.047)	(0.049)
Inflation			1.998	1.982	1.989	1.779	1.935	1.780	3.822	3.644	3.735
			(1.316)	(1.326)	(1.322)	(1.783)	(1.810)	(1.789)	(2.445)	(2.407)	(2.409)
Observations	1406	1406	1139	1139	1139	666	666	666	473	473	473
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.4. Tightening of MPMs (financial institutions-base) and extreme capital inflow waves

	Full sample					Before GFC			After GFC		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sudden stop in net flows	0.739***		0.836***		0.879***	0.630		0.638	0.881***		0.967***
	(0.238)		(0.262)		(0.271)	(0.511)		(0.517)	(0.317)		(0.325)
Surge in net flows		0.131		0.065	0.208		-0.041	0.041		0.233	0.417
		(0.281)		(0.310)	(0.318)		(0.420)	(0.425)		(0.418)	(0.428)
Macroprudential regulation			-0.080	-0.083	-0.075	0.039	0.030	0.041	-0.187	-0.195	-0.180
			(0.101)	(0.101)	(0.103)	(0.117)	(0.119)	(0.121)	(0.158)	(0.154)	(0.161)
Global uncertainty			-0.044	-0.032	-0.041	-0.056	-0.052	-0.056	-0.073*	-0.066*	-0.074*
			(0.050)	(0.049)	(0.050)	(0.055)	(0.054)	(0.055)	(0.039)	(0.040)	(0.040)
Globalization			0.001	0.002	0.000	-0.012	-0.010	-0.013	0.025*	0.027*	0.024*
			(0.009)	(0.010)	(0.009)	(0.012)	(0.012)	(0.012)	(0.014)	(0.015)	(0.014)
Central bank independence			2.195***	2.007***	2.179***	1.689	1.440	1.689	2.911**	3.115***	2.837**
			(0.726)	(0.701)	(0.730)	(1.135)	(0.996)	(1.134)	(1.145)	(1.137)	(1.133)
Fractionalization			-0.957	-0.983	-0.935	-0.940	-0.975	-0.933	-0.715	-0.702	-0.676
			(0.671)	(0.711)	(0.687)	(0.883)	(0.947)	(0.897)	(0.992)	(0.997)	(1.008)
Private credit to GDP (% change)			1.868**	1.566*	1.778**	1.410	1.219	1.391	3.445***	3.043**	3.199***
			(0.804)	(0.833)	(0.816)	(1.134)	(1.176)	(1.102)	(1.134)	(1.202)	(1.224)
Foreign exchange reserve to GDP (% change)			0.595***	0.585***	0.577***	0.681***	0.672***	0.677***	-0.229	-0.310	-0.253
			(0.192)	(0.182)	(0.186)	(0.245)	(0.238)	(0.244)	(0.470)	(0.438)	(0.451)
Real GDP growth			0.026	0.022	0.026	-0.030	-0.029	-0.030	0.093	0.095	0.091
			(0.036)	(0.038)	(0.037)	(0.050)	(0.054)	(0.050)	(0.062)	(0.059)	(0.061)
Inflation			1.869	1.911	1.845	1.063	1.307	1.063	4.085*	3.855	3.942
			(1.505)	(1.460)	(1.510)	(1.767)	(1.755)	(1.767)	(2.431)	(2.369)	(2.423)
Observations	1297	1297	1040	1040	1040	567	567	567	473	473	473
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.5. Tightening of MPMs (borrowers-base) and extreme capital inflow waves

	Full sample					Before GFC			After GFC		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sudden stop in net flows	0.789*		0.664		0.661	0.989		1.027	-0.239		-0.307
	(0.479)		(0.633)		(0.649)	(0.746)		(0.779)	(1.129)		(1.121)
Surge in net flows		-0.158		-0.122	-0.018		0.007	0.203		-0.350	-0.382
		(0.472)		(0.489)	(0.496)		(0.693)	(0.720)		(0.827)	(0.830)
Macroprudential regulation			-0.015	-0.015	-0.015	-0.003	-0.001	-0.005	-0.021	-0.024	-0.020
			(0.253)	(0.253)	(0.253)	(0.450)	(0.418)	(0.452)	(0.410)	(0.408)	(0.408)
Global uncertainty			-0.081	-0.069	-0.081	0.018	0.031	0.020	-0.273	-0.291	-0.288
			(0.087)	(0.082)	(0.087)	(0.112)	(0.104)	(0.111)	(0.199)	(0.200)	(0.203)
Globalization			0.031**	0.032**	0.031**	0.008	0.010	0.007	0.104***	0.106***	0.106***
			(0.014)	(0.014)	(0.014)	(0.016)	(0.015)	(0.016)	(0.035)	(0.036)	(0.035)
Central bank independence			-0.658	-0.774	-0.659	-0.907	-1.200	-0.903	0.738	0.600	0.661
			(1.126)	(1.154)	(1.137)	(1.233)	(1.197)	(1.236)	(3.014)	(3.220)	(3.239)
Fractionalization			0.550	0.469	0.548	0.673	0.474	0.719	0.781	0.785	0.795
			(0.813)	(0.820)	(0.810)	(0.995)	(1.004)	(1.054)	(2.004)	(2.000)	(1.991)
Private credit to GDP (% change)			0.753	0.624	0.760	0.529	0.234	0.429	5.234	5.533	5.494
			(1.419)	(1.353)	(1.354)	(1.564)	(1.528)	(1.549)	(4.764)	(4.555)	(4.610)
Foreign exchange reserve to GDP (% change)			1.099***	1.087***	1.100***	0.909*	0.859*	0.898	0.964	1.023*	1.023*
			(0.339)	(0.325)	(0.342)	(0.538)	(0.503)	(0.558)	(0.588)	(0.604)	(0.599)
Real GDP growth			0.091*	0.087*	0.091*	0.073	0.069	0.074	0.207**	0.210**	0.209**
			(0.050)	(0.051)	(0.050)	(0.057)	(0.058)	(0.057)	(0.104)	(0.104)	(0.104)
Inflation			2.820	2.744	2.821	2.162	2.047	2.159	8.064	8.206	8.160
			(2.266)	(2.303)	(2.252)	(3.164)	(3.306)	(3.210)	(5.092)	(5.036)	(5.050)
Observations	1297	1297	1043	1043	1043	666	666	666	377	377	377
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.6. Tightening of CFMs and extreme capital inflow waves

	Full sample					Before GFC			After GFC		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sudden stop in net flows	-0.460		-0.326		-0.239	-0.387		-0.367	-0.321		-0.109
	(0.333)		(0.427)		(0.430)	(0.431)		(0.442)	(0.702)		(0.694)
Surge in net flows		0.262		0.470*	0.442*		0.177	0.136		0.809**	0.796**
		(0.222)		(0.256)	(0.258)		(0.405)	(0.414)		(0.384)	(0.372)
Macroprudential regulation			-0.286	-0.301	-0.294	-0.480	-0.488	-0.479	0.023	-0.043	-0.038
			(0.478)	(0.474)	(0.480)	(0.601)	(0.594)	(0.601)	(0.576)	(0.602)	(0.605)
Global uncertainty			-0.070*	-0.070*	-0.067	-0.028	-0.029	-0.026	-0.078*	-0.083*	-0.082*
			(0.041)	(0.041)	(0.041)	(0.048)	(0.047)	(0.048)	(0.041)	(0.044)	(0.043)
Globalization			-0.016	-0.019*	-0.019	-0.028**	-0.030**	-0.029**	0.013	0.006	0.007
			(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.014)	(0.015)	(0.014)	(0.015)
Central bank independence			-0.309	-0.288	-0.304	-0.570	-0.526	-0.573	0.192	0.212	0.221
			(0.721)	(0.721)	(0.719)	(0.915)	(0.918)	(0.917)	(0.876)	(0.882)	(0.883)
Fractionalization			0.990	1.042*	1.016	1.150	1.204	1.164	0.906	0.850	0.843
			(0.646)	(0.631)	(0.647)	(0.764)	(0.757)	(0.775)	(1.061)	(1.118)	(1.117)
Private credit to GDP (% change)			0.474	0.265	0.244	0.220	0.171	0.157	2.210	1.621	1.607
			(1.139)	(1.155)	(1.161)	(1.219)	(1.198)	(1.228)	(1.987)	(1.980)	(1.970)
Foreign exchange reserve to GDP (% change)			0.214	0.211	0.213	0.172	0.175	0.167	-0.137	-0.146	-0.145
			(0.359)	(0.359)	(0.357)	(0.405)	(0.399)	(0.407)	(0.711)	(0.717)	(0.712)
Real GDP growth			0.019	0.020	0.017	0.009	0.013	0.009	0.051	0.043	0.043
			(0.038)	(0.037)	(0.039)	(0.045)	(0.043)	(0.045)	(0.056)	(0.060)	(0.060)
Inflation			4.077***	3.963***	3.991***	4.062***	3.950***	4.049***	6.266**	6.045**	6.022**
			(1.429)	(1.412)	(1.424)	(1.521)	(1.528)	(1.520)	(2.826)	(2.781)	(2.773)
Observations	983	983	819	819	819	480	480	480	339	339	339
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.7. Tightening of MPMs and CFMs and capital inflow (GFC dummy and excluding GFC periods)

	With GFC dummy		Excluding GFC periods	
	MPMs	CFMs	MPMs	CFMs
Sudden stop in net flows	0.787***	-0.279	0.703**	-0.656
	(0.269)	(0.422)	(0.318)	(0.489)
Surge in net flows	0.178	0.466*	0.080	0.361
	(0.286)	(0.258)	(0.345)	(0.297)
Macroprudential policy / Capital control	0.033	-0.268	0.013	-0.252
	(0.064)	(0.472)	(0.068)	(0.466)
VXO	0.015	-0.030**	0.037**	-0.031**
	(0.017)	(0.013)	(0.017)	(0.015)
Globalization	0.008	-0.018	0.015**	-0.011
	(0.007)	(0.012)	(0.007)	(0.012)
Central bank independence	1.280*	-0.249	1.430*	-0.203
	(0.677)	(0.710)	(0.743)	(0.654)
Fractionalization	-0.306	1.017	-0.435	0.931
	(0.610)	(0.659)	(0.618)	(0.710)
Private credit to GDP (% change)	0.891	-0.412	1.213	0.336
	(0.690)	(1.089)	(0.752)	(1.141)
Foreign exchange reserve to GDP (% change)	0.693***	0.138	0.682***	-0.109
	(0.194)	(0.327)	(0.222)	(0.353)
Real GDP growth	0.042	0.026	0.069***	0.016
	(0.028)	(0.036)	(0.026)	(0.037)
Inflation	1.565	3.862***	2.016	4.655***
	(1.285)	(1.384)	(1.289)	(1.656)
GFC Dummy	-0.325	-0.133		
	(0.329)	(0.305)		
Observations	1139	819	947	681
Year FE	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.8. Tightening of MPMs and CFMs, and extreme capital inflow waves (gross flows)

	MPMs			CFMs		
	Full sample	Before GFC	After GFC	Full sample	Before GFC	After GFC
Sudden stop in gross flows	0.825**	0.627	0.766**	0.431	0.238	0.494
	(0.342)	(0.579)	(0.375)	(0.434)	(0.558)	(0.574)
Surge in gross flows	-0.158	-0.214	0.035	-0.089	-0.218	0.247
	(0.312)	(0.385)	(0.394)	(0.280)	(0.373)	(0.464)
Macroprudential policy / Capital control	0.003	0.086	-0.101	-0.298	-0.483	-0.009
	(0.071)	(0.100)	(0.110)	(0.476)	(0.602)	(0.575)
VXO	-0.035	-0.031	-0.087**	-0.086**	-0.045	-0.089**
	(0.045)	(0.054)	(0.037)	(0.043)	(0.050)	(0.043)
Globalization	0.011	0.002	0.034***	-0.016	-0.025*	0.009
	(0.008)	(0.010)	(0.012)	(0.012)	(0.014)	(0.015)
Central bank independence	1.127	0.346	2.517*	-0.290	-0.520	0.154
	(0.690)	(0.866)	(1.352)	(0.710)	(0.899)	(0.858)
Fractionalization	-0.471	-0.532	-0.059	1.045	1.208	0.973
	(0.688)	(0.817)	(1.131)	(0.637)	(0.759)	(1.082)
Private credit to GDP (% change)	1.262*	0.913	3.018**	0.556	0.314	2.302
	(0.711)	(0.960)	(1.193)	(1.048)	(1.106)	(1.981)
Foreign exchange reserve to GDP (% change)	0.759***	0.786***	-0.031	0.218	0.255	-0.181
	(0.227)	(0.280)	(0.412)	(0.371)	(0.432)	(0.743)
Real GDP growth	0.047	0.015	0.112**	0.031	0.018	0.049
	(0.029)	(0.045)	(0.048)	(0.037)	(0.044)	(0.060)
Inflation	1.963	1.695	3.795	4.014***	3.907**	6.722**
	(1.318)	(1.839)	(2.440)	(1.469)	(1.580)	(2.853)
Observations	1139	666	473	819	480	339
Year FE	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.9. Tightening of MPMs and CFMs and extreme capital inflow waves (contagion effects)

	MPMs						CFMs					
	Full sample		Before GFC		After GFC		Full sample		Before GFC		After GFC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sudden stop in net flows	0.843***	0.868***	0.656	0.770*	0.815***	0.854***	-0.220	-0.069	-0.437	-0.226	-0.048	0.117
	(0.269)	(0.265)	(0.500)	(0.454)	(0.273)	(0.264)	(0.429)	(0.423)	(0.431)	(0.437)	(0.702)	(0.707)
Surge in net flows	0.071	0.150	-0.094	0.032	0.264	0.354	0.449*	0.473*	0.129	0.288	0.781**	0.702*
	(0.274)	(0.289)	(0.345)	(0.404)	(0.401)	(0.403)	(0.260)	(0.264)	(0.423)	(0.434)	(0.373)	(0.365)
Geographical contagion	0.439***		0.664***		0.330*		0.297		0.933		-0.650	
	(0.147)		(0.240)		(0.192)		(0.782)		(1.103)		(1.067)	
Continent contagion		0.101		0.145		0.139		0.045***		0.046***		0.047***
		(0.117)		(0.204)		(0.107)		(0.006)		(0.007)		(0.009)
Macroprudential policy / Capital control	-0.105	0.007	-0.113	0.100	-0.147*	-0.092	-0.346	-0.032	-0.645	-0.107	0.046	0.093
	(0.065)	(0.068)	(0.099)	(0.097)	(0.089)	(0.110)	(0.488)	(0.434)	(0.600)	(0.558)	(0.667)	(0.518)
Global uncertainty	-0.022	-0.006	-0.008	0.017	-0.083**	-0.047	-0.067	-0.019	-0.021	-0.017	-0.085*	-0.067
	(0.045)	(0.046)	(0.052)	(0.036)	(0.036)	(0.046)	(0.042)	(0.041)	(0.049)	(0.050)	(0.045)	(0.042)
Globalization	0.011	0.009	0.001	-0.003	0.036***	0.035***	-0.017	-0.010	-0.025*	-0.021	0.006	0.021
	(0.008)	(0.007)	(0.012)	(0.010)	(0.013)	(0.012)	(0.012)	(0.013)	(0.014)	(0.015)	(0.014)	(0.016)
Central bank independence	1.394*	1.226*	0.761	0.511	2.433*	2.381*	-0.342	-0.214	-0.672	-0.750	0.260	0.619
	(0.720)	(0.692)	(0.938)	(0.905)	(1.247)	(1.336)	(0.703)	(0.581)	(0.904)	(0.818)	(0.869)	(0.706)
Fractionalization	-0.550	-0.365	-1.047	-0.403	0.075	0.024	1.119	0.649	1.379*	0.760	0.691	0.571
	(0.586)	(0.642)	(0.782)	(0.758)	(0.998)	(1.125)	(0.683)	(0.593)	(0.815)	(0.739)	(1.129)	(1.076)
Private credit to GDP (% change)	1.662**	1.394*	1.242	1.066	3.434***	3.135**	0.254	0.296	0.220	0.474	1.847	0.717
	(0.733)	(0.717)	(0.947)	(0.937)	(1.301)	(1.238)	(1.138)	(1.310)	(1.162)	(1.425)	(2.175)	(2.107)
Foreign exchange reserve to GDP (% change)	0.754***	0.724***	0.732***	0.730**	0.013	-0.007	0.230	0.150	0.165	-0.020	-0.143	-0.083
	(0.233)	(0.233)	(0.281)	(0.285)	(0.380)	(0.390)	(0.365)	(0.336)	(0.447)	(0.406)	(0.725)	(0.734)
Real GDP growth	0.047	0.044	0.021	0.013	0.114**	0.109**	0.023	0.031	0.018	0.032	0.046	0.040
	(0.033)	(0.030)	(0.053)	(0.045)	(0.052)	(0.049)	(0.038)	(0.040)	(0.043)	(0.049)	(0.059)	(0.059)
Inflation	2.179*	1.989	2.376	1.780	3.633	3.735	4.167***	4.522***	4.761***	4.521***	6.211**	9.112***
	(1.312)	(1.322)	(1.760)	(1.789)	(2.261)	(2.409)	(1.461)	(1.376)	(1.749)	(1.529)	(2.845)	(3.066)
Observations	1139	1139	666	666	473	473	810	819	476	480	334	339
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.10. ATTs of extreme capital inflow waves on MPMs and CFMs

	MPMs								CFMs							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA	PSM	IPWRA
Full sample																
Sudden stop in net flows	0.098***	0.069**	0.086*	0.093**	0.083**	0.078**	0.113***	0.095***	-0.092*	-0.031	-0.063	0.004	0.031	-0.035	-0.083**	-0.051
	(0.032)	(0.032)	(0.048)	(0.041)	(0.038)	(0.034)	(0.035)	(0.035)	(0.048)	(0.030)	(0.053)	(0.045)	(0.036)	(0.032)	(0.042)	(0.037)
Surge in net flows	0.005	0.004	-0.053	-0.019	-0.032	0.000	0.032	0.003	0.031	0.058	0.009	0.023	0.015	0.048	0.092**	0.058
	(0.030)	(0.024)	(0.045)	(0.032)	(0.038)	(0.026)	(0.031)	(0.026)	(0.042)	(0.036)	(0.050)	(0.044)	(0.046)	(0.037)	(0.040)	(0.036)
Observations	1139	1139	1049	1049	946	946	807	807	818	818	752	752	673	673	570	570
Pre-GFC period																
Sudden stop in net flows	0.068*	0.041	0.081	0.067	0.108***	0.057	0.056	0.054	0.017	-0.038	0.017	-0.014	-0.086	-0.038	-0.109	-0.037
	(0.039)	(0.042)	(0.058)	(0.051)	(0.036)	(0.044)	(0.052)	(0.048)	(0.054)	(0.040)	(0.073)	(0.058)	(0.072)	(0.041)	(0.100)	(0.044)
Surge in net flows	0.018	0.009	0.009	0.011	0.045	0.013	0.027	0.026	0.079*	0.016	0.013	-0.010	0.013	-0.001	0.026	0.011
	(0.035)	(0.029)	(0.051)	(0.036)	(0.029)	(0.030)	(0.033)	(0.029)	(0.043)	(0.041)	(0.067)	(0.050)	(0.050)	(0.044)	(0.053)	(0.043)
Observations	666	666	666	666	553	553	467	467	480	480	480	480	393	393	328	328
Post-GFC period																
Sudden stop in net flows	0.119**	0.102**	0.222***	0.125**	0.136**	0.109**	0.102**	0.137***	-0.025	-0.020	-0.108	0.041	-0.024	-0.020	0.053	-0.038
	(0.051)	(0.049)	(0.063)	(0.062)	(0.062)	(0.052)	(0.051)	(0.049)	(0.066)	(0.045)	(0.085)	(0.068)	(0.052)	(0.046)	(0.058)	(0.055)
Surge in net flows	0.025	0.020	-0.131	-0.030	0.075*	0.005	-0.025	0.010	0.170***	0.138**	0.179**	0.132	0.096	0.132**	0.077	0.130**
	(0.047)	(0.040)	(0.100)	(0.055)	(0.041)	(0.042)	(0.054)	(0.042)	(0.058)	(0.063)	(0.084)	(0.085)	(0.068)	(0.065)	(0.082)	(0.065)
Observations	473	473	383	383	393	393	338	338	338	338	272	272	281	281	239	239

*Significant at 10%
**Significant at 5%
***Significant at 1%

Table 3.11. First-stage probit regression results used to calculate propensity scores (MPMs)

	Sudden stops			Surge		
	Full sample	Pre-GFC	Post-GFC	Full sample	Pre-GFC	Post-GFC
Macroprudential regulation	-0.038	-0.070	-0.017	-0.066**	-0.035	-0.105**
	(0.036)	(0.054)	(0.049)	(0.033)	(0.047)	(0.048)
VXO	0.054**	0.030	0.067***	-0.060***	-0.063***	0.001
	(0.024)	(0.025)	(0.017)	(0.022)	(0.024)	(0.013)
Globalization	0.006	0.011**	-0.003	0.013***	0.017***	0.007
	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)
Central bank independence	-0.876***	-1.412***	0.018	-0.006	0.168	-0.146
	(0.295)	(0.377)	(0.517)	(0.273)	(0.357)	(0.447)
Fractionalization	-0.220	-0.482	0.073	-0.408*	-0.634**	-0.116
	(0.229)	(0.297)	(0.382)	(0.217)	(0.291)	(0.340)
Private credit to GDP (% change)	-2.054***	-1.772***	-3.089***	1.949***	2.140***	2.074***
	(0.469)	(0.578)	(0.898)	(0.399)	(0.518)	(0.675)
Foreign exchange reserve to GDP (% change)	0.184	0.192	0.002	-0.020	-0.177	0.544**
	(0.159)	(0.192)	(0.286)	(0.146)	(0.192)	(0.261)
Real GDP growth	-0.025	-0.009	-0.044*	0.003	-0.024	0.031
	(0.016)	(0.021)	(0.025)	(0.014)	(0.021)	(0.022)
Inflation	-0.374	0.917	-2.125	0.862	-0.224	1.629
	(0.907)	(1.121)	(1.757)	(0.874)	(1.295)	(1.253)
Observations	1139	666	473	1139	666	473
Year FE	YES	YES	YES	YES	YES	YES

Table 3.12. First-stage probit regression results used to calculate propensity scores (CFMs)

	Sudden stops			Surge		
	Full sample	Pre-GFC	Post-GFC	Full sample	Pre-GFC	Post-GFC
Capital control	0.271	0.321	0.101	0.092	0.215	-0.038
	(0.256)	(0.328)	(0.433)	(0.250)	(0.337)	(0.383)
VXO	0.084***	0.043	0.077***	-0.058**	-0.071**	-0.015
	(0.030)	(0.028)	(0.021)	(0.027)	(0.029)	(0.017)
Globalization	0.015**	0.014*	0.014	0.027***	0.025***	0.032***
	(0.006)	(0.007)	(0.012)	(0.006)	(0.008)	(0.011)
Central bank independence	-0.898***	-1.384***	-0.150	-0.062	0.470	-0.566
	(0.343)	(0.434)	(0.602)	(0.328)	(0.436)	(0.529)
Fractionalization	-0.567**	-0.689*	-0.504	-0.318	-0.353	-0.139
	(0.281)	(0.359)	(0.474)	(0.290)	(0.390)	(0.454)
Private credit to GDP (% change)	-1.754***	-1.458**	-2.575**	2.315***	2.464***	2.673***
	(0.608)	(0.720)	(1.248)	(0.555)	(0.700)	(1.030)
Foreign exchange reserve to GDP (% change)	0.135	0.001	-0.015	-0.276	-0.161	-0.024
	(0.214)	(0.277)	(0.391)	(0.231)	(0.310)	(0.385)
Real GDP growth	-0.032	-0.023	-0.031	-0.004	-0.048	0.029
	(0.022)	(0.030)	(0.034)	(0.021)	(0.032)	(0.030)
Inflation	-0.485	0.839	-3.402	2.349**	0.497	5.304**
	(1.197)	(1.352)	(3.048)	(1.194)	(1.608)	(2.186)
Observations	819	480	339	819	480	339
Year FE	YES	YES	YES	YES	YES	YES

Table 3.13. Balancing property (Full sample)

	MPMs								CFMs							
	Sudden stops				Surge				Sudden stops				Surge			
	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-
	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value
Before matching																
Macroprudential regulation/ Capital control	1.63	1.85		0.135	1.55	1.88		0.009	0.33	0.32		0.950	0.26	0.34		0.006
VXO	23.48	22.15		0.049	23.01	22.17		0.148	23.91	22.05		0.018	22.93	22.15		0.260
Globalization	65.91	62.78		0.043	66.91	62.39		0.001	71.83	68.04		0.013	74.20	67.42		0.000
Central bank independence	0.56	0.61		0.006	0.62	0.60		0.166	0.57	0.62		0.008	0.64	0.61		0.048
Fractionalization	0.59	0.62		0.176	0.60	0.61		0.470	0.59	0.65		0.013	0.63	0.64		0.721
Private credit to GDP (% change)	0.01	0.06		0.000	0.10	0.04		0.000	0.02	0.05		0.017	0.08	0.03		0.000
Foreign exchange reserve to GDP (% change)	0.09	0.06		0.314	0.05	0.06		0.689	0.07	0.05		0.462	0.02	0.06		0.184
Real GDP growth	3.36	4.30		0.014	4.11	4.20		0.766	2.99	3.82		0.036	3.24	3.81		0.106
Inflation	0.55	0.06		0.534	0.06	0.06		0.967	0.05	0.05		0.231	0.05	0.52		0.858
After matching																
Macroprudential regulation/ Capital control	1.63	1.33	-37.8	0.081	1.55	1.52	90.3	0.829	0.32	0.34	-640.2	0.732	0.26	0.20	29.7	0.071
VXO	23.48	22.71	41.6	0.432	23.01	22.57	48.2	0.579	23.80	24.06	86.0	0.821	22.93	22.45	38.3	0.615
Globalization	65.91	67.40	52.3	0.477	66.91	67.91	77.9	0.561	71.77	71.42	91.0	0.868	74.20	75.28	84.1	0.495
Central bank independence	0.56	0.59	32.7	0.170	0.62	0.63	43.2	0.533	0.57	0.55	76.8	0.655	0.64	0.64	84.7	0.811
Fractionalization	0.59	0.60	58.6	0.681	0.60	0.60	71.7	0.876	0.60	0.59	83.3	0.805	0.63	0.64	-32.2	0.680
Private credit to GDP (% change)	0.01	0.01	92.1	0.811	0.10	0.11	91.9	0.745	0.02	0.02	98.2	0.971	0.08	0.08	89.8	0.719
Foreign exchange reserve to GDP (% change)	0.09	0.10	57.0	0.740	0.05	0.04	8.6	0.790	0.08	0.11	-33.4	0.556	0.02	0.04	38.2	0.523
Real GDP growth	3.36	3.00	60.8	0.423	4.11	4.22	-17.3	0.769	2.99	2.62	55.6	0.485	3.24	3.12	79.3	0.797
Inflation	0.55	0.06	99.9	1.000	0.06	0.05	-1701.2	0.517	0.05	0.05	54.9	0.706	0.05	0.05	86.6	0.986

Table 3.14. Balancing property (Pre-GFC)

	MPMs								CFMs							
	Sudden stops				Surge				Sudden stops				Surge			
	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-
	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value
Before matching																
Macroprudential regulation/ Capital control	1.34	1.60		0.142	1.34	1.62		0.074	0.36	0.31		0.252	0.23	0.33		0.009
VXO	19.83	19.89		0.941	20.05	19.85		0.787	20.49	19.77		0.465	19.80	19.88		0.926
Globalization	64.36	61.93		0.252	68.83	60.89		0.000	69.39	67.36		0.330	75.26	66.14		0.000
Central bank independence	0.51	0.60		0.000	0.63	0.58		0.030	0.52	0.61		0.001	0.66	0.59		0.008
Fractionalization	0.56	0.62		0.037	0.60	0.61		0.625	0.58	0.65		0.009	0.64	0.64		0.972
Private credit to GDP (% change)	0.01	0.06		0.003	0.10	0.05		0.000	0.01	0.05		0.018	0.09	0.04		0.002
Foreign exchange reserve to GDP (% change)	0.10	0.06		0.316	0.03	0.07		0.223	0.07	0.05		0.527	0.00	0.06		0.117
Real GDP growth	4.50	5.16		0.153	4.74	5.16		0.290	4.02	4.62		0.165	4.03	4.64		0.117
Inflation	0.05	0.05		0.852	0.05	0.06		0.103	0.05	0.05		0.553	0.05	0.05		0.243
After matching																
Macroprudential regulation/ Capital control	1.34	1.01	-23.1	0.092	1.34	1.28	76.6	0.700	0.36	0.36	88.5	0.928	0.23	0.22	85.0	0.721
VXO	19.83	20.90	-1579.7	0.386	20.05	19.94	43.2	0.902	20.49	20.91	42.2	0.771	19.79	19.75	40.0	0.964
Globalization	64.36	65.29	61.3	0.740	68.83	68.32	93.4	0.822	69.39	71.06	17.6	0.544	75.26	75.94	92.6	0.730
Central bank independence	0.51	0.52	86.5	0.689	0.63	0.63	85.2	0.797	0.52	0.54	73.1	0.494	0.66	0.65	89.5	0.817
Fractionalization	0.56	0.56	89.0	0.882	0.60	0.57	-185.1	0.293	0.58	0.58	91.4	0.897	0.64	0.63	-1269.4	0.699
Private credit to GDP (% change)	0.01	0.00	73.9	0.509	0.10	0.10	95.9	0.900	0.01	0.00	67.3	0.567	0.09	0.08	86.0	0.702
Foreign exchange reserve to GDP (% change)	0.10	0.08	60.0	0.771	0.03	0.05	60.1	0.728	0.07	0.12	-55.8	0.599	0.00	0.02	78.0	0.732
Real GDP growth	4.50	4.05	31.4	0.486	4.74	4.73	97.1	0.977	4.02	3.90	79.8	0.851	4.04	3.86	71.9	0.711
Inflation	0.05	0.05	34.4	0.937	0.05	0.05	94.2	0.924	0.05	0.06	-142.6	0.438	0.05	0.03	-24.7	0.067

Table 3.15. Balancing property (Post-GFC)

	MPMs								CFMs							
	Sudden stops				Surge				Sudden stops				Surge			
	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-	Mean		Bias	P-
	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value	Treated	Control	Reduction	value
Before matching																
Macroprudential regulation/ Capital control	2.00	2.20		0.381	1.84	2.25		0.046	0.28	0.34		0.203	0.29	0.34		0.254
VXO	28.07	25.38		0.002	27.08	25.44		0.036	28.74	25.26		0.001	27.35	25.36		0.036
Globalization	67.85	63.98		0.084	64.268	64.51		0.904	75.28	69.01		0.005	72.71	69.21		0.077
Central bank independence	0.62	0.61		0.738	0.61	0.62		0.577	0.63	0.63		0.906	0.62	0.63		0.803
Fractionalization	0.62	0.61		0.751	0.60	0.62		0.587	0.61	0.64		0.432	0.62	0.64		0.610
Private credit to GDP (% change)	0.01	0.05		0.029	0.94	0.04		0.000	0.02	0.03		0.43	0.08	0.02		0.000
Foreign exchange reserve to GDP (% change)	0.06	0.05		0.694	0.08	0.04		0.362	0.07	0.05		0.697	0.04	0.05		0.848
Real GDP growth	1.93	3.05		0.059	3.22	2.85		0.479	1.54	2.68		0.096	2.12	2.63		0.405
Inflation	0.05	0.06		0.452	0.07	0.06		0.055	0.04	0.05		0.211	0.06	0.05		0.042
After matching																
Macroprudential regulation/ Capital control	2.00	2.02	91.7	0.958	1.84	1.73	72.7	0.632	0.26	0.33	-3.1	0.331	0.28	0.31	46.3	0.622
VXO	28.07	27.84	91.5	0.840	27.08	26.99	94.3	0.935	28.59	28.15	87.4	0.754	27.21	27.16	97.3	0.971
Globalization	67.85	68.04	95.1	0.952	64.268	64.76	-108.4	0.859	75.23	76.05	86.8	0.766	72.83	72.54	91.8	0.910
Central bank independence	0.62	0.63	1.70	0.807	0.61	0.60	30.9	0.776	0.64	0.67	-858.6	0.409	0.62	0.60	-222.2	0.569
Fractionalization	0.62	0.63	-20.60	0.748	0.60	0.61	17.2	0.733	0.62	0.60	38.3	0.738	0.62	0.64	80.3	0.933
Private credit to GDP (% change)	0.01	0.01	98.00	0.968	0.94	0.11	70.5	0.441	0.02	0.01	28.4	0.628	0.07	0.08	91.5	0.835
Foreign exchange reserve to GDP (% change)	0.06	0.05	43.60	0.876	0.08	0.03	-27.6	0.418	0.075	0.170	-401.2	0.242	0.05	0.02	-206.9	0.679
Real GDP growth	1.92	1.60	71.10	0.650	3.22	2.81	-10.2	0.552	1.50	0.63	23.8	0.290	2.11	1.88	54.3	0.768
Inflation	0.05	0.05	48.60	0.716	0.07	0.07	86.0	0.853	0.04	0.04	88.4	0.892	0.06	0.06	79.4	0.799

Chapter 4: Global uncertainty and capital flows: any difference between foreign direct investment and portfolio investment?

4.1 Introduction

Many countries have been liberalized and integrated into international financial markets with the wave of capital flows since the 1990s. Recently, international capital flows have fluctuated tremendously due to the Global Financial Crisis (GFC) in 2008 and China's stock market crash in 2015. Since volatile capital flows could cause macroeconomic and financial instabilities, policy makers always concern the stability of capital flows. A lot of literature has documented the causes and consequences of such extreme capital flow episodes. Forbes and Warnock (2012) describe that extreme fluctuation in capital flows is mainly driven by global uncertainty, rather than domestic factors. Extending their work, Calderón and Kubota (2013) and Comelli (2015) also explain the justification for the significant role of global uncertainty in driving extreme capital flows. Passari and Rey (2015) further state that gross capital flows and risky asset prices around the world are largely driven by fluctuations in global uncertainty.

However, given the fact that total capital flows consist of foreign direct investment (FDI), portfolio investment (FPI), and other investment (OTH) including notable bank flows, only few studies have employed the subcomponents of capital flows in explaining the link between large fluctuations in capital flows and global uncertainty (Schmidt & Zwick, 2015; Choi & Furceri, 2018). Practitioners have highlighted that different types of capital flows display different behaviors and nature. The perceived wisdom is that FDI is the least volatile form of capital flows, OTH is the most volatile, and FPI ranks between FDI and OTH (Sole Pagliari & Ahmed, 2017). Some studies also show that FDI is the most resilient flows (Kose et al., 2006). On the other hand, a highly uncertain environment with the presence of fixed costs increases the real-option effect by hindering investment, which is in line with the 'wait-and-see' mechanism of Bernanke (1983) and Bloom (2009). In this case, FDI is not necessarily less vulnerable to uncertainty shocks, so that theoretical prediction is indeterminate. Thus,

this paper examines it empirically by dividing capital flows into FDI, FPI, and OTH. More importantly, this paper addresses potential differences in awareness of global uncertainty between advanced and developing economies, since few studies have existed on this issue.

By using quarterly data on gross capital inflows and outflows over 57 countries covering the period from 2000 to 2015, we first identify four types of episodes ('stop' and 'surge' for sudden contraction and boom in capital inflows, and 'retrenchment' and 'flight' for sudden contraction and boom in capital outflows) for each type of capital flows and then evaluate how global uncertainty relates to each of the four types of episodes. Our analysis provides clear evidences showing the similarity and difference in the responses to global uncertainty between different types of capital flows as well as between advanced and developing economies. Intensified global uncertainty generally increases the likelihood of sudden contraction of most types of capital inflows and outflows. On the other hand, intensified global uncertainty decreases the likelihood of sudden expansion of all types of capital outflows, but the link between global uncertainty and sudden expansion of all types of capital inflows is less clear. More importantly, concerning differences between advanced and developing economies, global uncertainty increases the likelihood of sudden contraction of portfolio investment in both advanced and developing economies, while it increases that of foreign direct investment in only advanced economies.

The structure of the paper is as follows. Section 2 explains the methodology to classify the capital flow episodes and our empirical approach to identify the relationship between global uncertainty and four types of capital flow episodes. Section 3 presents empirical results. Section 4 concludes.

4.2 Methodology

4.2.1 Classifying extreme capital flows

To classify extreme capital flows into four types of episodes (stop, surge, flight, and retrenchment), this study follows the work of Forbes and Warnock (2012). We first construct four-quarter moving sum of gross flows, $KF_{j,t} = \sum_{i=0}^{3} CapitalFlows_{j,t-i}$, where $CapitalFlows_{j,t-i}$ denotes gross flows of country j in quarter $t - i$. We define the four quarter (year-over-year) change in gross flows of country j in quarter t by $\Delta KF_{j,t} = KF_{j,t} - KF_{j,t-4}$, and then we calculate the rolling mean and standard deviation of $\Delta KF_{j,t}$ over the last five years.

A stop (retrenchment) episode is defined when a change in four-quarter gross inflow (outflow), $\Delta KF_{j,t}$, falls below one-standard deviation from its rolling mean and subsequently there is at least one-quarter when $\Delta KF_{j,t}$ declines below its two-standard deviation from its rolling mean. The stop (retrenchment) episode ends when the change in gross inflow (outflow) exceeds the one-standard deviation from its rolling mean. Similarly, a surge (flight) episode is denoted when a change in four-quarter gross inflow (outflow) rises more than one-standard deviation above its rolling mean and subsequently there must be at least one-quarter $\Delta KF_{j,t}$ that exceeds above its two-standard deviation from its rolling mean. The period of the surge (flight) episode ends when a change in gross inflow (outflow) falls below one-standard deviation above its rolling mean. The four types of episodes (stop, retrenchment, surge, and flight) are identified for total (gross) capital flows and the three subcomponents (FDI, FPI, and OTH flows) (see Table 4.6).

4.2.2 Empirical specification

To discuss the role of global uncertainty in relating to extreme capital flows, we mainly follow Forbes and Warnock (2012) and estimate the following model with regard to each of the four types of episodes for total (gross) capital flows, FDI, FPI, and OTH flows:

$$Prob(EPS_{j,t} = 1) = F(\beta GLB_{t-1} + \gamma CON_{t-1} + \delta DOM_{t-1})$$

where $EPS_{j,t}$ is an episode dummy that takes the value of 1 if country j experiences an episode in quarter t and 0 otherwise, and GLB_{t-1}, CON_{t-1}, and DOM_{t-1} denote the vectors of global, contagion,

and domestic factors, respectively. Forbes and Warnock (2012) consider global and contagion factors as push elements and domestic factors as pull elements (see also Calvo et al., 1996; Fratzscher, 2012; Sarno et al., 2016).

This study includes four global macroeconomic indicators: uncertainty, liquidity, interest rates, and growth. In addition, we include two contagion measures: regional and trade linkages. The regional linkage is a binary variable by taking one if at least one economy in the same region experiences an episode, and zero otherwise. We measure the trade linkage by:

$$TL_{j,t} = \frac{\sum_{i=1}^{n}(EXP_{j,i,t} \times EPS_{i,t})}{\sum_{i=1}^{n} EXP_{j,i,t}} \times \frac{EXP_{j,t}}{Y_{j,t}},$$

We calculate $TL_{j,t}$ for each type of episodes (stop, surge, flight, and retrenchment) for total (gross) capital flows, FDI, FPI, and OTH flows. To account for domestic factors, we include six variables: financial development, financial openness, public debt, growth shock, income level, and inflation index (see Table 1).[33] Since capital flow episodes occur irregularly (at least 70% of the sample is zero for all episodes), we estimate the empirical model by employing the complementary log-log model with the assumption that $F(\cdot)$ follows the extreme value distribution function $F(Z) = 1 - \exp[-\exp(Z)]$. Our model applies country clustered standard errors.

4.3 Estimation results

Tables 2-5 present our estimation results related to extreme movements of total (gross) capital flow and each of the three subcomponents (FDI, FPI, and OTH flows). The first panel shows results for the full sample countries, and the second and third panels show results for advanced and developing economies, respectively. First, our results related to total (gross) capital flows generally confirm the findings of Forbes and Warnock (2012) indicating that intense global uncertainty is positively correlated with stops and retrenchments and negatively correlated with flights, although its effect on

[33] Following Dell'Erba and Reinhardt (2015), we construct the inflation index to adjust the cases of hyper-inflation.

surges is insignificant. These findings show similar behaviors of foreign and domestic investors during a period of a sharp contraction of capital flows (stops and retrenchments), whereas they have different behaviors during a boom period for capital flows (surges and flights). Second, concerning the different types of capital flows, the analysis presents that higher global uncertainty increases the probability of a sudden decline in FDI and FPI inflows and in all types of capital outflows. At the same time, higher global uncertainty decreases the probability of a sharp rise in all types of capital outflows, but its effects on the probability of a sharp rise in all types of capital inflows are insignificant. These results present that the responses to global uncertainty are not heterogeneous among different types of capital flows. The conventional wisdom suggests that FDI is more resilient during the crisis period. However, in the presence of uncertainty, a significant wait-and-see effect appears on investment with large fixed costs (Bloom, 2009), so that such investment, like FDI, can also be vulnerable to uncertainty shocks.[34]

More importantly, once the sample countries are divided into two groups of advanced and developing economies, we find a clear difference between them. The analysis indicates that global uncertainty increases the likelihood of sudden contraction of FPI flows in both advanced and developing economies, while it tends to increase the likelihood of sudden contraction of FDI and OTH flows only in advanced economies but not in developing economies. As often suggested in conventional wisdom on capital flow volatility, FDI is most resilient in developing economies during times of high global uncertainty. However, the analysis reveals that FDI is vulnerable to uncertainty shock in advanced economies, which confirms presence of "wait-and-see" mechanism in these economies.

4.4 Conclusion

[34] We conduct two robustness checks. The first robustness check is to drop the periods of the Global Financial Crisis (2007Q4 through 2009Q4) from our sample, and the second is to incorporate dummies of these periods into the models. The results are generally similar to our original ones, which are shown in the online appendix (Tables 4.7-4.10).

This empirical study has confirmed the argument of the existing literature, including Forbes and Warnock (2012), Calderón and Kubota (2013), and Passari and Rey (2015), that global uncertainty is a crucial source of extreme capital flow waves. More importantly, we have found clear differences in the role of global uncertainty between advanced and developing economies. In developing economies, FDI is more resilient, compared to FPI, during times of high global uncertainty, as suggested in conventional wisdom. In contrast, FDI is as vulnerable as FPI to uncertainty shock in advanced economies. Thus, the "wait-and-see" mechanism matters on FDI only in advanced economies.

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Tables

Table 4.1. Definitions and sources of data

Variable	Definition and construction	Source
Capital flows	Quarterly data on gross capital inflows and outflows	International Financial Statistics (IFS)
Global uncertainty	Chicago Board Options Exchange, VXO volatility index	Federal Reserve Economic Data
Global liquidity	Quarterly growth rate of sum of M2 in the US, Japan, and core Euro-Zone, and M4 in the UK	International Financial Statistics (IFS)
Global interest rate	Average interest rate on long-term government bonds of the US, Japan, the UK, and Euro area	International Financial Statistics (IFS)
Global growth	Quarterly average growth rate of the US, Japan, the UK, and the Euro	International Financial Statistics (IFS)
Trade flows	Exports	Direction of Trade Statistics (DOTS) and International Financial Statistics (IFS)
Financial development	Ratio of domestic credit to private sector to GDP	World Development Indicators (WDI)
Capital controls	Ratio of foreign assets plus liabilities to GDP	International Financial Statistics (IFS)
Public debt	Ratio of public debt to GDP	Abbas et al. (2010) and IMF Historical Public Debt
Growth shock	Difference between the log of actual real GDP and its trend components	World Economic Outlook (WEO)
Income	Log of real GDP per capita	World Economic Outlook (WEO)
Inflation index	An index based on inflation data from WEO, which assigns a value between 0 and 12 to different inflation intervals (0 for inflation rates below 2% and 12 above 120%), following Dell'Erba and Reinhardt (2015).	International Financial Statistics (IFS)

Table 4.2 Estimation results for stops

	All sample countries				Advanced countries				Developing countries			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors												
Uncertainty	0.078***	0.067***	0.043***	0.014	0.099***	0.103***	0.039***	0.042**	0.043	0.032	0.062***	-0.078
	(0.013)	(0.013)	(0.008)	(0.019)	(0.020)	(0.018)	(0.009)	(0.017)	(0.035)	(0.024)	(0.019)	(0.051)
Liquidity	-9.477***	-6.390**	-4.358	-5.142*	-9.069**	-7.989**	-6.865	-3.806	-11.946*	-7.444	5.077	-2.854
	(3.010)	(3.242)	(4.329)	(2.703)	(4.183)	(4.014)	(5.058)	(4.259)	(6.354)	(5.729)	(5.990)	(3.326)
Interest rates	-0.432*	-0.427**	0.173	-0.328*	-0.173	-0.165	0.314	-0.147	-1.014***	-0.864***	-0.239	-0.499
	(0.245)	(0.197)	(0.201)	(0.173)	(0.271)	(0.241)	(0.212)	(0.350)	(0.295)	(0.253)	(0.398)	(0.333)
Growth	0.169**	0.181**	-0.055	0.030	0.162	0.345***	-0.089	0.019	-0.072	-0.087	0.041	0.308
	(0.077)	(0.091)	(0.077)	(0.187)	(0.114)	(0.106)	(0.103)	(0.236)	(0.248)	(0.151)	(0.141)	(0.445)
Contagion												
Trade	29.787***	19.394***	20.684***	17.962**	29.562***	20.973***	19.953**	18.979*	26.063***	20.841**	25.735*	36.385*
	(5.761)	(6.086)	(6.665)	(7.635)	(6.413)	(7.085)	(8.341)	(9.957)	(7.985)	(10.405)	(14.883)	(21.800)
Regional	2.207***	2.591***	1.766***	0.145***	2.744***	3.396***	1.707***	0.154*	2.336***	2.675***	1.884***	0.144**
	(0.261)	(0.285)	(0.209)	(0.041)	(0.314)	(0.450)	(0.224)	(0.082)	(0.589)	(0.494)	(0.568)	(0.063)
Domestic Factors												
Financial System	0.005	0.003	0.003	-0.000	0.004	0.002	0.004	0.003	0.001	0.004	-0.001	-0.016*
	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.008)	(0.003)	(0.004)	(0.007)	(0.006)	(0.009)	(0.009)
Capital Controls	-0.006***	-0.011	-0.007**	-0.000	-0.009**	-0.101	-0.007**	-0.001	0.010	0.047***	0.004	0.022**
	(0.002)	(0.007)	(0.003)	(0.002)	(0.004)	(0.076)	(0.003)	(0.003)	(0.009)	(0.012)	(0.022)	(0.011)
Debt to GDP	0.005	-0.000	0.010***	0.008*	0.004	0.005	0.011***	0.012**	0.023*	-0.010	0.016	0.016
	(0.004)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.005)	(0.014)	(0.010)	(0.017)	(0.011)
Real GDP Growth	-0.053	-0.045	-0.117***	0.008	-0.054	-0.074	-0.141**	0.024	-0.055	0.026	-0.104	-0.027
	(0.040)	(0.036)	(0.044)	(0.031)	(0.063)	(0.046)	(0.067)	(0.061)	(0.072)	(0.051)	(0.074)	(0.049)
Real GDP per capita	0.060	0.078	0.288	-0.435	0.350	0.860	0.450	0.006	0.359	0.188	0.448	-0.198
	(0.345)	(0.434)	(0.311)	(0.291)	(0.666)	(0.978)	(0.438)	(0.678)	(0.500)	(0.401)	(0.582)	(0.414)
Inflation	-0.063	-0.067	-0.084	-0.054	-0.162	-0.230	-0.104	-0.086	0.148	0.075	-0.093	-0.117
	(0.086)	(0.074)	(0.086)	(0.080)	(0.104)	(0.168)	(0.113)	(0.097)	(0.137)	(0.125)	(0.155)	(0.126)
Observations	1667	1667	1667	1667	992	992	992	992	675	675	675	675

Table 4.3 Estimation results for retrenchments

	All sample countries				Advanced countries				Developing countries			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors												
Uncertainty	0.065***	0.049***	0.031***	0.029**	0.074***	0.056***	0.033***	0.032**	0.038*	0.040	0.026**	0.022
	(0.010)	(0.015)	(0.007)	(0.012)	(0.013)	(0.019)	(0.009)	(0.016)	(0.020)	(0.034)	(0.011)	(0.016)
Liquidity	-7.416**	-11.525***	-5.217	-6.812**	-5.693*	-15.716***	-2.938	-7.319*	-6.008	-9.867	-10.138**	-9.049
	(3.054)	(3.268)	(3.436)	(3.429)	(3.442)	(3.884)	(5.426)	(4.416)	(5.770)	(6.862)	(4.075)	(5.650)
Interest rates	-0.413*	-0.299	0.207	-0.497***	-0.095	-0.148	0.330	0.033	-0.596	0.088	0.199	-1.069***
	(0.229)	(0.276)	(0.208)	(0.191)	(0.310)	(0.425)	(0.271)	(0.285)	(0.387)	(0.344)	(0.391)	(0.299)
Growth	0.085	0.087	-0.044	0.071	-0.034	0.033	-0.343***	0.181	0.240	0.251	0.318*	-0.094
	(0.080)	(0.135)	(0.097)	(0.147)	(0.120)	(0.193)	(0.122)	(0.212)	(0.146)	(0.209)	(0.193)	(0.164)
Contagion												
Trade	31.718***	27.055***	10.744	0.391	37.785***	32.332***	20.465*	-10.768	22.332***	33.646***	-10.229	0.678
	(5.444)	(6.106)	(8.280)	(7.431)	(9.460)	(7.618)	(11.636)	(8.061)	(6.195)	(11.884)	(13.552)	(17.677)
Regional	1.960***	2.437***	2.290***	0.146***	2.126***	2.369***	2.140***	0.169***	2.174***	2.884***	2.750***	0.190***
	(0.286)	(0.323)	(0.284)	(0.034)	(0.322)	(0.346)	(0.310)	(0.048)	(0.573)	(0.660)	(0.522)	(0.055)
Domestic Factors												
Financial System	0.014***	0.010*	0.008***	0.006*	0.010***	0.010	0.013***	0.001	0.017**	0.017	0.004	0.022***
	(0.003)	(0.006)	(0.002)	(0.004)	(0.003)	(0.008)	(0.003)	(0.004)	(0.008)	(0.012)	(0.007)	(0.008)
Capital Controls	-0.005	-0.024	-0.010	-0.003	-0.079***	-0.084	-0.062*	-0.002	0.050***	-0.048	0.057***	-0.024
	(0.005)	(0.034)	(0.010)	(0.003)	(0.030)	(0.052)	(0.036)	(0.002)	(0.019)	(0.080)	(0.012)	(0.035)
Debt to GDP	0.001	0.014***	0.003	0.008	0.006**	0.020***	0.011***	0.014***	-0.015	0.011	-0.021*	-0.035***
	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.006)	(0.004)	(0.004)	(0.013)	(0.014)	(0.013)	(0.012)
Real GDP Growth	-0.060*	-0.039	-0.134***	-0.104***	-0.068	-0.083	-0.206***	-0.167***	-0.086*	-0.009	-0.130***	-0.104**
	(0.036)	(0.042)	(0.034)	(0.035)	(0.050)	(0.070)	(0.064)	(0.059)	(0.052)	(0.064)	(0.041)	(0.044)
Real GDP per capita	-0.574*	-0.757**	-0.108	-0.734**	1.091**	1.556	0.622	-0.501	-0.661*	-1.068**	0.063	-0.686**
	(0.300)	(0.357)	(0.237)	(0.326)	(0.538)	(1.183)	(0.729)	(0.470)	(0.400)	(0.445)	(0.342)	(0.336)
Inflation	-0.066	-0.216**	-0.049	-0.145*	-0.080	-0.206	-0.089	-0.035	-0.042	-0.357**	-0.083	-0.188
	(0.060)	(0.102)	(0.061)	(0.075)	(0.087)	(0.138)	(0.112)	(0.110)	(0.141)	(0.159)	(0.087)	(0.115)
Observations	1711	1711	1711	1711	978	978	978	978	733	733	733	733

Table 4.4 Estimation results for surges

	All sample countries				Advanced countries				Developing countries			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors												
Uncertainty	-0.003	-0.011	-0.013	-0.005	0.004	-0.017	-0.030	-0.006	-0.004	-0.005	-0.003	0.004
	(0.012)	(0.012)	(0.012)	(0.008)	(0.020)	(0.018)	(0.019)	(0.010)	(0.014)	(0.016)	(0.012)	(0.014)
Liquidity	11.285***	2.842	6.670***	6.024**	13.521***	3.517	4.930	6.150**	9.604***	5.322*	8.808***	5.944
	(2.196)	(2.362)	(2.213)	(2.434)	(3.743)	(3.856)	(3.413)	(2.795)	(3.314)	(3.174)	(2.450)	(4.803)
Interest rates	1.181***	0.796***	0.314*	0.732***	1.664***	1.203***	0.505*	0.846***	0.967***	0.411	0.223	0.666**
	(0.263)	(0.246)	(0.179)	(0.169)	(0.391)	(0.268)	(0.281)	(0.231)	(0.350)	(0.329)	(0.273)	(0.306)
Growth	0.224	0.109	0.285	0.093	0.736***	0.351**	0.421*	0.184	0.007	-0.047	0.259	0.053
	(0.156)	(0.114)	(0.179)	(0.132)	(0.186)	(0.155)	(0.250)	(0.144)	(0.166)	(0.146)	(0.238)	(0.240)
Contagion												
Trade	13.695***	17.761***	-4.930	2.067	27.885***	11.205	-11.060	6.218	1.612	25.064**	-1.479	-3.559
	(5.307)	(6.093)	(8.731)	(3.289)	(8.135)	(9.201)	(8.864)	(4.183)	(5.215)	(12.268)	(14.845)	(5.976)
Regional	3.224***	2.109***	2.598***	0.123***	3.034***	2.160***	2.752***	0.098***	3.396***	2.045***	2.206***	0.156***
	(0.319)	(0.326)	(0.287)	(0.021)	(0.427)	(0.200)	(0.430)	(0.023)	(0.855)	(0.739)	(0.458)	(0.047)
Domestic Factors												
Financial System	0.007**	0.004	0.009***	0.004	0.010**	0.003	0.009**	0.003	0.025**	0.017	0.021**	0.024
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.011)	(0.012)	(0.010)	(0.015)
Capital Controls	-0.086**	0.007***	-0.179***	-0.073*	-0.038	0.009***	-0.161**	-0.029	-1.095**	-0.252	-0.141	-1.315***
	(0.035)	(0.002)	(0.064)	(0.040)	(0.037)	(0.003)	(0.066)	(0.041)	(0.430)	(0.582)	(0.139)	(0.416)
Debt to GDP	-0.002	-0.007	-0.009*	-0.006	0.002	-0.003	-0.006	-0.007	-0.017	-0.021	-0.022	-0.006
	(0.004)	(0.005)	(0.005)	(0.004)	(0.006)	(0.005)	(0.005)	(0.005)	(0.016)	(0.013)	(0.015)	(0.014)
Real GDP Growth	0.030	0.016	0.036	0.000	0.049	-0.006	0.005	0.003	0.016	0.017	0.057	-0.005
	(0.023)	(0.018)	(0.034)	(0.033)	(0.052)	(0.032)	(0.032)	(0.041)	(0.028)	(0.026)	(0.054)	(0.060)
Real GDP per capita	-0.528*	-0.604***	-0.630***	-0.271	-1.633**	-0.679	-1.279**	-0.300	-0.391	-0.488*	-0.595*	-0.195
	(0.278)	(0.228)	(0.197)	(0.285)	(0.692)	(0.564)	(0.557)	(0.547)	(0.307)	(0.275)	(0.315)	(0.390)
Inflation	0.081	0.035	-0.047	-0.049	0.165	0.038	-0.003	-0.061	0.125	0.061	-0.032	-0.003
	(0.083)	(0.072)	(0.066)	(0.071)	(0.146)	(0.126)	(0.147)	(0.069)	(0.103)	(0.097)	(0.080)	(0.098)
Observations	1665	1665	1665	1665	992	992	992	992	673	673	673	673

Table 4.5 Estimation results for flights

	All sample countries				Advanced countries				Developing countries			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors												
Uncertainty	-0.028***	-0.015*	-0.041***	-0.019*	-0.028*	-0.020*	-0.052**	-0.017	-0.028***	-0.006	-0.032*	-0.031***
	(0.009)	(0.009)	(0.015)	(0.011)	(0.016)	(0.011)	(0.024)	(0.019)	(0.009)	(0.015)	(0.018)	(0.009)
Liquidity	11.667***	4.822***	5.346*	8.175***	18.392***	7.288***	9.866**	10.171***	4.113	4.972	1.326	4.699
	(2.539)	(1.719)	(2.775)	(2.702)	(2.745)	(1.905)	(4.429)	(3.427)	(3.865)	(3.063)	(4.087)	(4.931)
Interest rates	1.060***	0.853***	0.892***	0.683***	1.138***	1.646***	1.293***	0.862***	1.122***	0.356	0.734***	0.484**
	(0.160)	(0.176)	(0.168)	(0.147)	(0.215)	(0.298)	(0.243)	(0.219)	(0.264)	(0.230)	(0.270)	(0.207)
Growth	0.233	-0.063	0.564**	0.369**	0.716***	-0.171	1.047***	0.614**	0.051	-0.076	0.204	0.069
	(0.191)	(0.122)	(0.226)	(0.185)	(0.201)	(0.177)	(0.269)	(0.248)	(0.229)	(0.163)	(0.271)	(0.313)
Contagion												
Trade	14.509***	9.472*	11.517*	6.310*	28.849***	8.096	16.082*	10.872*	1.940	9.760	6.970	0.185
	(5.469)	(5.361)	(6.690)	(3.578)	(6.983)	(9.227)	(9.654)	(5.574)	(6.662)	(7.460)	(8.719)	(4.495)
Regional	2.848***	2.572***	2.346***	0.107***	2.915***	2.340***	2.613***	0.085**	2.788***	2.980***	2.184***	0.161***
	(0.241)	(0.371)	(0.291)	(0.026)	(0.335)	(0.548)	(0.309)	(0.034)	(0.466)	(0.550)	(0.391)	(0.039)
Domestic Factors												
Financial System	0.007***	-0.000	0.004	0.006	0.009**	0.003	0.002	0.004	0.011	-0.002	0.011	-0.003
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.010)	(0.012)	(0.009)	(0.014)
Capital Controls	-0.097***	0.002	-0.098*	-0.089*	-0.110***	0.009**	-0.045	-0.080	-0.440	-0.165	-0.361	-0.333
	(0.038)	(0.002)	(0.052)	(0.054)	(0.037)	(0.004)	(0.060)	(0.051)	(0.367)	(0.321)	(0.249)	(0.596)
Debt to GDP	-0.003	-0.013**	-0.008	-0.005	-0.002	-0.008	-0.009	-0.008*	-0.013	-0.015	-0.001	-0.001
	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)	(0.007)	(0.008)	(0.004)	(0.012)	(0.009)	(0.015)	(0.010)
Real GDP Growth	0.014	-0.015	-0.039	0.002	-0.093*	0.017	-0.060*	-0.062**	0.035	-0.049**	-0.041	0.050
	(0.030)	(0.021)	(0.032)	(0.029)	(0.048)	(0.037)	(0.034)	(0.030)	(0.033)	(0.023)	(0.042)	(0.033)
Real GDP per capita	-0.377	-0.122	-0.017	-0.324	-0.201	-0.809	-0.375	0.399	-0.386	0.119	0.130	-0.647**
	(0.237)	(0.306)	(0.294)	(0.206)	(0.411)	(0.705)	(0.638)	(0.525)	(0.319)	(0.272)	(0.316)	(0.286)
Inflation	-0.022	0.034	-0.052	-0.043	0.021	0.033	0.066	0.031	-0.044	0.050	-0.052	-0.135*
	(0.062)	(0.085)	(0.074)	(0.061)	(0.132)	(0.188)	(0.121)	(0.118)	(0.085)	(0.068)	(0.090)	(0.072)
Observations	1719	1719	1719	1719	986	986	986	986	733	733	33	733

Table 4.6 Occurrence of capital flow episodes

Quarter	Stops				Retrenchments				Surges				Flights			
	Gross	FDI	FPI	OTH	Gross	FDI	FPI	OTH	Gross	FDI	FPI	OTH	Gross	FDI	FPI	OTH
2000Q1	0	0	3	1	1	0	0	3	3	2	3	3	3	3	4	0
2000Q2	0	0	3	1	1	0	0	2	3	2	3	3	4	3	4	0
2000Q3	0	0	4	1	1	0	0	2	3	2	4	2	4	3	4	0
2000Q4	0	0	3	0	0	0	0	2	2	2	3	1	3	3	5	0
2001Q1	0	0	2	0	0	1	1	0	2	1	2	1	2	3	4	0
2001Q2	1	0	0	0	1	2	1	0	0	1	0	2	2	1	3	0
2001Q3	3	1	0	0	2	2	2	0	0	0	0	1	0	1	2	0
2001Q4	5	2	0	0	3	2	2	0	0	0	0	1	0	1	1	0
2002Q1	5	2	0	0	4	2	2	1	0	0	0	1	0	1	1	1
2002Q2	4	2	0	0	3	1	2	1	0	0	0	1	1	1	0	1
2002Q3	2	1	1	0	3	1	1	1	1	3	1	1	1	2	0	1
2002Q4	2	1	3	0	1	0	0	1	3	3	3	1	1	2	1	2
2003Q1	0	1	5	0	0	0	0	1	6	5	5	3	5	3	3	4
2003Q2	0	1	5	0	0	0	0	1	6	6	5	5	6	3	4	8
2003Q3	0	0	6	0	0	0	0	0	7	5	6	5	9	4	5	9
2003Q4	0	0	7	0	0	0	0	0	8	5	7	6	9	5	6	11
2004Q1	0	0	7	0	0	0	0	0	8	6	7	5	10	6	8	12
2004Q2	0	0	10	1	0	0	0	0	9	7	10	6	12	8	9	11
2004Q3	0	0	10	1	0	0	0	0	9	7	10	6	12	8	9	10
2004Q4	0	0	10	1	0	0	0	0	9	7	10	6	12	9	9	12
2005Q1	0	0	11	0	0	0	0	0	10	8	11	7	15	9	10	15
2005Q2	0	0	9	0	0	0	0	0	10	9	9	8	15	9	9	14
2005Q3	0	0	7	0	0	0	0	0	10	9	7	8	14	9	9	15
2005Q4	0	0	6	2	0	0	0	0	10	10	6	9	14	10	12	13
2006Q1	0	2	6	2	0	0	0	1	9	10	6	7	12	8	12	10
2006Q2	0	2	5	2	0	0	0	1	9	12	5	7	13	10	15	8
2006Q3	0	2	7	2	0	0	0	1	11	13	7	10	15	12	14	11
2006Q4	0	1	9	1	0	0	1	0	16	13	9	13	21	18	15	13
2007Q1	0	0	13	1	0	0	0	0	19	17	13	18	23	19	18	18
2007Q2	0	0	12	0	0	0	0	0	23	21	12	22	27	21	20	20
2007Q3	0	0	16	0	0	0	0	0	24	21	16	23	29	20	21	22
2007Q4	0	0	16	0	0	0	0	0	25	23	16	27	29	20	21	24
2008Q1	0	0	13	0	0	0	0	0	27	25	13	28	30	22	19	27
2008Q2	0	2	14	0	0	0	0	0	27	24	14	28	29	23	16	27
2008Q3	0	2	7	0	0	0	3	0	25	23	7	26	27	22	8	23
2008Q4	1	2	5	0	1	1	13	0	17	16	5	26	16	17	4	20
2009Q1	11	8	3	1	9	4	18	0	8	11	3	20	5	9	2	7
2009Q2	20	17	1	5	19	9	23	10	5	7	1	8	1	7	2	2
2009Q3	23	19	1	9	22	12	25	15	4	5	1	4	1	5	0	1
2009Q4	24	19	1	11	24	12	27	17	3	2	1	4	1	3	0	2
2010Q1	17	12	2	12	17	7	19	17	3	0	2	4	4	4	1	3
2010Q2	6	7	6	10	6	4	7	8	5	1	6	3	4	5	1	4
2010Q3	5	2	6	11	3	2	5	5	7	2	6	2	4	7	1	3
2010Q4	4	2	7	8	2	1	4	4	8	2	7	3	2	6	2	1
2011Q1	3	2	7	7	2	1	5	4	5	2	7	3	2	8	4	1
2011Q2	2	2	7	4	3	2	4	3	5	3	7	4	2	6	4	2
2011Q3	0	2	9	2	3	1	3	1	5	5	9	5	2	6	3	2
2011Q4	0	1	8	2	3	1	4	2	7	8	8	5	2	8	4	4
2012Q1	0	1	8	2	4	2	4	3	6	9	8	5	1	7	3	3
2012Q2	1	1	8	2	3	3	5	5	5	8	8	3	2	7	2	3
2012Q3	3	4	5	6	7	4	5	7	3	9	5	2	2	6	2	3
2012Q4	5	5	7	7	6	4	6	7	3	8	7	2	2	6	3	4
2013Q1	6	4	9	7	6	3	7	6	6	9	9	1	3	6	4	4
2013Q2	6	6	10	8	6	4	4	7	6	10	10	1	3	7	5	4
2013Q3	5	6	10	9	6	6	3	7	6	9	10	1	3	6	6	5
2013Q4	5	6	12	8	4	6	1	6	6	9	12	1	3	6	4	5
2014Q1	4	5	12	8	4	6	1	5	3	9	12	2	3	9	6	4
2014Q2	2	4	13	7	2	6	1	5	4	10	13	2	6	9	9	6
2014Q3	1	5	13	7	0	5	1	6	4	9	13	5	5	9	8	4
2014Q4	2	5	12	7	3	4	1	5	4	7	12	6	5	8	9	3
2015Q1	6	11	10	9	5	10	2	8	2	5	10	9	9	6	8	4
2015Q2	22	23	7	14	19	20	5	16	1	2	7	7	4	2	6	3
2015Q3	32	28	5	16	30	22	11	17	1	4	5	3	3	2	7	3
2015Q4	32	30	3	18	31	23	15	18	1	4	3	2	2	3	5	3

Table 4.7 Estimation results for stops and retrenchments (excluding GFC periods)

	Stops				Retrenchments			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors								
Uncertainty	0.107***	0.081**	0.068***	-0.001	0.052***	0.031	0.054***	0.041**
	(0.021)	(0.035)	(0.018)	(0.028)	(0.018)	(0.027)	(0.019)	(0.020)
Liquidity	-18.368***	-10.937*	-6.626	-4.032	-8.447*	-12.481**	-11.189**	-9.846**
	(4.634)	(6.111)	(6.519)	(2.768)	(4.667)	(6.292)	(4.623)	(3.865)
Interest rates	-0.513*	-0.526*	0.004	-0.313*	-0.413	-0.307	-0.035	-0.446**
	(0.270)	(0.275)	(0.250)	(0.184)	(0.275)	(0.354)	(0.262)	(0.212)
Growth	-0.708*	-0.161	-0.766*	0.171	-0.033	0.029	-0.683*	-0.201
	(0.410)	(0.546)	(0.427)	(0.308)	(0.429)	(0.509)	(0.361)	(0.350)
Contagion								
Trade	34.286***	19.625***	27.873***	18.634**	33.623***	26.173***	12.626	-2.500
	(5.660)	(6.283)	(5.628)	(8.293)	(4.883)	(6.353)	(9.156)	(7.671)
Regional	2.622***	2.897***	1.689***	0.147***	1.846***	2.544***	2.352***	0.144***
	(0.335)	(0.346)	(0.299)	(0.042)	(0.374)	(0.423)	(0.375)	(0.036)
Domestic Factors								
Financial System	0.002	-0.001	0.005	-0.004	0.011***	0.007	0.008**	0.003
	(0.005)	(0.007)	(0.004)	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)
Capital Controls	-0.004*	-0.008	-0.003	0.001	-0.003	-0.020	-0.004	-0.003
	(0.002)	(0.005)	(0.002)	(0.002)	(0.004)	(0.035)	(0.006)	(0.003)
Debt to GDP	0.006	0.001	0.013***	0.009**	0.002	0.015***	0.002	0.008
	(0.004)	(0.006)	(0.003)	(0.004)	(0.003)	(0.005)	(0.004)	(0.006)
Real GDP Growth	-0.116**	-0.066	-0.146*	0.025	-0.096**	-0.083	-0.216***	-0.114**
	(0.058)	(0.062)	(0.077)	(0.047)	(0.044)	(0.064)	(0.045)	(0.046)
Real GDP per capita	-0.331	-0.161	-0.336	-0.480	-0.668**	-0.751*	-0.577*	-0.673**
	(0.333)	(0.482)	(0.344)	(0.297)	(0.285)	(0.407)	(0.298)	(0.313)
Inflation	-0.096	-0.120	-0.158	-0.059	-0.076	-0.266**	-0.054	-0.132
	(0.094)	(0.114)	(0.113)	(0.084)	(0.074)	(0.112)	(0.120)	(0.089)
Observations	1410	1410	1410	1410	1442	1442	1442	1442

Table 4.8 Estimation results for surges and flights (excluding GFC periods)

	Surges				Flights			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors								
Uncertainty	-0.011	-0.035	-0.012	-0.020	-0.071***	-0.037*	-0.062**	-0.035
	(0.023)	(0.026)	(0.019)	(0.025)	(0.025)	(0.020)	(0.027)	(0.028)
Liquidity	5.574**	-1.280	4.872**	2.074	7.645***	3.207	3.332	8.142***
	(2.790)	(2.789)	(1.988)	(3.403)	(2.849)	(2.129)	(2.868)	(2.840)
Interest rates	1.161***	0.709***	0.326*	0.600***	1.061***	0.890***	0.961***	0.582***
	(0.249)	(0.250)	(0.172)	(0.212)	(0.167)	(0.170)	(0.187)	(0.166)
Growth	0.200	0.379*	0.148	0.402	0.732**	0.216	0.637***	0.669**
	(0.270)	(0.196)	(0.174)	(0.328)	(0.287)	(0.194)	(0.220)	(0.271)
Contagion								
Trade	13.954	13.229	-5.260	2.292	8.485	-3.336	0.866	13.115***
	(10.018)	(9.516)	(10.437)	(4.854)	(9.850)	(9.948)	(10.059)	(4.742)
Regional	3.311***	2.155***	2.540***	0.156***	2.470***	2.417***	2.356***	0.090***
	(0.356)	(0.322)	(0.307)	(0.037)	(0.292)	(0.412)	(0.275)	(0.035)
Domestic Factors								
Financial System	0.008**	0.005	0.010**	0.004	0.008**	0.000	0.005	0.007*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)
Capital Controls	-0.194***	0.007***	-0.225***	-0.139*	-0.176***	0.003	-0.146**	-0.123*
	(0.065)	(0.002)	(0.075)	(0.071)	(0.057)	(0.002)	(0.070)	(0.071)
Debt to GDP	-0.003	-0.009	-0.010**	-0.008	-0.004	-0.014**	-0.009	-0.006
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)	(0.006)	(0.004)
Real GDP Growth	-0.015	-0.013	0.014	-0.058	-0.022	-0.023	-0.097**	-0.046
	(0.029)	(0.027)	(0.037)	(0.036)	(0.047)	(0.025)	(0.045)	(0.046)
Real GDP per capita	-0.356	-0.735***	-0.467**	-0.094	-0.438*	-0.273	-0.053	-0.315
	(0.328)	(0.260)	(0.223)	(0.350)	(0.243)	(0.341)	(0.279)	(0.234)
Inflation	0.076	-0.046	-0.041	-0.039	-0.074	0.027	-0.067	-0.025
	(0.096)	(0.083)	(0.075)	(0.100)	(0.077)	(0.103)	(0.083)	(0.072)
Observations	1409	1409	1409	1409	1450	1450	1450	1450

Table 4.9 Estimation results for stops and retrenchments (adding GFC dummy)

	Stops				Retrenchments			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors								
Uncertainty	0.073***	0.055***	0.035***	0.010	0.056***	0.039***	0.020***	0.026**
	(0.012)	(0.016)	(0.008)	(0.018)	(0.009)	(0.015)	(0.007)	(0.012)
Liquidity	-9.078***	-5.640	-2.505	-4.881*	-6.623**	-10.752***	-3.511	-6.556*
	(3.144)	(3.554)	(4.487)	(2.655)	(3.245)	(3.632)	(3.931)	(3.422)
Interest rates	-0.454*	-0.530**	0.062	-0.376**	-0.492*	-0.395	0.037	-0.527**
	(0.268)	(0.261)	(0.234)	(0.183)	(0.265)	(0.335)	(0.237)	(0.207)
Growth	0.197**	0.248***	0.069	0.117	0.158*	0.174	0.108	0.117
	(0.081)	(0.073)	(0.066)	(0.201)	(0.082)	(0.129)	(0.082)	(0.141)
Contagion								
Trade	29.254***	18.697***	17.888***	18.410**	30.553***	26.359***	5.893	0.320
	(5.669)	(6.127)	(6.424)	(7.621)	(5.349)	(6.138)	(8.069)	(7.423)
Regional	2.214***	2.579***	1.893***	0.145***	2.018***	2.461***	2.425***	0.146***
	(0.264)	(0.284)	(0.219)	(0.042)	(0.290)	(0.329)	(0.275)	(0.035)
Domestic Factors								
Financial System	0.005	0.003	0.003	-0.000	0.014***	0.010*	0.008***	0.006*
	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.006)	(0.002)	(0.004)
Capital Controls	-0.006***	-0.011	-0.007**	-0.000	-0.005	-0.025	-0.010	-0.003
	(0.002)	(0.007)	(0.003)	(0.002)	(0.005)	(0.035)	(0.011)	(0.003)
Debt to GDP	0.005	0.000	0.010***	0.008*	0.002	0.014***	0.004	0.008
	(0.004)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.005)
Real GDP Growth	-0.039	-0.009	-0.090*	0.022	-0.029	-0.000	-0.103***	-0.096**
	(0.044)	(0.051)	(0.048)	(0.031)	(0.035)	(0.050)	(0.036)	(0.040)
Real GDP per capita	0.065	0.067	0.335	-0.440	-0.571*	-0.749**	-0.080	-0.739**
	(0.347)	(0.434)	(0.314)	(0.291)	(0.296)	(0.352)	(0.230)	(0.328)
Inflation	-0.065	-0.066	-0.090	-0.056	-0.069	-0.212**	-0.053	-0.147*
	(0.087)	(0.075)	(0.088)	(0.080)	(0.063)	(0.102)	(0.061)	(0.077)
Dummy global financial crisis	0.309	0.827	0.883**	0.472	0.711**	0.863	1.136***	0.273
	(0.395)	(0.662)	(0.392)	(0.420)	(0.355)	(0.573)	(0.392)	(0.340)
Observations	1667	1667	1667	1667	1711	1711	1711	1711

Table 4.10 Estimation results for surges and flights (adding GFC dummy)

	Surge				Flight			
	Total	FDI	FPI	OTH	Total	FDI	FPI	OTH
Global Factors								
Uncertainty	-0.008	-0.018	-0.013	-0.017	-0.047***	-0.019*	-0.045**	-0.023
	(0.015)	(0.015)	(0.014)	(0.010)	(0.014)	(0.011)	(0.022)	(0.014)
Liquidity	10.693***	2.324	6.675***	4.500*	9.456***	4.466**	4.923*	7.632***
	(2.194)	(2.295)	(2.162)	(2.412)	(2.557)	(1.814)	(2.920)	(2.600)
Interest rates	1.152***	0.761***	0.314*	0.726***	1.027***	0.839***	0.887***	0.682***
	(0.266)	(0.249)	(0.183)	(0.175)	(0.164)	(0.183)	(0.168)	(0.148)
Growth	0.302**	0.162	0.284*	0.194*	0.454***	-0.035	0.598***	0.419**
	(0.143)	(0.106)	(0.159)	(0.116)	(0.172)	(0.110)	(0.223)	(0.166)
Contagion								
Trade	11.690*	15.042**	-4.910	-0.088	9.189	8.211	10.721	5.847
	(6.181)	(6.123)	(8.976)	(3.395)	(6.019)	(5.065)	(6.766)	(3.621)
Regional	3.170***	2.064***	2.598***	0.109***	2.763***	2.556***	2.330***	0.104***
	(0.329)	(0.320)	(0.290)	(0.022)	(0.251)	(0.367)	(0.278)	(0.027)
Domestic Factors								
Financial System	0.007**	0.004	0.009***	0.004	0.007**	-0.000	0.004	0.006
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Capital Controls	-0.087**	0.007***	-0.179***	-0.075*	-0.100***	0.002	-0.098*	-0.089
	(0.036)	(0.002)	(0.064)	(0.044)	(0.038)	(0.002)	(0.053)	(0.055)
Debt to GDP	-0.002	-0.007	-0.009*	-0.006	-0.004	-0.013**	-0.008	-0.005
	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.004)
Real GDP Growth	0.037	0.023	0.036	0.030	0.018	-0.012	-0.038	0.006
	(0.028)	(0.018)	(0.034)	(0.039)	(0.033)	(0.022)	(0.031)	(0.031)
Real GDP per capita	-0.543*	-0.608***	-0.630***	-0.311	-0.357	-0.118	-0.019	-0.324
	(0.280)	(0.231)	(0.198)	(0.294)	(0.248)	(0.306)	(0.295)	(0.207)
Inflation	0.075	0.028	-0.047	-0.070	-0.043	0.031	-0.054	-0.048
	(0.085)	(0.072)	(0.069)	(0.075)	(0.062)	(0.086)	(0.075)	(0.063)
Dummy global financial crisis	0.350	0.349	-0.003	0.970***	0.884***	0.193	0.128	0.230
	(0.342)	(0.238)	(0.292)	(0.280)	(0.309)	(0.288)	(0.289)	(0.302)
Observations	1665	1665	1665	1665	1719	1719	1719	1719

Chapter 5: Overall conclusion

This thesis deals with the broad issues of the roles and drivers of financial turmoil, which are often captured by extreme capital flow waves and financial crises and how these in turn affect the policy responses of policy makers. In all chapters and throughout the dissertation, I have attempted to make a significant contribution to the existing literature by providing empirical supports.

A number of research efforts have conducted on 'crisis begets reform' hypothesis and confirmed it. However, the existing studies is not sufficient to draw a definite conclusion since financial policy reform generally includes both liberalization of the financial system and the strengthening of prudential regulation. To address this issue, Chapter 2 clearly describe whether both financial liberalization and prudential regulation are included during the process of financial policy reform or not. In addition, it explains the nexus between the origins of financial crises and the policy dimensions of financial policy reform by using five types of financial crises. The results confirm the crisis-begets-reform argument in the context of financial liberalization by showing that all types of financial crises promote financial liberalization. However, financial policy reform following financial crises does not generally include the strengthening of prudential regulation.

The chapter postulates that financial crises tend to promote ‘incomplete’ financial policy reform since financial liberalization should be accompanied by prudential regulation. As suggested in the works of Mishkin (2001), Rosenbluth and Schaap (2003), and Walter (2003), financial liberalization without sound prudential regulation fails to reduce vulnerability to subsequent financial crises. Furthermore, it clearly states that financial regulators’ choice of policy dimensions in response to financial crises varies depending on the crisis origin. This chapter suggests that financial regulators should evaluate the short- and long-term benefits and costs of each policy dimension of financial policy reform (both financial liberalization and

prudential regulation) and should choose the optimal combination of policy dimensions to maintain financial stability and to mitigate the adverse effects of possible financial disturbances when a country faces a specific type of financial crisis.

Subsequently, the recent Global Financial Crisis (GFC) has led to the literature to the focus on the macroprudential policies and capital controls. An extensive literature has explored the relationships among macroprudential policies, capital controls, and financial stability. Yet, study on the link between volatile capital inflows and upgrading of such policies still need to be explored. Chapter 3 has filled this gap by empirically testing whether countries employ MPMs or CFMs following shocks related to volatile capital inflows. In addition, it states the significant differences in the focus of these policies between the pre- and post-GFC periods.

The results reconfirm the crisis-beget-reform argument in the crisis-reform literature by showing that financial regulators facing sudden stops of capital inflows (which can be regarded as one type of financial crises) tend to upgrade macroprudential policy, particularly financial institutions-based macroprudential policy. Furthermore, it indicates that an economy facing sharp increases of capital inflows upgrades its capital control measure to manage the risk associated with such large volatility. Such results are more pronounced in the post-GFC periods. This chapter suggest that macroprudential policies and capital controls are upgraded in the face of volatile capital inflows and the use of such policies have become much more common in the wake of the GFC.

The final chapter revisits the old debate of how global uncertainty how global uncertainty relates to extreme waves of capital flows. The chapter attempts to focus on foreign direct investment, portfolio investment, and other investment besides gross capital flows. In addition, it explores the differences in the role of global uncertainty between advanced and developing economies since the role of global uncertainty could be different across countries. This empirical study has confirmed the argument of the existing literature, including Forbes and Warnock (2012), Calderón and Kubota (2013), and Passari and Rey (2015), that global

uncertainty is a crucial source of extreme capital flow waves. More importantly, A significant contribution of the study is that it has shown clear differences in the role of global uncertainty between advanced and developing economies. In developing economies, FDI is more resilient, compared to FPI, during times of high global uncertainty, as suggested in conventional wisdom. In contrast, FDI is as vulnerable as FPI to uncertainty shock in advanced economies. Thus, the "wait-and-see" mechanism matters on FDI only in advanced economies.

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