

UNIVERSITY OF LJUBLJANA  
FACULTY OF ECONOMICS

MASTER'S THESIS

JURE OTOREPEC



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**THE IMPACT OF INTERNATIONAL CAPITAL FLOWS ON  
MACROECONOMIC INSTABILITY**

Ljubljana, September 2014

JURE OTOREPEC

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## INTRODUCTION

Academic economists and economic experts in international institutions such as the International Monetary Fund (IMF) are engaged in an active discussion on the impact of capital flows on international economic stability. In the last few years, many economists have expressed concern that international capital flows (flows of capital between countries) may be responsible for the occurrence of so called *sudden stop* crises in emerging market economies.

Sudden stop crises are defined by Calvo et al. (2004) as periods, in which at least one observation in year-on-year international capital flows lies at least two standard deviations below its sample mean. Such crises have been a source of major macroeconomic instability in emerging markets as measured by GDP variation from peak to trough. When capital inflows into an emerging market rapidly slow down (or reverse) GDP variation can be massive in a timeframe of just a couple of months.

Such has been the case in Indonesia (December 1997 – December 1998: -17.3% change in GDP), Thailand (September 1996 – September 1998: -15.1% change in GDP), Morocco (December 1994 – June 1995: -13.3% change in GDP) and many others which experienced a double-digit or close to a double-digit decline in GDP in a matter of months (Ortiz, Ottonello, Sturzenegger, & Talvi, 2009). Probably the most infamous sudden stop crisis involving a group of emerging market economies<sup>1</sup> was the Asian financial crisis of 1997.

More recently, in this millennium, emerging Europe (Central and Eastern European countries) has experienced a crisis that is very reminiscent of the aforementioned East Asian financial crisis in the 1990s. Similarly, in the 2000s, Central and East European countries received massive capital inflows, which resulted in large current account deficits and high growth in the supply of credit. However, with the advent of the Great Recession in 2008, the massive capital inflows suddenly subsided, which culminated in major falls in GDP across Central and Eastern Europe (although some countries fared better than others).

Although sudden stop crises like the ones mentioned are commonly seen as a relatively recent phenomenon, this may not be the case. We have to remember that international capital flows had been suppressed through a large part of the 20<sup>th</sup> century, most notably in the Bretton Woods period (1945-1971/73), hence during this period international capital flows were largely a non-factor in economic affairs. However, as this thesis explores, sudden stops are by no means limited to the modern period of liberalized international capital flows (1980s-today). The case of Argentina in the late 1880s and early 1890s shows that these kinds of crisis are by no means a new phenomenon.

Regardless of the period, however, what are now called sudden stop crises are seen to occur, mostly due to the observation that international capital flows behave in a pro-cyclical manner. In other words, they exacerbate economic expansions as well as economic contractions and are thus often blamed for increased economic instability. This observation applies to small open economies in particular, which are usually much more dependent on foreign trade and inflows of foreign capital than large economies.

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<sup>1</sup> This group of countries included Indonesia, South Korea, Thailand, Malaysia and the Philippines.

In order to explain why large inflows of foreign capital in the pre-crisis period may cause economic instability, a large body of modern literature has pointed to the accompanying large growth in the supply of credit that has been observed in countries, which later suffered a sudden stop. Empirical observations point out that in general only those countries have suffered a sudden stop, which allowed large capital inflows to fuel a credit bubble. The bursting of the credit bubble eventually brings about major economic turbulence during which capital inflows subside.

Many hence regard sudden stops as a special case of credit bubbles gone bust, where the business cycle is brought about primarily by external factors. However, as standard macroeconomic models have a hard time explaining (much less predicting) business cycles propagated by credit expansion, Calvo (2013a) and White (2012) have suggested the use of the Austrian business cycle theory for explaining credit bubbles and sudden stops. This theory was developed by von Mises (1949, reprinted 1998) and Hayek (1935, reprinted 1967) and while it emphasizes credit as the driver of business cycles, the theory was developed for a closed economy environment.

Therefore, an open economy version of the theory might help understand sudden stops and the interplay between international capital flows and credit growth that precedes a crisis. Specifically the literature suggests low interest rates in large developed economies, as a key external factor (push factor), which triggers massive capital inflows to emerging economies with relatively higher interest rates.

Hence, in this thesis, this external factor is incorporated into the Austrian business cycle theory, with the aim of explaining sudden stop episodes. Thus to provide an explanation of sudden stops, first the standard closed economy version of the Austrian business cycle theory is presented. The presentation of the closed economy version is followed by the expansion of the theory to an open economy version and finally the theory is applied to two historical episodes of sudden stops in two distinct periods of globalization. In the first period of globalization, the events leading up to the Argentine crisis of 1890 are explored while in the second period we explore developments leading up to the 2008 crisis in Central and Eastern Europe.

Therefore, the objective of this thesis is primarily to explain the common empirical observation that (1) credit booms precede financial crises in small open economies. Additionally the thesis aims to explain (2) why these credit booms are unsustainable and end in a sudden stop, and finally the thesis attempts to (3) apply the theory developed herein to historical two historical episodes of sudden stops.

It is important to note that the thesis does not focus on providing policy prescriptions regarding international capital flows and sudden stops, rather the focus is on developments during the boom phase. In other words, the focus is on how financial imbalances are created during the period of excessive credit growth and how business cycles are transmitted across borders.

Hence, the main objective of this paper is to determine the causes for the periodic shocks to macroeconomic stability that sudden reversals in international capital flows seem to at the very least amplify, if not outright be the cause of. To identify the causes for the destabilizing impact of international capital flows, the following research questions are addressed:

1. Is there a link between credit growth and international capital flows?
2. Can the Austrian theory of the business cycle provide a good explanation for credit bubbles and can it be expanded to account for the international transmission of credit bubbles?
3. Do buoyant capital inflows create credit bubbles in small open economies, followed by a bust when capital flows come to a sudden stop? Is this a negative development due to the distortion of relative prices caused by the credit bubble?
4. Are sudden stops a modern phenomenon or can similar historical episodes in previous periods be identified and was the Argentine crisis of 1890 a sudden stop crisis?

In order to answer these questions, the thesis is structured in the following way. In *Chapter 1* the problems associated with international capital flows are presented, and the hypothesis that international capital flows are connected to excessive credit growth is offered. As excessive credit growth is at the heart of the Austrian theory of the business cycle, the closed economy version of this theory is presented in *Chapter 2*, with an analysis of the impact of credit growth dynamics on the structure of production in the economy. In *Chapter 3*, this theory is then expanded to an open economy, in order to ascertain the impact of international capital flows on credit growth. Finally, the theory developed in *Chapter 3*, is applied in *Chapter 4* on two historical episodes to ascertain the empirical validity of the theory.

Empirical episodes are hence examined through the lens of the theory that we have developed. Based on the theoretical and empirical examination, we find that the Austrian business cycle theory is a useful tool in analyzing sudden stop episodes. By expanding the Austrian theory of the business cycle to the open economy, we can explain many empirical observations of the build-up of events leading to a sudden stop crisis. The distortion of relative prices and hence a distorted structure of production, which are key features predicted by the Austrian business cycle theory, are present in our empirical episodes. There are also indications that the international transmission of credit expansions through the interest rate and foreign exchange rate channel is at work, especially in the case of Central and Eastern European crisis of 2008.

It is important to note that using the Austrian business cycle theory in an open economy context is a novel approach and one which has seldom been used in the literature hitherto. The contribution of this thesis is hence the use of a new theory, which can shed new light on the connection between credit growth, international capital flows and economic crises. An additional contribution is the application of the theory on two historical episodes, which have hitherto rarely been associated with the Austrian business cycle theory.

## **1 THEORY OF THE LINK BETWEEN MONETARY POLICY AND INTERNATIONAL CAPITAL FLOWS**

### **1.1 Definitions of Key Terms**

In this chapter, the theory of the link between international capital flows and monetary policy will be discussed. In order to guide the discussion on international capital flows and monetary policy, it is appropriate to define the commonly used terms.

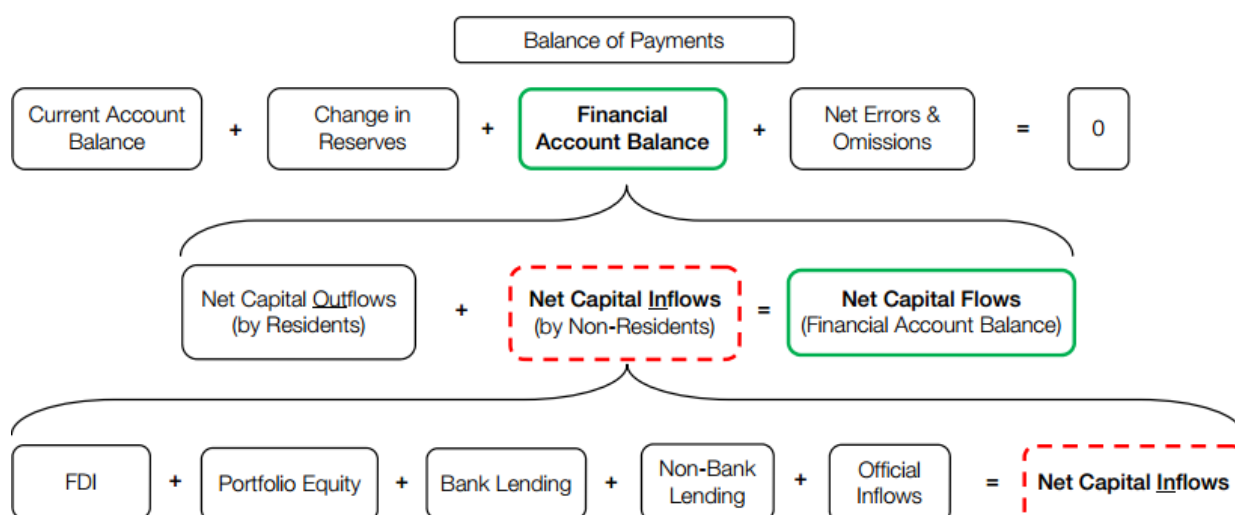
In order to better examine international capital flows let's first discuss the meaning of the word *capital*. The standard definition of the word capital as used in economics is a produced means of production (Jackson, 2000). Of course, economists also use the term capital to mean

a sum of money. Therefore, it is useful to make a distinction between capital as a physical concept - *capital goods*, and capital as a sum of money - *financial capital* (Murphy, 2014). This distinction will be useful in discussing capital flows (especially capital flight) and later monetary policy and business cycles.

Then what is a *capital flow*? Technically, capital flows emerge with any act of selling or buying of a good or service with a monetary payment. However, economists usually use the term capital flow in an international context, to describe the financial side of international trade. For instance, if somebody imports goods and services, he has to pay for them by transferring a monetary payment (Ott, 2008). This monetary payment is called a capital flow, which emerges when the ownership of a financial asset is transferred from one country to another. Most commonly the assets that are involved in such transactions are equity and debt instruments. In international economic accounts these transactions are recorded in the financial account of a country's balance-of-payments accounts (Institute of International Finance, 2013). The balance-of-payments accounts of a country record the payments and receipts of the residents of the country in their transactions with residents of other countries (Stein, 2008).

For our purposes, we are going to focus our attention on only some parts of the balance-of-payments account. In particular, capital flows are recorded on the capital account balance, which consists of net errors & omissions, change in reserves and the financial account balance. It is useful to divide the financial account into net capital outflows (by residents) and net capital inflows (by non-residents). These net capital inflows are further divided into foreign direct investment (FDI), portfolio equity, bank lending, non-bank lending and official inflows (see *Figure 1*).

*Figure 1: Simplified Illustration of Capital Flows within the Balance of Payments*



Source: Institute of International Finance, *IIF Capital Flows User Guide*, 2013, p. 1.

Hopefully, by now, the reader understands what the concept of capital flows intends to portray. Now we can move on to the other part of our discussion, namely, monetary policy. Broadly speaking, we can define monetary policy as any policy that is related to the money supply, particularly as it relates to the directives, policies, statements, and actions of a central bank, which have an effect on national spending (Labonte & Makinen, 2008).

While defining monetary policy might be pretty straightforward, it is non-trivial to answer the question of: what is money? The answer is simple at first, by observing that money is the most saleable good in society or the general medium of exchange, from which the secondary functions of money such as a store of value, unit of account and a standard of deferred payments are derived (Salerno, 1994). What constitutes money is harder to answer though. To distinguish what is money and what is not is harder than it seems at first glance. The key criteria for determining what is money and what is not, is liquidity or moneyness, which is defined as the quality or state of being readily convertible to cash (Retrieved May 8, 2014, Merriam-Webster: <http://www.merriam-webster.com/dictionary/moneyness>). In other words, money substitutes have to be perfectly liquid to act as money in society. Therefore, as Rothbard (1962, reprinted 2009) noted, the conclusive test of what is money is if it is used to settle debts and if it is such a means of payment at par. Meaning that for something to be money, it has to be accepted without any discount (at a one to one ratio with cash) whatsoever, however small the discount might be, and used as the general medium of exchange and accepted in the payments of debts.

However, some assets are so highly liquid that they enjoy the status of near-money. Near-moneys are assets, which gain a higher price on the market because of their high marketability. The existence of near-money lowers the demand for money, as holders of near-money, can economize on money by keeping near-money as assets. The price of near-money is higher than would be the case in the absence of their quasi-monetary status (Rothbard, 1962). In advanced economies near-moneys are usually short-term debts or securities that have a broad market.

Defining and discussing liquidity is relevant for our purposes because, as Hayek (1937) and Calvo (2013a) stress, the impact of liquidity considerations is significant, when dealing with issues of capital flows, monetary policy and business cycles. Hayek (1937) in particular stressed the influence of multiple layers of liquidity on the functioning of the international monetary system. This system is influenced by the interplay between international capital flows and monetary policies in individual countries in a major way.

As we will also be dealing a lot with international financial crises, it is also good to keep in mind the different types of international financial crises (International Monetary Fund, 1998):

1. *Currency Crises*, which occur due to a loss of credibility of a fixed (or pegged) exchange rate system;
2. *Banking Crises*, which occur when there is a sudden collapse of the domestic banking system;
3. *Systemic financial crises or sudden stops*, which as defined in Calvo (1998) entail a large and unexpected fall (sudden stop) of capital inflows (it need not result in outright capital outflows);
4. *Sovereign Debt Crises*, which occur due to the government being unable to pay-off its debts to international creditors.

## 1.2 International Capital Flows and Economic Crises

Without free movements of capital under the Bretton Woods system (1945-1971/73), international capital flows were too small to have more than a minor impact on macroeconomic performance.

However, with financial liberalization in the 1980s international capital flows have notably increased in size and, as a result, their influence on national economies has increased. This is particularly the case for small and medium-sized economies. In theory financial liberalization should be a positive development, as with unrestricted capital flows; capital can get allocated to countries that need it the most. Besides this optimal resource allocation, Bordo (2000) lists additional benefits of open international capital markets enabling intertemporal optimization, the international diversification of portfolios and imposing discipline on policymakers.

Unfortunately, freeing up capital flows has also brought about negative side effects. As Krugman (2013) notes financial liberalization coincides with the appearance of financial crises in small and medium-sized economies<sup>2</sup>. These crises are associated with large and abrupt changes in international capital flows, which can cause systemic financial crises.

Such crises have been named *sudden stops*, which under the most common definition first described by Calvo (1998), are characterized by a *large* and *unexpected* fall of international capital inflows. Calvo et al. (2004) more formally qualify a fall in international capital inflows as *large*, if the annual change in capital flows is at least one standard deviation below the mean. While a fall in international capital inflows is deemed to be *unexpected*, if at least one observation in the annual variation in capital flows is at least two standard deviations below its sample mean.

As was mentioned above, sudden stop crises were practically unknown in the Bretton Woods system when international capital flows were strictly regulated. However, the deregulation of capital flows brought about recurring financial crises, a fact which certainly was not predicted by the neoclassical theory regarding the determinants of international capital mobility, as we will see.

Canonical neoclassical intertemporal models of the current account are built upon a small open economy, which is populated by a representative agent who is subject to fluctuations in his income. However, as Lubik (2007) notes, having access to international financial markets enables the representative agent to reduce uncertainty by loaning out excess funds or by borrowing funds in order to maintain a constant consumption path. As this story often fails to stack up to empirics, the international macroeconomics literature has made a distinction between an international asset market that is incomplete and one that is complete. In complete markets risk sharing is perfect, because agents in such models have access to a complete set of state-contingent securities.

However, foreign debts are not state-contingent, as foreign debts are commonly expressed in nominal terms, regardless of their real value (Lubik, 2007). Therefore, international financial markets have increasingly been regarded as incomplete. This incompleteness, as Calvo (2014) notes, implies that debt deflation-type effects as described in Fisher (1933) arise, which might

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<sup>2</sup> Some examples of such financial crises are Mexico, Brazil, Argentina and Chile in 1982; Sweden and Finland in 1991; the Mexican Tequila crisis in 1995; the Asian Financial Crisis in Thailand, Malaysia, Indonesia and Korea in 1998.

magnify the damage caused by international capital flow volatility, with the accompanying sudden floods and sudden stops of capital inflows.

Moreover, the assumption of internationally complete asset markets was found to be unrealistic in a study by Obstfeld and Rogoff (2001). The main finding from their empirical study was that financial markets perform better at promoting risk sharing across regions within countries than across countries, which goes against the assumption of international asset markets being complete.

However, regardless if the more realistic assumption of incomplete markets was incorporated into the models, the standard Dynamic stochastic general equilibrium (DSGE) models still find it difficult to account for sudden stop episodes occurring. As Mendoza (2010) notes, this applies to frictionless real business cycle models, as well as to models with nominal rigidities.

The divergence between neoclassical theoretical predictions and real life experience soon became apparent, as many unexplained phenomena (or *puzzles*) emerged. The following are just some among many presented in the literature:

1. Lucas (1990) showed how the neoclassical theory cannot account for the lack of capital flows from rich to poor countries (*the Lucas paradox*);
2. Feldstein and Horioka (1980) noted that in OECD countries, savings have not been flowing to countries with the highest rate of return on investment as the neoclassical theory predicts because the co-movement in domestic savings and investment remains high (*Feldstein-Horioka puzzle*);
3. French and Poterba (1991) identified the *equity home bias puzzle*, the observation that home country residents do not invest nearly as much in foreign capital markets as predicted by theory;
4. According to neoclassical theory, consumption should be correlated higher across countries than output. However, Backus, Kehoe and Kydland (1992) noted that the correlations of consumption growth across countries are low, which indicates a lack of risk sharing (*the Backus–Kehoe–Kydland consumption correlation puzzle*).

As Alfaro et al. (2008) point out, all these puzzles directly or indirectly relate to the small size and the opposite direction of capital flows to what should have happened according to neoclassical theory. This phenomenon of capital flows going into the opposite direction to the theoretical benchmark has also been observed regarding sudden stop crises. As Prasad (2013) noted, instead of capital flows behaving in a counter-cyclical manner as theory would predict, capital flows behave in a pro-cyclical manner. Meaning that countries receive capital inflows during good times, but the capital inflows decrease rapidly during bad times.

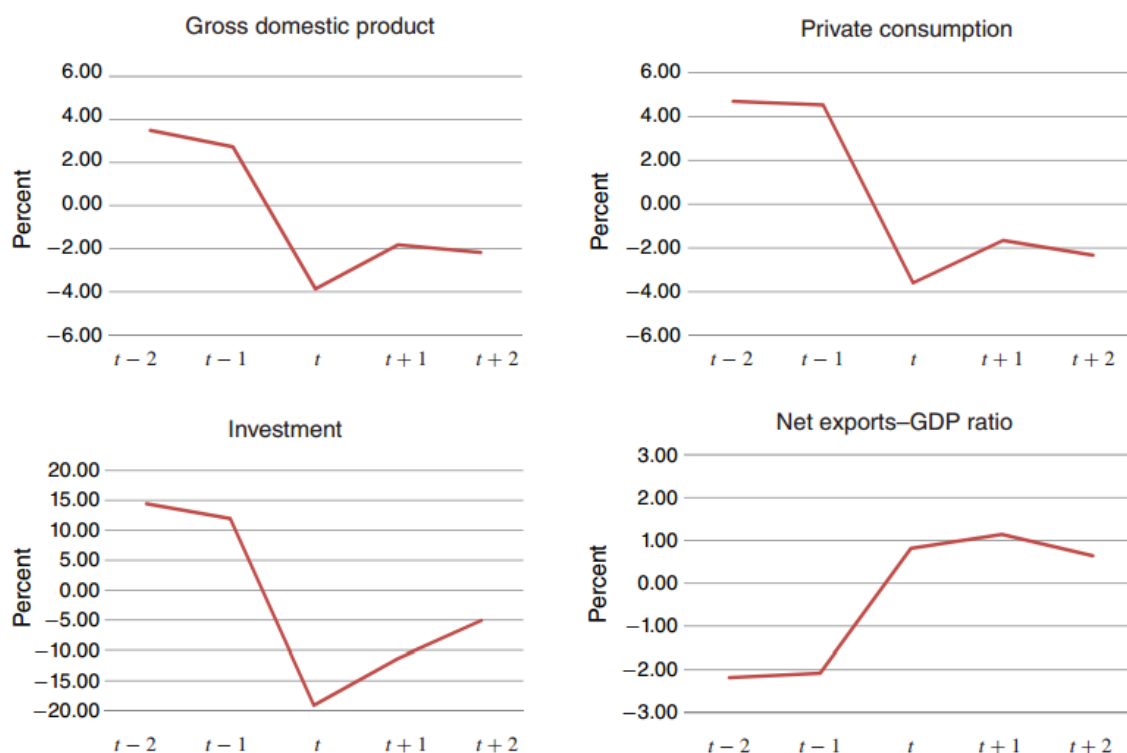
As pointed out by Mendoza (2010), these empirical regularities like large reversals in international capital flows can be seen in the data as a sudden increase in net exports and the current account. The consequence of a reversal in capital flows is often, as Cavallo and Frankel (2007) note, a financial or currency crisis accompanied by a sharp fall in output. These output collapses in emerging markets can be observed in the large declines in GDP and investment, which are also reflected in a large collapse in private consumption.

Such dynamics were observed by Calvo et al. (2006), who identified 22 sudden stop episodes (for a list of all the episodes see *Appendix A*) occurring in the 1980-2004 period. These episodes are delineated from other crises by looking at changes in JP Morgan's Emerging Market Bond Index. Changes in the index were used to provide a connection to the level of

integration of world capital markets, which provided a basis for identifying crises that stemmed from credit shocks rather than from other factors.

The stylized facts for a median sudden stop episode (out of 22) are reflected in *Figure 2*, which depicts a five-year event window with changes in output (GDP), consumption (C), investment (I) and the net exports-GDP ratio centered on sudden stop events at date  $t$ .

*Figure 2: Macroeconomic Volatility around Sudden Stop Episodes in Emerging Market Economies (Cross-country Medians of Deviations from Hodrick-Prescott (HP) Trends)*



Source: E. G. Mendoza, *Sudden Stops, Financial Crises, and Leverage*, 2010, p. 1942.

*Figure 2* shows that sudden stops of capital flows are preceded by expansions. In the expansionary phase, both consumption and production are above trend, while the trade balance is below trend. For a median sudden stop episode, we can observe that the ratio of net exports to GDP swings by about three percentage points at date  $t$  (at the onset of a sudden stop). All the while in a median sudden stop, GDP and consumption fall to about four percent below trend. However, this is mild compared to the fall in investment, which falls by about twenty percent below trend.

These observations are not in line with neoclassical models, which predict that capital flows behave counter-cyclically. As Mendoza (2010) notes, capital flows are only counter-cyclical if credit markets are assumed to be efficient in smoothing consumption and investment. This means that households should be successful in keeping their consumption stable by borrowing from abroad in bad times. However, the exact opposite is observed in sudden stops, as external accounts are driven higher exactly when output and consumption fall. In line with this, Prasad and Rogoff (2003) point out that by liberalizing capital flows, emerging economies actually experience increases in consumption volatility, at least in the short run.



One common explanation for the trouble associated with capital flows to emerging markets has been that the problems with international capital flows only arise due to underdeveloped or inadequate institutions in emerging market economies. However, this explanation is not satisfactory in explaining such episodes as the recent crisis in some euro area economies, where institutions were relatively well-developed (Committee on International Economic Policy and Reform, 2012).

Therefore, in the last few years, sudden stop crises in emerging markets have forced many economists to reassess the theoretical models of international capital flows. First generation models of speculative attacks, as described in Krugman (1979) dominated thinking about capital flows and crises until the 1990s. For a time, these models were successful in explaining several important features of balance of payments crises, pinpointing the problem as one of fiscal profligacy on the part of crisis-stricken governments. However, as East Asian countries were fiscally prudent, these models fell out of favor for their failure to predict the Asian financial crisis 1997/1998. Therefore, second generation models were developed, which incorporated more complicated assumptions about governments' behavior were incorporated into the models (Dooley & Walsch, 1999). Along with financial crises in the 1990s, the development of theories of international economic policy interdependence and its applications was influenced by new movements in economics toward macroeconomic theories with microeconomic foundations (Dias & Dias, 2013).

However, after 2008, considering that the Great Recession of 2008 was financial in origin, economists started to shift their focus on the role of credit in the economy to better grasp the origins of the crisis. Furthermore, as the economic (financial) crisis quickly permeated throughout the global economy, understanding the transmission of credit-driven business cycles across countries became paramount as well.

In line with this renewed focus on credit as the driving force of business cycles, Lane and McQuade (2014) note some common developments prior to a financial crisis occurring. Such as that (i) in the pre-crisis period some countries (e.g. Ireland and Spain) experienced rapid growth in credit, and that there were (ii) excessive external imbalances in some countries. Likewise, the importance of credit growth and external imbalances in the build-up to a financial crisis has been acknowledged by a vast body of recent literature (amongst others: Jorda, Schularick, & Taylor, 2011; Gourinchas & Obstfeld, 2012).

The international aspect of domestic credit booms is as Mendoza (2010) indicates that credit booms are often fuelled by rapid capital inflows from abroad, which establishes a connection between domestic credit booms and capital flows. However, to investigate this connection, it might be unwise to resort to standard macroeconomic models. This is because standard macroeconomic models, as Hume and Sentance (2009) caution, find it hard to account for credit booms occurring, and it is hard to incorporate all the relevant macrofinancial elements into the models. However, macrofinancial elements like credit are very important. As Schularick and Taylor (2009) found in their econometric study of macroeconomic instability for the 1870-2008 period, past credit growth is the single best predictor of future financial instability.

On the other hand, as Calvo (2013a) observes, credit booms are the central theme of the Austrian business cycle theory, as presented in Hayek (1935, reprinted 1967) and von Mises (1949, reprinted 1998). These two authors focused on changes in relative prices that develop during a boom in a closed economy setting.

However, as Calvo (2014) notes, although Hayek and von Mises focused on credit booms in a closed economy setting, their reasoning equally applies to cycles involving capital inflows and sudden stops. In fact White (2006) argues that the Hayek-Mises explanation of the business cycle is even more applicable to small open economies as capital inflows can bring about credit booms driven by foreign credit.

In a similar manner, McKinnon and Pill (1997) blame excessive foreign lending to lead to unsustainable levels of investment in small open economies. With regards to the Asian financial crisis of 1997/1998, Corsetti et al. (1999) came to the same conclusion that over-borrowing and over-investment led to the crisis.

These arguments and observations are reminiscent of that of Hayek (1935) and von Mises (1949). As White (2006) notes, these two authors focused on changes in relative prices that are a result of the increase in the supply of credit and were concerned that changes in relative prices will be costly to roll back when credit returns to normal. This process is triggered by an increase in credit, which impacts interest rates and hence financial calculations (in particular present value calculations). If the increase in credit is not based on changes in real conditions (e.g. changes in intertemporal consumption preferences), unsustainable (temporary) credit growth can falsify the financial calculations of economic agents, who might make unwise investment decisions based on this new information.

With this process in mind and considering the appeal of the Austrian business cycle theory from the standpoint of the theory's success in explaining credit booms, this thesis aims to describe the Austrian framework and apply it to an open economy setting. However, before going to an open economy setting, we must look at the standard closed economy setting (in *Chapter 2*) and in order to extend it to the open economy setting (in *Chapter 3*).

However, before analyzing the Austrian business cycle theory in the closed economy, there are a few things that need mentioning in connection with credit and international capital flows. First of all, there is something to be said about the impact of international capital flows between different financial (banking) systems. While analyzing the influence of the composition of international capital flows and the effects of exchange rate regimes on capital flows is also important. Therefore, these factors are analyzed first, before going into the nitty-gritty of the Austrian business cycle theory (*Chapter 2*) and its connection to credit booms and international capital flows (*Chapter 3*).

### **1.3 The Fragmented World Financial System and International Capital Flows**

We have just seen that there exists the potential of sudden stops and the associated economic instability, when international capital flows (especially to small open economies) turn out to be excessive. However, it is interesting to note that hardly anyone pays any attention to regional (within a single country) balances of payments and flows of capital between regions like flows from New York to California or Bavaria to Brandenburg.

The lack of attention is certainly not due to the lack of capital flows between these regions, as the flows are frequent and large, yet hardly any economic problems are associated with them. This begs the question: why then should international capital flows be any different? In other

words, if large and abrupt changes in international capital flows are so disruptive that they occasionally cause systemic financial crises (sudden stops), why are flows from let's say New York to California so harmless?

This question had been raised by Heilperin (1939) and more recently by Steil (2007). Given that national borders are just as abstract as regional borders, it is conceivable that flows between nations should have identical economic effects as flows between regions.

In practice, however, regions are integrated with other national regions by free trade, free migration, free flows of capital, a common currency, a common fiscal policy and a common banking system. While nations are less integrated and lack one or more of the aforementioned features, which bind the economic and financial systems of regions together.

Nations are less connected than regions within countries, but one issue has been specifically singled out as the ultimate source of the problems associated with international capital flows by the Committee on International Economic Policy and Reform<sup>3</sup> (2012) - the fragmentation of the world financial systems. In other words, the existence of multiple banking systems with different regulations and multiple monetary policies directed toward achieving domestic goals.

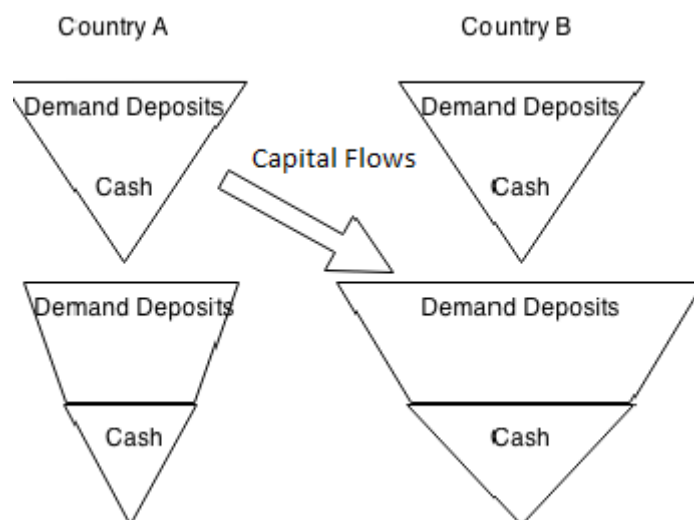
The fragmentation of the world financial system was also identified as the main problem of international capital flows by Hayek (1937), who blamed this fragmentation for deficiencies in the operation of the classical gold standard (1870-1914). More specifically, Hayek (1937), Heilperin (1939), von Mises (1949) and Salerno (2010) point to the institutional arrangement of the one-reserve system as the root of the problem. The adoption of the one-reserve system meant that commercial banks could now hold central bank liabilities, notes and deposits, as their main reserves (Fischer, Schnadt, Capie, & Goodhart, 1994), instead of each commercial bank holding their own reserves. What this development meant, as von Mises (1949) pointed out, is that the commercial banks no longer needed to match the maturity of their liabilities and their assets in order to meet their obligations to their creditors without the aid of the central bank.

An additional problem is that under the one-reserve system, movements of capital between countries can disturb the structure of the national money and credit system. The structure is disturbed, if the central bank expands or contracts its liabilities (mostly cash or banknotes – the base of the inverted pyramid in *Figure 3*) in the face of capital inflows or outflows. The central bank can absorb capital inflows and outflows by buying or selling foreign exchange reserves and expanding or contracting its liabilities in the process, or it can leave its liabilities intact and simply let the currency appreciate or depreciate freely. However, this is often not the case in emerging markets, where central banks are reluctant to let their currencies fluctuate freely, a phenomenon named fear of floating by Calvo and Reinhart (2002).

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<sup>3</sup> Members of the Committee on International Economic Policy and Reform include: Markus Brunnermeier, Philip R. Lane, Dani Rodrik, Jose de Gregorio, Jean Pisani-Ferry, Kenneth Rogoff, Barry Eichengreen, Eswar Prasad, Hyun Song Shin, Mohamed El-Erian, Raghuram Rajan, Andres Velasco, Arminio Fraga, Maria Ramos, Beatrice Weder di Mauro, Takatoshi Ito, Helene Rey and Yongding Yu.

*Figure 3: Effect of non-sterilized capital flows between two different banking systems*



Therefore, if countries do not sterilize capital inflows by allowing their currencies to appreciate and instead expand central bank liabilities (cash), the base of the inverted pyramid (*Figure 3*) widens and the potential of bank money (demand deposit) creation increases. However, it is important to note that no such considerations exist within a unified financial system.

As Salerno (2010) points out the financial system (and its structure) remains intact if capital moves from one region to another within the same financial system. For instance, if suddenly a large number of depositors feel the urge to transfer money from New York to California this will be thoroughly inconsequential. Because these transfers are made entirely through changes in the assets and liabilities of banks the base of the inverted pyramid (central bank liabilities) remains undisturbed, as the liabilities (demand deposits) of these banks are backed by the same central bank.

It is important to remember that short-term foreign credits serve a similar function to their owners as demand deposits do for residents. That means they are short-term for a reason – the owners of such funds are attracted to them because of their high liquidity. It is well-known that domestically a change in the composition of liquid assets from demand deposits (short-term credits) to cash, as Calvo (2013b) and Harwick (2012) note, can ultimately lead to a financial crisis initiated by local depositors.

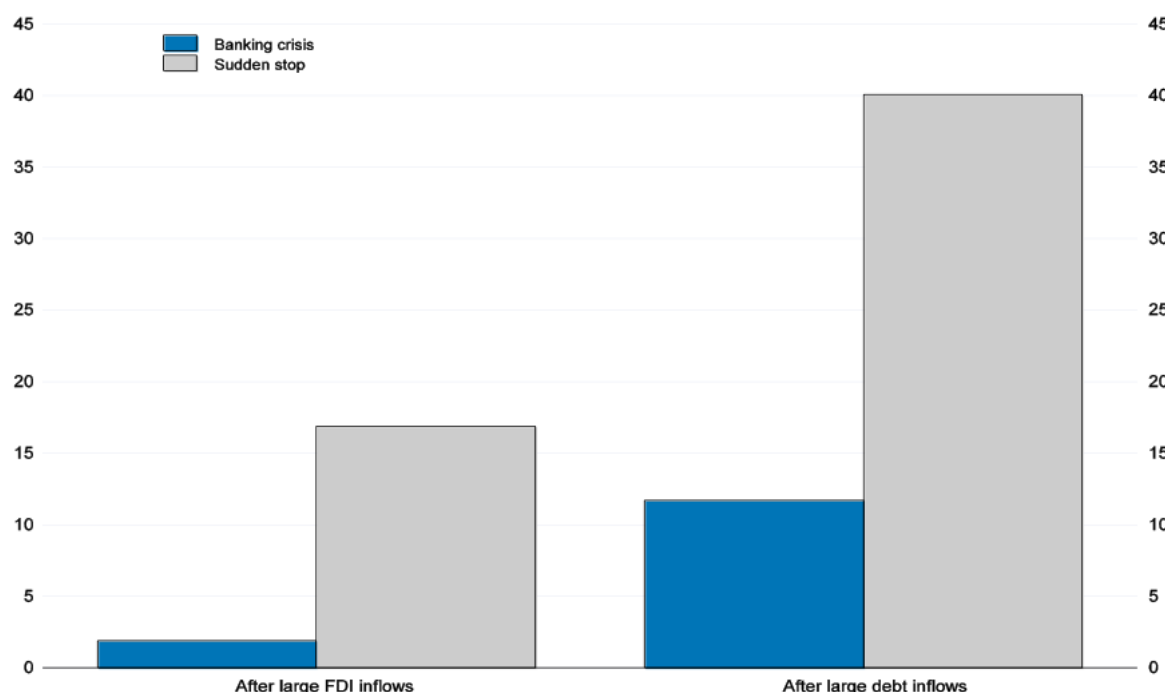
In a similar manner, foreigners who provide short-term credits can also initiate a financial crisis. The crisis can occur if they suddenly pull their short-term credits out of the country, resulting in international capital outflows. The problem is that the banks often treat the capital inflows previously received as any other funds and extend loans on the basis of these funds, as von Mises (1949) noted. Despite the fact that short-term credits can be called in swiftly. Such considerations lead us to the importance of the composition of capital inflows from abroad.

## 1.4 Composition of Capital Inflows

To put the composition of capital flows into context, keep in mind that capital inflows consist mostly of foreign direct investment (FDI), portfolio investment and international bank lending (credit flows). Foreign direct investment and equity portfolio are seen as conducive to international risk sharing by most economists (Committee on International Economic Policy and Reform, 2012). On the other hand cross-border credit flows, especially when these credits have a short maturity, are the most problematic from the point of view of macroeconomic stability.

One reason for this difference may lay in the fact that, as Taleb (2010) put it, equity investors have *skin in the game*, meaning that they share in the gains as well as in the losses that their investments produce. On the other hand, there is a certain likelihood that losses from bank credits will ultimately be borne by the taxpaying public (moral hazard). Not only that, but as *Figure 4* shows credit flows (capital inflows in the form of debt) increase the likelihood of a crisis occurring by a significant amount.

*Figure 4: The Likelihood of a Crisis is Greater with Capital Inflows in the Form of Debt*



*Note: Based on regression results in Table 10 and Table 14 in Furceri et al. (2011). Probabilities are evaluated at sample means for all other variables entering the equation.*

*Source: Organization for Economic Cooperation and Development (OECD), International capital flows: Structural reforms and experience with the OECD Code of Liberalization of Capital Movements, 2011, p. 3.*

When talking about short-term foreign credits, as Heilperin (1939) notes, it is too often forgotten that all capital flows is not made available for investments in capital goods. Cash and short-term funds, which is what people have in mind when talking about *hot money*, have not been made available for investment in capital goods, in fact, they are valued precisely because they are highly liquid and hence not devoted to long-term projects.

However, the commercial banks treat these inflows of short-term funds as if they were made available for investment purposes. Hence, the banks extend credit, which finances long-term investments, based on these short-term funds. As owners of these short-term funds have the right to withdraw them on short notice, while loans to businesses cannot be recovered so swiftly, the withdrawal of short-term funds (capital flight) can leave the banks illiquid.

Therefore, banks that fund their operations by acquiring debt from foreign banks face a real possibility that they themselves will become illiquid. That is because international bank lending is highly mobile, and the value of foreign credits is nominally fixed (Tong & Wei, 2009). Both of these facts together - that foreign credits are nominally fixed and highly liquid - can bring about the problems of *currency mismatching* and *maturity mismatching*.

A *maturity mismatch* describes the situation, where an economic agent funds long-term investments (assets) by taking on short-term (external) debts (liabilities). This practice of *borrowing short and lending long* entails the risk of illiquidity if the debts are not rolled over, which can have similar repercussions internationally, as a bank run does domestically. Like domestic depositors who dump bank deposits in favor of cash in a typical bank run, foreign creditors also increase their demand for liquidity in times of financial distress.

Therefore, as Hayek (1937) stresses short-term foreign credits are recalled because of changes in the demand for money (i.e. liquidity preference) and not due to changes of demand for investment capital. Investment capital can thus flow out of a country precisely when it is most needed. Another factor is as Calvo (2013a) points out, is that there exist monies with different degrees of liquidity. Therefore, whenever there is a rush for liquidity, less liquid monies such as currencies of emerging markets are exchanged for more liquid monies such as the US dollar, appreciating the US dollar in the process, which causes problems for economic agents who have a currency mismatch in their balance sheet.

A *currency mismatch* from the point of view of the borrowers describes the situation of economic agents, who have acquired debt (liabilities) in a foreign currency, while they receive their income (assets) in their domestic currency. This is risky, as a fall in the value of their domestic currency on the foreign exchange markets reduces their income in terms of the foreign currency and makes it harder to service debt denominated in foreign currency.

On the other hand, a currency mismatch occurs from the point of view of a lender if economic agents engage in *carry trades*. The term carry trade describes the practice of borrowing money in the currency of a country where interest rates are low and lending that money in a currency of a country with higher interest rates. The resulting interest rate differential presents an opportunity to make a profit from the interest rate margin. This practice is very profitable unless the currency in which you borrowed from (your liabilities) appreciates relative to the currency you lent into (your assets). This is so because the proceeds from your loan come in the form of a depreciated currency, which makes it harder to service your debt in the appreciated currency.

To counteract such dangers of holding short-term debt in a foreign currency, it is hence prudent according to Krugman (2007), to hold liquid assets in foreign currency as well. Krugman (2007) is especially adamant to point out that sufficient reserves of foreign currency or foreign exchange reserves in the form of liquid assets such as US Treasury bonds will

suffice to stave off any potential creditor run that might have arisen in the absence of such reserves.

Creditor runs, as a consequence of maturity and currency mismatches, were a big problem even in the first part of the 20<sup>th</sup> century. During the pre-WWII period (1931-1945) of floating exchange rates, foreign creditor runs caused large economic instability. Consequently, the Bretton Woods system (1945-1971/73) institutionalized capital controls in order to prevent *capital flight* (investors pulling out their capital) from national economies.

This term capital flight describes the idea that invested wealth leaves one country for another. However, as von Mises (1949) noted, it is important to remember that capital cannot literally flee the country. Only the value of the capital can fall, which is usually the case because investors have lowered their expectations of the future value of this capital. It is important to note that investors only profit from capital flight if their predictions about future market values turn out to be correct.

Therefore, capital flight can most accurately be described as a loss in confidence that results in a drop in values. The same applies to national fiat currencies, which usually do not leave the country in a crisis; however, their value can drop (depreciate) significantly. This implies that capital flight, far from being a conspiracy by foreign investors, involves foreign investors taking on significant losses. Unless in the case, if foreign investors hold investments in the form highly liquid assets (such as money and short-term credit) in which case investors may avoid losses altogether and the country may have to fully absorb the losses.

Therefore, we must be careful to note that analyzing the composition of capital inflows in the period that preceded the capital flight is crucial to determine if capital can fly out of a country. Money and short-term credits can, in fact, leave the country swiftly, leaving nothing in their place. However, foreign direct investments (FDI), portfolio inflows and long-term credits share in the losses.

This leads us to conclude that only short-term funds can leave the country in times of financial distress without the owners of these funds experiencing losses themselves. Whether the owners of such funds will really pull out of a country swiftly depends on their expectations.

These expectations of short-term creditors are seen to be formed by many factors, which have been identified to act as incentives for investors to lend short-term rather than long-term. Most observers base their suggestions on the experience of the East Asian crisis of 1997/1998, which was (at least partly) attributed to short-term capital movements (see Furman and Stiglitz 1998; Radelet and Sachs 1998; Rodrick and Velasco 1999).

Rodrick and Velasco (1999) argue that one of the incentives for investors to lend short-term rather than long-term is insolvency risk. In other words, creditors may prefer to only lend short-term in order to have more control over borrowers' actions in order to reduce the risk of default. Rodrick and Velasco (1999) also point out that liquidity risk plays a role in the choice between short-term and long-term lending. While Buch and Lusinyan (2000) also list informational deficiencies in foreign lending as a reason to lend short-term, as lending short-term reduces the cost of gathering information about the borrower.

In relation to the East Asian crisis of 1997/1998, Dadush et al. (2000) and Kaminsky and Reinhart (1998) also highlight the role of high interest rate differentials. Such differentials were a consequence of capital inflows sterilization and exchange rate pegging by East Asian governments, which was one of the chief reasons for excessive short-term capital movements in that period. Interest rate differentials were also emphasized by Hayek (1937), Heilperin (1939) and Bloomfield (1963), as one of the key factors for short-term capital movements, with another factor being the uncertainty about the future value of exchange rates in a fluctuating exchange rate regime. Therefore, the influence of the exchange rate regimes on short-term capital movements is explored further in the following chapter.

## **1.5 The Influence of Exchange Rate Regimes**

The influence of the exchange rate regime employed on short-term capital movements was one of the main topics Hayek (1937) was concerned about. He explored the causes behind short-term capital movements and was in particular interested in the volume and the direction of short-term capital movements under different exchange rate regimes.

Under the regime of fluctuating exchange rates the volume of short-term capital flows, which as we saw can be a source of macroeconomic instability, becomes larger. That is because there is uncertainty about the future movements of foreign exchange rates, while we must also not forget, as Rothbard (1963b) noted, that just the existence of multiple currencies adds additional uncertainty to the natural uncertainty that exists in the market. Market participants hence protect themselves from the increased uncertainty by only providing short-term funds. However, this can foster macroeconomic instability as we saw with the problems of maturity and currency mismatching.

On the other hand, as Bloomfield (1963) found out in his research of short-term capital movements under the classical gold standard, short-term movements had a benign effect on receiving economies as they had a stabilizing effect rather than a destabilizing one. Bloomfield (1963) attributes this to the commitment of monetary policy at the time to keeping gold parity - external stability. Whereas modern monetary policy, more often aims at a reasonable level of stability in economic activity and most of all to keep the price level relatively stable - internal stability.

This dichotomy between internal stability and external stability has been at the heart of the discussion of exchange rate regimes at the very least since the beginning of the 20<sup>th</sup> century. Back then Keynes (1924) put forth the argument that in choosing among fixed exchange rates and independent monetary policies, countries are faced with a choice of external stability (fixed exchange rates and balanced current accounts) and internal stability (stable employment and domestic price level).

Easier pursuit of internal stability is one of the main arguments in favor of fluctuating exchange rates. The main benefit, as Friedman (1953) noted, is in the ease of adjustment, as exchange rates are much more flexible than internal prices. Internal prices are downward sticky, which can inhibit the adjustment process. Furthermore, there should be no leakage of inflationary monetary policy to other countries as Friedman (1953) and later Rogoff (1985) argued.



In terms of adjustment it is important to remember though, that monetary policy cannot prevent a real change in demand from taking place nor can monetary policy prevent the effects of a fall in income for the domestic producer to gradually spread throughout the economy. What monetary policy can do though, as Hayek (1937) observed, is to offset this fall in a single price by making other prices rise in order for to maintain a stable price level.

This thinking in terms of the average price level instead in terms of the structure of prices is the key error committed by supporters of fluctuating exchange rates according to Heilperin (1939). Hayek (1937) argued along similar lines that the beneficial effects of fluctuating exchange rates rely on the assumption that relative prices within each country are uniquely determined by constant relative costs. However, we must remember that changes in demand imply changes in the relative quantities of goods produced. This change in the structure of production can only be achieved through changes in relative prices and the relative incomes.

Heilperin (1939) also argues that there are certain monetary policy spillovers (by way of capital flows) to other countries even under fluctuating exchanges. He attributes this to the fact that foreign prices also affect the formation of prices within any one country, especially as the degree of openness increases. Along similar lines, Corsetti and Pesenti (2001) note that adhering to domestic policy objectives such as the stabilization of domestic output is not optimal if firms' markups are exposed to currency fluctuations. That is because with fluctuating currencies domestically focused monetary policies can induce excessive volatility in exchange rates and foreign sales revenue. This hurts welfare, because the volatility leads exporters to set higher prices in response to higher profit risk.

Despite these objections to fluctuating exchange rates, it does not necessarily follow that we should favor fixed exchange rates over fluctuating exchange rates. One thing that fluctuating exchange rates have got going for them is that supply and demand determine exchange rates.

On the other hand, if governments unilaterally fix the exchange rate it is a form of price control. The prices of foreign exchange are usually fixed in a way, which undervalues the domestic currency and in effect subsidizes exports. This is distortionary, as some companies will become temporarily more profitable (as long as exchange rates can resist market pressure) and will hence expand production. The expansion of production in export industries occurs because exchange rates adjust before internal prices. However, this good fortune for exporters will be reversed when their costs also rise.

Though these criticisms only apply if fixes are set unilaterally. If this is done by means of independent monetary policy decisions, which are not part of a working system of international monetary framework such as the classical gold standard. The classical gold standard was a coherent international monetary framework. This stems from the fact that it is coherent from the standpoint of the impossible trinity<sup>4</sup> because countries on the classical gold standard abandoned the pursuit of independent monetary policies in favor of fixed exchange rates and the free flow of capital. There was also a coherent system under Bretton Woods (1945-1971/73), in which the free flow of capital was inhibited to allow countries to run independent monetary policies even under fixed exchange rates.

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<sup>4</sup> The impossible trinity (also known as the Trilemma) is a hypothesis in international economics that alludes to the observation that countries cannot simultaneously have fixed exchange rates, free capital flow and an independent monetary policy.

## **2 THE RELATIONSHIP BETWEEN INTERNATIONAL CAPITAL FLOWS AND CREDIT-INDUCED BUSINESS CYCLES**

### **2.1 Key Features and Dynamics of Credit-induced Business Cycles**

At the end of the previous chapter we noted that under Bretton Woods there were fixed exchange rates, but the free flow of capital was inhibited. This leads to the effect that these stringent capital controls had on the incidence of business cycles emanating from the financial system. As Bordo and Eichengreen (2000) document credit-induced business cycles declined internationally during the Bretton Woods period. While they documented that the incidence of business cycles driven by credit rose again due to financial and capital account liberalization and other structural changes in the world economy since the 1980s.

With international capital flows liberalized the effects that they have on financial systems and macroeconomic instability in the form of business cycles, can no longer be ignored. Therefore in this section the relationship between international capital flows and credit-induced business cycles will be examined. There are certain developments during the run-up to sudden stop episodes in emerging markets that they share in common with developments leading up to the Great depression, the Great Recession of 2008 and the Japanese asset price bubble in the 1980s.

As White (2006) notes, the build-up to all of these crises was marked by large increases in credit, asset prices and fixed investment, which was followed by a crash in all of these categories. However, in the build-up to emerging market crises like the Asian financial crisis of 1997, the process was also accompanied by large inflows of foreign capital. However, it is interesting to note that in the run-up of the aforementioned crises, these major economic disruptions occurred in environments of effective price stability.

This is surprising, especially considering the emphasis that policymakers and economists have put on the stability of the aggregate level of prices for assuring macroeconomic stability in recent decades. This suggests that focusing on aggregate measures such as the aggregate level of prices in the economy, might neither be a necessary nor a sufficient condition for macroeconomic stability. In any case, looking at aggregate price levels would not reveal the build-up of macroeconomic imbalances in the aforementioned crises.

Therefore studying the co-movement of macroeconomic aggregates across countries like is done in international business cycles models like the Backus–Kehoe–Kydland model (1992) based on real business cycle theory, may be inadequate to explain empirical regularities of sudden stop crises. Indeed, as Basu and Taylor (1999) note, the Backus–Kehoe–Kydland model and other standard international business cycle models have a hard time explaining empirical regularities and are very inconclusive when it comes to the channel by which money and credit effect the economy.

In contrast, by focusing on the dynamics of relative rather than aggregate variables during the run-up to these crises, empirical regularities such as increases in credit, asset prices and fixed investment can be illuminated. By focusing on changes in relative prices and the market process of a business cycle, which is the essence of the Austrian business cycles theory, some common empirical features can be explained. For instance, such a feature is the disproportionate increase in the quantity of capital goods (investment), another is the increase

in the prices of titles to capital goods (asset prices) prior to a crisis occurring. Both of these features are connected to the growth in credit.

As Rothbard (1963a, reprinted 2000) notes the growth in credit triggers a rise in the quantity and prices in the capital goods sector which will outpace the rise in the consumer goods sector, which will change the structure of production.

This change in the structure of production is explained on the basis of Böhm-Bawerk's (1889, reprinted 1959) capital theory, which is the most distinguishing feature of the Austrian theory. As Boettke (2010) points out, most other macroeconomic schools of thought usually treat capital (and investment) as homogeneous, while Böhm-Bawerk's capital theory emphasizes the heterogeneous and multi-specific nature of capital. Distortions in capital allocation are at the center of the theory, as credit expansion does not affect all prices at once or in some random fashion. As Garrison (1989) notes, the price that clears the market for credit and governs the allocation of capital - the interest rate - is affected first. The change in the interest rate alters the terms of trade between present and future goods.

This is a problem if policy decisions make the capital market rate (financial or lending rate) of interest deviate from the natural rate of interest, building upon Wicksell's (1936, reprinted 1962) distinction between the capital market rate (financial or lending rate) of interest and the natural rate of interest. When policy decisions make the capital market rate deviate from the natural rate, an intertemporal coordination problem emerges. As Ebeling (2014) notes, this happens because interest rates no longer accurately inform market participants about underlying, real supply and demand conditions.

In line with this deviation of the capital market rate from the natural rate, the trigger of the business cycle in the Austrian business cycle theory is the cyclical reduction in interest rates (Garrison R., 1989). This aligns well with studies on sudden stop episodes in emerging markets, as the dominant role of interest rates in major financial centers like the US in driving capital inflows to emerging markets has been documented in Fernandez-Arias and Montiel (1996) and Agenor (1998).

Another parallel between the Austrian theory and the literature on sudden stop episodes is the recognition of the temporary (self-reversing) character of interest rates. In the context of an open economy, as Fernandez-Arias and Montiel (1996) note capital flows driven by temporarily low interest rates in financial centers like the US are likely to be reversed. The self-reversing character of monetary shocks is also central to the Austrian theory.

Monetary shocks are self-reversing because, as Garrison (1989) explains credit expansion disturbs the market's distribution of income, and hence spending patterns, which give rise to a certain pattern of prices. Because the pattern of prices is changed by credit expansion, the change in relative prices then induces economic agents to reallocate resources to sectors where prices are rising fastest. However, the increase in these prices is impermanent. The price increases are not permanent because subsequent rounds of spending of the newly created money reflect the preferences of income earners, not policy objectives. Hence, prices that were not initially affected by the monetary injection are eventually bid up, which causes a reversal in the movement of resources.

These considerations seem to align well with the recognized reversals in international capital flows, which are driven by changes in world capital market interest rates (Fernandez-Arias &

Montiel, 1996). Moreover, they are aligned with empirical regularities (increase in credit, asset prices and fixed investment) associated with developments in the run up to a sudden stop crisis. Therefore, the Austrian business cycle theory is used to explain the connection between international capital flows and macroeconomic instability. This is a rarely used approach, but there it shows promise that it will shine new light on developments in the run-up to sudden stop crises.

However, as the Austrian business cycle theory is designed for a closed economy it will have to be expanded to an open economy. In order to do that the thesis continues with an exposition of Austrian business cycle theory in a closed economy before expanding it to the open economy.

## **2.2 Austrian Business Cycle Theory in a Closed Economy**

### **2.2.1 Introduction**

For the originator of the Austrian business cycle theory, Ludwig von Mises (1949, reprinted 1998), the key question to be answered by his theory, was whether it was possible to permanently lower interest rates through credit expansion? No, is the simple answer. This is because the rate of interest can only be lowered in the short run, resulting in a temporary period of prosperity. However, this is followed by a bust in the long run.

The interplay between the short run and the long run has long been a major weakness in the core of mainstream macroeconomics according to Solow (1997). Solow continues that taking into account the fact that the short run and the long run merge into one another; they can never be completely independent. All the while, von Mises (1949) recognized that what happens in the short run is just the first stage in the chain of successive transformations, which tend to bring about the long run effects.

Because the long run emerges as a seamless consequence of short runs in Austrian theory, as Garrison (2001) points out, the Austrian theory manages to couple some propositions of neo-classical growth models<sup>5</sup>, which focus on the long run, and propositions derived from Keynesian insights. The Keynesian idea by which consumption and investment move together in the short run – to recession or to full employment – is coupled together with the classical idea of a trade-off between current consumption and investment in each period. The trade-off recognizes that the economy's rate of growth can be increased, by foregoing current consumption and increasing investment (and hence future consumption).

As for the trigger, Hayek (1935) focuses on a credit-induced artificial boom (credit-expansion) as the cause of the business cycle. Credit is the focal point for Hayek, because newly created money initially enters the economy by way of credit markets, as Garrison (2001) points out. Therefore, it affects interest rates first and thus affects the intertemporal allocation of resources through changes in interest rates.

The intertemporal allocation of resources can also, of course, be influenced by an underlying real change, for instance, through an increase in savings. An increase in savings lowers interest rates and shifts consumer purchasing power into the future. Lower interest rates affect

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<sup>5</sup> Examples of such models are the Solow-Swan model and the Ramsey-Cass-Koopmans model.

present value calculations made by businesses, which now take base their financial calculations on lower borrowing costs caused by lower interest rates.

Due to lower interest rates all present value calculations (and all investment) will rise, but more importantly, some present values will rise faster than others. This can be seen in a simple hypothetical example in *Table 1*. The example presupposes present value calculations for two cash flows of a hundred units, one coming in after one year and the other coming in after ten years. The initial assumption that the interest rate used is initially five percent per annum. Then we change the assumption, so that the interest rate falls to two percent.

*Table 1: Present Value Calculations for Two Time-varying Cash Flows with Two Assumed Interest Rates*

Time of cash flow	Interest rate 5%	Interest rate 2%	Difference in PV's
Present value (PV) for cash flow in one year	$PV = 100/(1.05)^1 = 95$	$PV = 100/(1.02)^1 = 98$	$98/95 = 1.03$ (+3%)
Present value (PV) for cash flow in ten years	$PV = 100/(1.05)^{10} = 61$	$PV = 100/(1.02)^{10} = 82$	$82/61 = 1.34$ (+34%)

*Table 1* shows that present values increase across the board, but the cash flows, which are farther away in time are more interest-sensitive and hence increase relatively more (in our example by 34% for a cash flow in ten years, compared to just 3% for a cash flow in one year).

Differences in present value calculations are important to link the Austrian business cycle theory to decisions made by economic agents in practice. As Cachanosky and Lewin (2014) insightfully note, present value calculations form the basis of investment decisions in practice. Therefore, in order to account for how economic agents make decisions in the real world, explaining the influence of changes in interest rates on investment decisions is crucial to make the macroeconomic model that is presented here realistic.

In particular, the lower interest rate disproportionately increases the present value of early-stage capital, which has cash flows farther away in the future. Investment decisions thus become skewed towards projects, for which revenues come farther in the future. Consequently, the structure of production also shifts towards more future-oriented investment projects. In *Figure 5* (below) more future-oriented production (early-stages of production) are represented by mining, refining and manufacturing (these stages are depicted for illustrative purposes but in reality they might be different). These productions processes are far removed in time from the consumer goods that will ultimately emerge as the product of the time-consuming production process, while retailing is relatively close to the final output from the time-dimension.

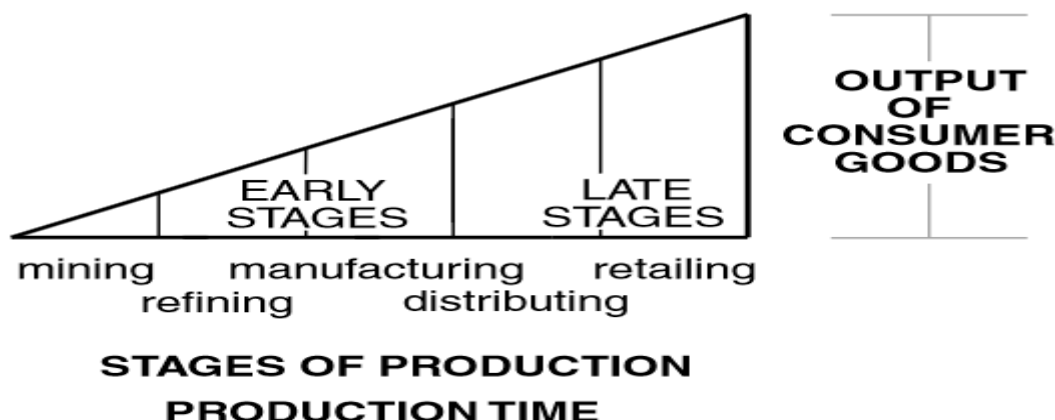
*Figure 5* is an illustration of the economy's structure of production, the so called *Hayekian triangle*; the name stems from the fact that the idea was first described by Hayek (1935) and that the structure of production is depicted in the form of a triangle.

The Hayekian triangle's time-dimension on the horizontal axis has two dimensions, as Garrison (2001) points out. On the one hand, it depicts goods-in-process moving through time from the beginning to the end of a production process (final consumption). A simple example

of the goods-in-process from the earlier production process to the final consumer good: The farmer sells grain to the miller; the miller sells flour to the baker; the baker sells cases of bread to the grocer, and the grocer sells individual loaves to the consumer (Garrison, 2001).

On the other hand, it can represent the separate stages of production, each of which exists in the present, each of which aims at consumption at different points in the future.

*Figure 5: The Structure of Production with a Value-Dimension (Vertical Axis) and a Value-Time-Dimension (Horizontal Axis)*



*Source: R. Garrison, Time and Money: The Macroeconomics of Capital Structure, 2001, p. 47.*

As was already mentioned a change in interest rates affects every stage of production. However, the early-stages of production are more sensitive to changes in interest rates than the late-stages (closer to the consumer).

The main issue is, whether these interest rate changes are sustainable. In the case, where the underlying change is an increase in real savings, these changes are sustainable. This is because consumers have curtailed their consumption in the present in order to consume more in the future. The intertemporal coordination of consumption decisions and investment decisions is thus aligned. This is based on Wicksell's (1936, reprinted 1962) idea of the natural interest rate (it cannot be directly observed), which is consistent with the time preferences of consumers and resource scarcities.

However, the capital market rate (which we can observe) can diverge from natural interest rate because of monetary shocks. These monetary shocks, as Hayek (1937) explained, are problematic that they are self-reversing in the sense that they trigger changes, which will have to be reversed because they are not based on any corresponding change in the underlying real facts.

The problem with changing the capital market rate is that economic agents have a hard time distinguishing between a change in interest rates induced by an underlying real change – an increase in savings (also technology or other factors), and when the underlying change is monetary – the expansion of credit. This is because the expansion of credit depresses interest rates, which send the same price signal to economic agents, as an increase in savings. Therefore, people making investment decisions miscalculate the present values in favor of more future-oriented (*roundabout*) production processes.

In this context of decision making of economic agents in real life, it is important to note that the horizontal axis in *Figure 5* does not measure pure time, but value-time (production time). This concept of value-time was first developed by Böhm-Bawerk (1889, reprinted 1959), who named it *roundaboutness* (labeled production time in *Figure 5*). As Cachanosky and Lewin (2014) explain, the concept of value-time in the Austrian theory is similar to Hicks's (1939) concept of the *average period of an asset*, which was built upon Böhm-Bawerk's work, while both concepts are very similar to the more well-known concept of *Macauley duration*. Therefore, one way to interpret the horizontal axis in *Figure 5* would be that it represents Macauley duration.

Going back to the model, it is important to note that if the expansion of credit is not based on an increase in savings and is a consequence of an increase in the money supply, the configuration of the economy's production structure will ultimately prove to be unsustainable. This is because of the aforementioned miscalculations of present values by entrepreneurs, whose forecasts are now based on a lower interest rate (induced by money supply growth). In time, their forecasts prove to be erroneous, as there has been no change in intertemporal consumer preferences towards more future-oriented consumption (i.e. an increase in savings) that would align with more future-oriented production structure that now exists.

Therefore, entrepreneurs err because their financial calculations are distorted by policy decisions, as lower interest rates give a signal to entrepreneurs, who based on the interest rate signal might be tempted to decide on a different investment project than they would have if the interest rate had remained constant. Investors are now biased toward engaging in more interest sensitive projects (more capital intensive and time intensive). Hence, the overexpansion of production in more interest sensitive industries occurs (early-stage industries, the example in *Figure 5* is mining, which is a capital intensive and time intensive industry).

The error is recognized when the lack of anticipated future demand is revealed. This systematic cluster of entrepreneurial errors, as opposed to regular and relatively milder business fluctuations, is the telltale sign of the business cycle according to Rothbard (1963a, reprinted 2000).

As Boettke (2010) notes, Austrian theorists hence emphasize the mismatch between the heterogeneous capital goods structure in place due to credit expansion and the structure, which should exist to satisfying consumer demand. Therefore, the credit-induced boom turns into a bust, not because of insufficient aggregate demand, but because there is not enough demand for the consumer goods produced by the existing combinations of capital goods. A costly reallocation must hence take place, to correct the mistakes made in the boom phase of the business cycle.

## 2.2.2 The Effects of Credit Expansion on the Structure of Production

A simple graphical framework for analyzing the effects of credit expansion on the economy in line with the Austrian theory of the business cycle was developed by Garrison (2001). Garrison (2001) achieved this by combining the Hayekian triangle (illustrates the structure of production), the credit market (represented by the loanable-funds market<sup>6</sup>) and an augmented

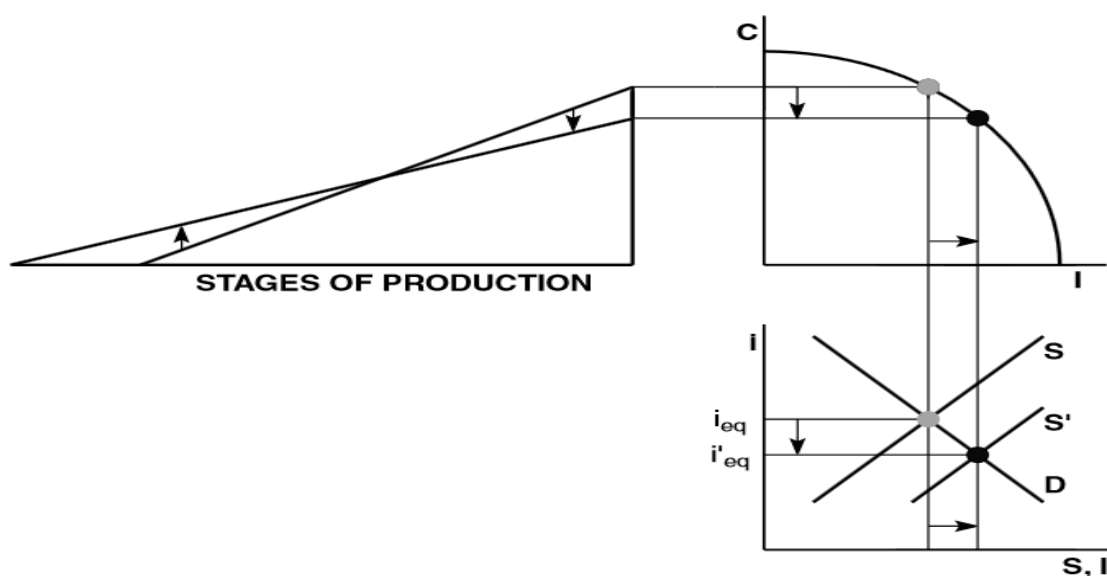
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<sup>6</sup> In the loanable funds market the interest rate is equivalent to the price of loans, which is determined by the supply and demand such loans.

production possibility frontier (which represents the intertemporal trade-off consumers face in choosing between consumption and investment). The production possibility frontier is defined as sustainable combinations of consumption and investment. The implication of such a production possibility frontier is that by sacrificing consumer goods in favor of capital goods, an economy can grow faster than otherwise.

The connection between the structure of production, the production possibility frontier and the credit market is depicted in *Figure 6*. In *Figure 6* the credit market (loanable-funds market) and the production possibility frontier are connected by their common horizontal axis measuring investment. While the production possibility frontier and the structure of production (Hayekian triangle) are connected through their common vertical axis measuring consumption. Explaining the slope of the hypotenuse in the triangle is not quite so straightforward. The simplest interpretation is that the slope reflects the market-clearing interest rate in the market for loanable funds.

*Figure 6: The Framework and the Dynamics Induced by an Increase in Savings*



Source: R. Garrison, *Time and Money: The Macroeconomics of Capital Structure*, 2001, p. 62.

Now let's assume that intertemporal consumer preferences have changed in favor of some savings (move from  $S$  to  $S'$  in *Figure 6*). The consequence of this is, first of all, that an increase in savings sends two signals to the market (Garrison R. W., 2001):

1. Because consumers decrease consumption of late-stage goods, this lowers the demand for investment goods that are the closest (time-wise) with consumption goods. This is the *derived demand effect*.
2. A lower interest rate reduces borrowing costs and increases the demand for investment goods that far away (time-wise) from consumption goods. This is the *time-discount or interest rate effect*.

In *Figure 6*, the two effects manifest themselves in the Hayekian triangle, in the reduced slope of the triangle's hypotenuse. In other words, as people are consuming less, less is being



produced for immediate consumption. On the other hand, people are saving up for future consumption, and hence, production is aligned to meet that future demand.

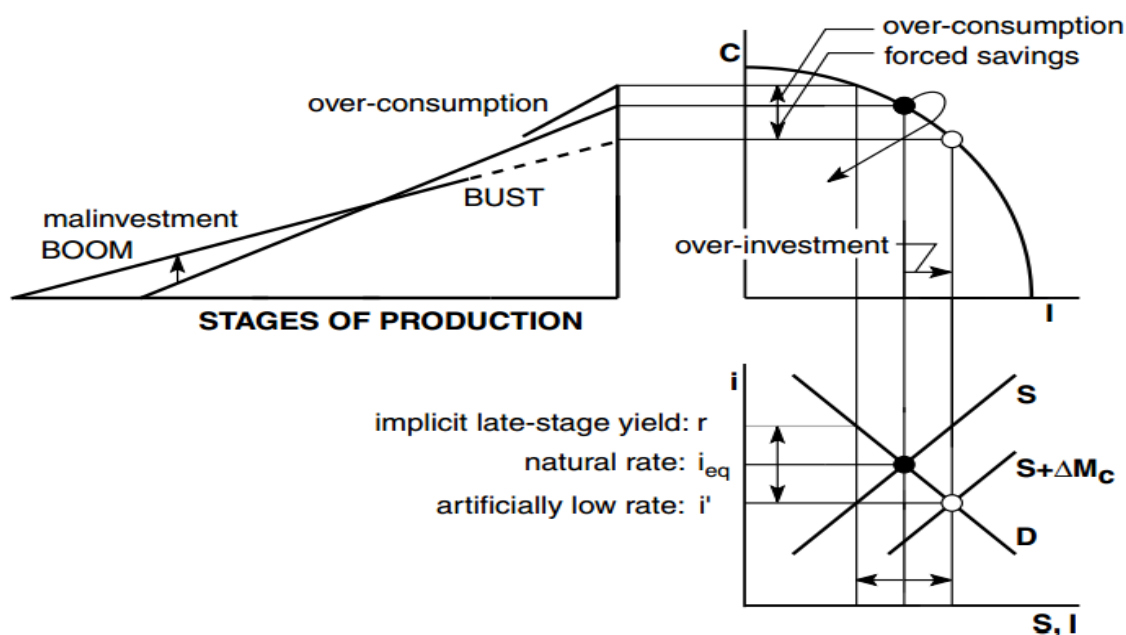
Analyzing the growth dynamics of the economy through this framework reveals that a change in consumer intertemporal preferences, in this case – an increase in savings – can change the structure of production. As an increase in savings increases the supply of loanable funds, the new equilibrium interest rate is now lower, which induces the businesses to borrow more and increase investment. As resources are limited, the increased investment has to come at the cost of a decrease in consumption.

These changes also change the structure of production, as more investment goes into early-stages of production (relatively far from the consumer in the time-dimension), which are the most sensitive to changes in interest rates (the present values increase relatively faster than in the early-stages). It is also important to note that increased savings imply increased consumption sometime in the future (what for and when is uncertain) and therefore imply an increase in the profitability of ventures aiming to meet that future consumption demand.

What is crucial here though, as Garrison (2001) states is that the lower interest rate, which reflects itself in a shallower slope of the triangle's hypotenuse, favors relatively long-term investments. Resources are bid away from late-stages of production, where demand is weak because of the currently low consumption, and into early-stages, where demand is strong because of the lower rate of interest.

We can notice some of the same dynamics as an increase in savings induces, when it comes to the effects of the expansion of credit on the economy, but there are some crucial differences. *Figure 7* depicts the economy's response to a policy-induced expansion of credit, assuming constant technology and consumption-savings preferences.

*Figure 7: Consequences of Credit Expansion on the Structure of Production*



Source: R. Garrison, *Time and Money: The Macroeconomics of Capital Structure*, 2001, p. 69.

The first point to make here is that an increase in the money supply first shows up in credit markets. The second point is that the effects at first seem similar to the effects of an increase in savings. However, there are crucial differences in the effects of credit expansion on the economy. Here an attempt is made to explain the effects step-by-step.

In *Figure 7*, the direct effect of increased lending is a movement of the supply side in the loanable-funds market (lower right diagram) rightward from  $S$  to  $S+\Delta M_c$  ( $\Delta M_c$  denotes new money in the form of additional credit). Note that the movement of the supply curve appears even though there is no sacrifice in reduced consumption, which would free up resources to be used elsewhere in the economy.

Nevertheless an increased supply of credit (loanable funds) causes a fall in interest rates, which causes an increase in business borrowing. In the diagram there is a move from the black point ( $S, D$ ) to the white point ( $S+\Delta M_c, D$ ). All the while the lower interest rate discourages savings, in the diagram this is shown as a move from the black point ( $S, D$ ) to the intersection between  $S$  and  $i'$  (artificially low rate). Another effect of credit expansion (not depicted in *Figure 7*) is that has uneven effects on different labor markets, with the early-stage (the most interest-sensitive) production processes receiving a boost in employment and wages relative to other stages of production.

Therefore, the key difference in *Figure 6* and *Figure 7* is between the dynamics of savings and investment. With intertemporal preferences being constant, two opposing forces come into play. The lower interest rate induces savings to decrease while the expanding supply of credit increases investment. Whereas investment moved in the same direction as savings in the case of a change in intertemporal preferences, investment now moves in the opposite direction. In other words, the loanable funds market malfunctions and there is a wedge between savings and investment. The market process fails to coordinate.

On the production possibility frontier (upper right diagram in *Figure 7*), higher investment demand for credit translates to higher investment and a clockwise movement along the production possibility frontier. However, as Salerno (2012) points out, over-consumption is also another important feature of the boom.

There are two explanations for the over-consumption during the boom. The credit boom, as von Mises (1949) noted, distorts monetary calculation and causes entrepreneurs and households alike to overestimate their income and net worth (i.e. wealth effect). Garrison (2001) provides an alternative explanation for overconsumption during the boom phase. He attributes the growing consumption during the boom to the lower interest rate, which incentivizes consumers to save less and consume more, which would translate to a counterclockwise movement along the production possibility frontier. In any case, the ultimate result is that both consumption and investment increase simultaneously, pushing the economy above the production possibility frontier.

Focusing attention now on the Hayekian triangle (structure of production), the lower interest rate stimulates investment in the early- (interest-sensitive) stages. On the other hand, consumer demand draws resources to the late-stages. Thus, the boom is characterized by overconsumption and overinvestment simultaneously.

However, the most important aspect of the boom is not *over-investment*, but *malinvestment*. *Malinvestment*, which is defined as a misallocation of the capital structure, because the capital

is misallocated in the sense that it is no longer in line with the intertemporal preferences of consumers. As Oppers (2002) points out, the capital structure is, therefore, unsustainable. The unsustainability, as Rothbard (1995) notes, is the result of credit expansion which occurs through loans to businesses and causes an overinvestment in capital goods, especially in such areas as construction, long-term investments, machine tools, and industrial commodities. Also, since the ownership of stocks and real-estate ownership is a title to capital goods, there tends to be an excessive boom in the stock and real-estate markets as well. On the other hand, there is a relative under-investment in consumer goods industries.

The result of this imbalance is that the temporary economic boom cannot last. This is the case because investment projects that are initiated will experience disappointment in the future, when the expected future demand will fail to materialize (the consumers did not postpone their consumption as the interest rate signaled; hence, resources were misallocated). This will become clear when the average default risk of investment will gradually increase. As Hoffmann and Schnabl (2011) point out, the default rate goes up because resources in the economy are not unlimited. Therefore, the capital market rate will have a tendency to return to the natural rate in the long run (absent additional extra-market interventions).

This tendency persists as Rothbard (1963a, reprinted 2000) stresses because the suppression of the capital market rate did not change intertemporal preferences. Hence, market forces push the capital rate back towards the natural rate. A higher rate of interest now makes the expanded investments in the higher stages unprofitable. However, consumers' preferences require a shift from capital goods to consumer goods industries. To achieve this requires the liquidation of the unprofitable investments made, a most unfortunate consequence of the boom, as this means a recession will ensue.

### **3 THE INTERNATIONAL MONETARY TRANSMISSION MECHANISM**

#### **3.1 Austrian Business Cycle Theory in the Open Economy**

In the previous chapter, a description of the Austrian business cycle theory in the closed economy was given. The closed economy model of the theory is relatively well-known ever since Hayek popularized it in his work *Prices and Production* (1935). However, an open economy version of the theory is not well-developed yet. The development of an open economy version of the theory that focuses on the effects of credit expansion in center (core) economies on peripheral economies has only occurred very recently. The lion's share of the development has been made in the works of Hoffmann and Schnabl (2011) and Cachanosky (2012a). Still, traces of the development of an open economy version of the Austrian business cycle theory have already been found in Hayek (1937) and Heilperin (1939).

The main difference between the Austrian business cycle theory in a closed economy and an open economy is that involves the cross-border transmission of the increased supply of credit from the core economy to the periphery economy. Expanding the supply of credit, with the accompanying low interest (funding) rates, in the core countries might not help to lift domestic investment activity if investors have a bleak outlook for the domestic economy; thus domestic investment demand remains low.

According to Steil (2007), the reason behind this is that the policy of creating new (additional) credit to stimulate domestic growth in the core economies is ineffective if this new credit leaks out in the form of capital outflows. In a similar manner, Portes (2012) emphasizes, that with integrated world financial markets, the low funding rates in world financial centers can spur investment demand in peripheral economies, for which investors forecast a highly growing economy, with accompanying high yields for investors.

Peripheral economies are thus on the receiving end of large capital inflows from core economies, which can be problematic due the instability of these capital inflows. As Hoffmann (2014) points out, in countries with pegged currencies, foreign investment and credit expansion translate into higher wages. However, if the exchange rates are floating, their flexibility brings the danger of a currency's rapid appreciation. To prevent rapid appreciation, central banks in small (and medium) open economies often follow interest rates cuts in core countries with their own cuts in interest rates.

The drop in interest rates then naturally encourages more investment, consumption and the incentive to borrow against future income. This poses a problem of excessive borrowing, because imports accelerate and the current account turns negative, with new money from abroad fueling asset-price and CPI<sup>7</sup> inflation at home. As Reinhart (2013) notes, the problem with all this is that these credit booms are bound to end when market interest rates in the core (funding) economies rise.

Following Hoffmann and Schnabl (2011) and Cachanosky (2012a) a simple model will be developed building on the foundation of the Austrian business cycle theory in a closed economy. In a closed economy, as has been seen, the expansion of credit is transmitted to economic agents through the change in interest rates. Similarly, changes in interest rates by major central banks affect international interest rates and in turn, major economies affect economic conditions in small open economies.

However, when it comes to more than one economy, we also have to take into account the foreign exchange channel (Cachanosky, 2013). While the interest rate channel implies a change in the structure of production, the foreign exchange channel brings about a change in the relative prices of tradable and non-tradable goods and services.

Therefore, the extended open economy framework, assumes two countries, a center (big) country and a peripheral (small) country. Furthermore, these two countries each have their own currencies, which are linked by exchange rates. The exchange rate regimes under the modern institutional environment have to be taken into account. Historically, the exchange rate regimes of peripheral countries have been pegged exchange rates (e.g. East Asian countries in the 1990s), or a managed floating regime. Though, these managed floating regimes are only *de jure* floating. Acknowledging the *fear of floating* phenomenon as identified by Calvo and Reinhart (2002), they are very far from fully floating in reality.

The reason behind this is that assuming a credit expansion in the center economy, there will be pressure for the periphery currency to appreciate. Appreciation can have negative effects on domestic exporters, which entices the periphery central bank to intervene. The intervention is in the form of exchanging domestic currency (monetary expansion) for foreign currency, with the foreign currency accumulating in the balance sheet of the central bank. In this way,

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<sup>7</sup> CPI – Consumer Price Index.

the monetary policy of the center economy is in effect exported to the periphery economy. As Hoffmann and Schnabl (2011) observe, in our modern asymmetric monetary system periphery economies usually either follow a policy of fixed exchange rates to center currencies or a policy of discretionary interventions in foreign exchange markets by periphery central banks to stabilize exchange rates.

### 3.2 Convergence through the Interest Rate Channel

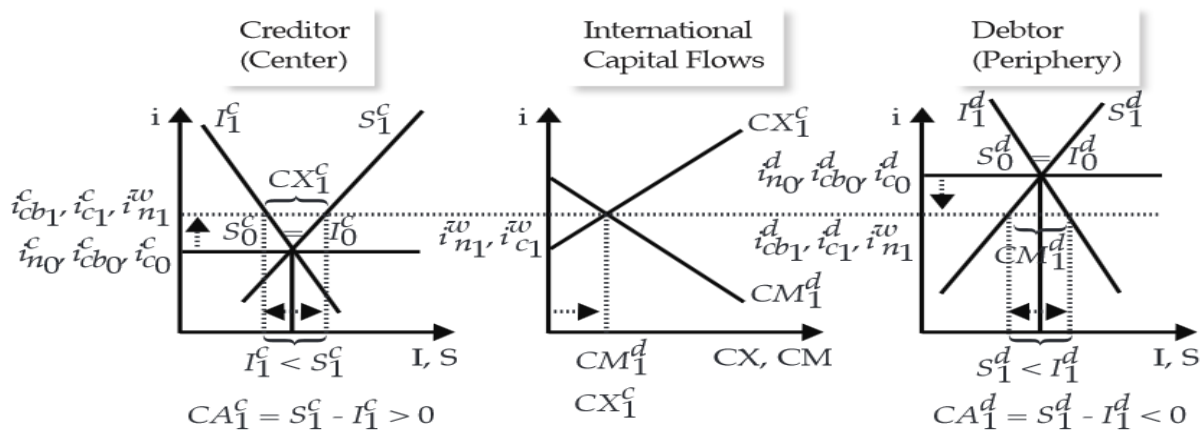
First, to set up a framework for analysis let's show the effects of international borrowing, if there are no monetary policy actions in either the core economy or the periphery economy. Following Hoffmann and Schnabl (2011), let's assume that we are dealing with two economies, in the first individuals save more on average, while in the second they save relatively less. With closed capital markets, this would imply a lower interest rate in the country with higher savings. For now let's assume that the center (core) economy has a higher savings rate (it does not affect the analysis) and for the sake of simplicity, to avoid size effects, let's assume that the center and a group of periphery economies are of equal size.

However, with open capital markets, borrowers in the relatively high interest rate country (debtor economy) can take advantage of lower interest rates in the creditor economy. While investors in the low interest rate country can take advantage of the higher expected returns on investment (interest rates) in the high interest economy. The international borrowing in this case is the result of different preferences between consumption and savings (investment) between the economies.

The high savings economy is an exporter of capital and becomes a creditor economy. On the other hand, the periphery economy imports capital and becomes a debtor economy. A convergence process takes place, with a common world interest rate.

This is illustrated in *Figure 8* below. The convergence process is depicted under the assumption that international capital markets are initially closed. With closed capital markets, the creditor country has the capital market interest rate at  $i_{c0}^c$  (at which  $S_0^c = I_0^c$ ) and the debtor country at  $i_{c0}^d$  (at which  $S_0^d = I_0^d$ ). With open capital markets, the interest rates converge to a common world capital market rate  $i_{c1}^w = i_{c1}^c = i_{c1}^d$ .

*Figure 8: Convergence of International Capital Market Interest Rates*



Source: A. Hoffmann and G. Schnabl, *National Monetary Policy, International Economic Instability and Feedback Effects - An Overinvestment View*, 2011, p. 7.

The creditor country exports  $CX^c_1$  capital, while  $CM^d_1$  of capital is imported by the debtor country. The interest rate in the creditor country increases from  $i^c_{c0}$  to  $i^c_{c1}$ , which is equal to  $i^w_{c1}$ . The increased interest rate increases the incentive to save and saving increases from  $S^c_0$  to  $S^c_1$  while part of domestic investment is replaced by foreign investment ( $I^c_1 < I^c_0$ ).

Whereas in the debtor economy, the lower interest rate discourages savings ( $S^d_0 < S^d_1$ ) and promotes investment ( $I^d_1 > I^d_0$ ). The savings-investment gaps appear in each country from an international perspective savings and investment are balanced. This balance, as McKinnon and Pill (1997) observe, ensures that resources are efficiently allocated internationally.

Therefore, in this case, international capital mobility is beneficial as it provides capital from a capital-abundant country to a country with a shortage of capital, in the process stimulating investment and growth in the receiver of capital inflows and higher expected returns for investors from the creditor country. International capital flows thus contribute to higher welfare on both sides.

### 3.3 Transmission of International Credit Booms through the Interest Rate Channel

Unfortunately, the optimistic scenario described above is not the only possible outcome of the liberalization of international capital flows. As Hoffmann (2010) and Löffler et al. (2010) point out, the problem arises when credit expansion and the consequent reduction in interest rate in the center (funding) countries is transmitted into small open economies with underdeveloped capital markets via capital inflows. The inflows of foreign capital can thus serve as a vehicle for exporting credit booms in center economies abroad.

Therefore, while the trigger is now external, in the case where lower interest rate are a consequence of an expansionary monetary policy of central banks, which aim to boost domestic growth, the end results are similar as in the analysis of the Austrian business cycle theory in the closed economy.

Following Hoffmann and Schnabl (2011), the starting point for analyzing the internationally transmitted credit boom is the convergence of interest rates analyzed in *Figure 8* above, where the world natural rate (which equilibrates world savings with world investment) is the same for both economies. The difference is that now the central bank in the center (creditor) country lowers its policy rate  $i^c_{cb2}$  below the world natural rate  $i^w_{n1}$ . In response to the lower interest rate  $i^c_{cb2}$  the financial sector creates additional credit  $\Delta C^c_1$ . The supply of credit  $S^c_2$  is now increased by  $\Delta C^c_1$  to  $S^c_2$ . The additional credit has the same impact on the credit markets as an increase in savings (without the underlying real change), thus the supply of credit increases from  $S^c_1$  to  $S^c_2$ . As a result, the world capital market interest rate falls from  $i^w_{c1}$  to  $i^w_{c2}$  as is shown in *Figure 9* below.

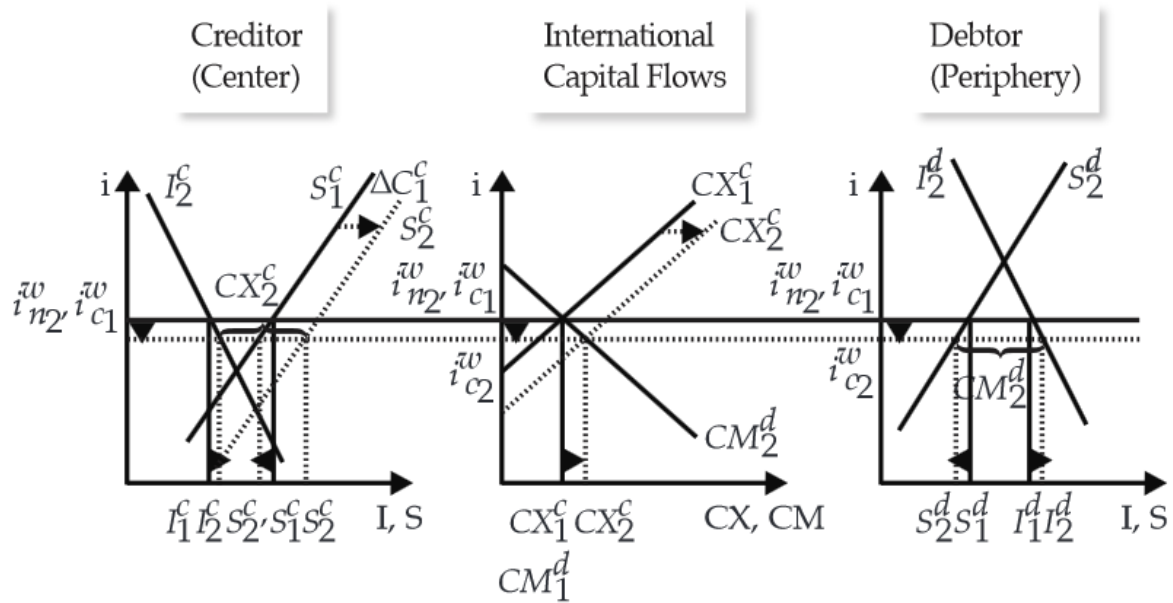
Due to lower world interest rates, investment activities are stimulated in both countries (from  $I^c_1$  to  $I^c_2$  and from  $I^d_1$  to  $I^d_2$ ) while savings fall in both countries (from  $S^c_1$  to  $S^c_2$  and  $S^d_1$  to  $S^d_2$ ). Capital exports of the center economy rise even more and that reflects itself in an even higher current account surplus by moving from  $CA^c_1$  to  $CA^c_2$ <sup>8</sup> while in the periphery the current

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<sup>8</sup> The equation for the current account is now the following:  $CA^c_2 = S^c_2 - I^c_2$ .

account deficit increases from  $CA_1^d$  to  $CA_2^d$ . Therefore, the capital outflows from the center increase ( $CX_2^c$ ), as do capital inflows to the periphery ( $CM_2^d$ ).

Figure 9: Credit Expansion in the Creditor (Center) Economy being Transmitted through International Capital Flows to Debtor (Periphery) Economy



Source: A. Hoffmann and G. Schnabl, *National Monetary Policy, International Economic Instability and Feedback Effects - An Overinvestment View*, 2011, p. 10.

Following Hoffmann and Schnabl (2011) the world natural interest rate is defined as one where world savings equal world investment, however, with the expansion of credit, the capital market interest rate falls below the world natural interest rate ( $i_{c2}^w < i_{n2}^w$ ). The aggregated savings ( $S_2^c + S_2^d$ ) and the aggregated investment ( $I_2^c + I_2^d$ ) are no longer in equilibrium ( $S_2^c + S_2^d \neq I_2^c + I_2^d$ ). Hence, the world structure of production is no longer in line with the intertemporal preferences of individuals in both economies, as we saw in the closed economy model in the previous chapter. Like in the closed economy model this cannot last, as the price signals (capital market interest rates) on credit markets are distorted, and investment projects are shown to lack the demand that was expected when these projects were initiated.

### 3.4 Transmission of International Credit Booms through the Foreign Exchange Rate Channel

As was shown, the effects of credit expansion in an open economy setting are very similar to the effects of credit expansion in a closed economy setting, if the focus is on the interest rate channel. However, with an open economy model we also have to appreciate the impact of the foreign exchange rate channel, as Cachanosky (2012a) stresses. Because of changes in the foreign exchange rates, the relative prices of tradable goods and services and non-tradable goods and services are affected, and hence the structure of production in both economies also changes.

This consideration has to be taken into account when countries are choosing a foreign exchange rate regime. Choosing an exchange rate regime that minimizes macroeconomic

volatility depends on the nature of the shock. Calvo and Mishkin (2003) outline the common theory in modern literature, which suggests that a country should choose a fixed exchange rate regime in the case of a monetary shock while a floating exchange rate regime is better for dealing with real shocks. If the shock emanating in another country is not real, hence it is monetary (nominal), then this monetary shock is transmitted into the real sector through a change in the foreign exchange rate.

However, a change in the foreign exchange rate impacts tradable and non-tradable goods differently. Therefore, the relative prices between tradable and non-tradable goods change as well. While the change in relative prices would be desirable in the case of a real shock (e.g. productivity change), as it would speed up the adjustment to real conditions, monetary shocks only bring about a temporary change in conditions because they are unwarranted by real conditions. It is in this vein that Hayek (1937) characterizes monetary shocks as self-reversing because the change that the monetary shock triggered is out of line with consumer demand, productivity and other real factors.

Not real factors, but monetary shocks are the primary driver of business cycles in the Austrian business cycle theory as was described in previous sections. Therefore, to avoid the transmission of business cycles through the foreign exchange channel, Calvo and Mishkin (2003) would recommend that countries adopt a fixed exchange rate regime.

However, as has been stated in Cachanosky (2012a), using the Austrian business cycle theory, which highlights the heterogeneous nature of capital goods and focuses on changes in relative prices, can explain changes in the capital structure. By focusing on changes in the structure of capital, further insights can be gained on the process by which monetary shocks in other countries manifest themselves through the foreign exchange rate channel by changing the relative prices, and therefore the relative shares of output between tradable and non-tradable goods.

To analyze changes in the tradable and non-tradable goods sectors under an external monetary shock, another dimension has to be added to the Hayekian triangle (*Figure 5*). The Hayekian triangle is two-dimensional, which is enough to capture the effect of the interest rate channel discussed in Chapter 4.1.2 (over-consumption, over-investment and a distorted structure of production). However, as Cachanosky (2012a) stresses, simultaneously to this process, in an open economy setting changes are also occurring through the foreign exchange channel. Hence, a third dimension has to be added to the Hayekian triangle to capture the changes in relative prices (and relative shares) between tradable and non-tradable capital goods.

Therefore, a three-dimensional framework is illustrated in *Figure 10* and *Figure 11* below, with the Hayekian triangle and an additional third dimension measuring the share of capital goods assigned to tradable and non-tradable industries. The share of capital goods assigned to produce non-tradable industries is colored light grey, while the share of tradable industries is colored dark grey. The medium grey represents the share that is reallocated to tradable (or non-tradable) industries after the credit expansion in the center economy takes place. The solid lines in *Figure 10* and *Figure 11* represent the starting point in both economies, while the dashed lines represent the change due to the expansionary monetary policy in the center economy.

For the sake of simplicity, at the starting point (pre-shock), both economies produce tradable (1/2) and non-tradable goods (1/2) in an equal ratio. This ratio changes, after we introduce an

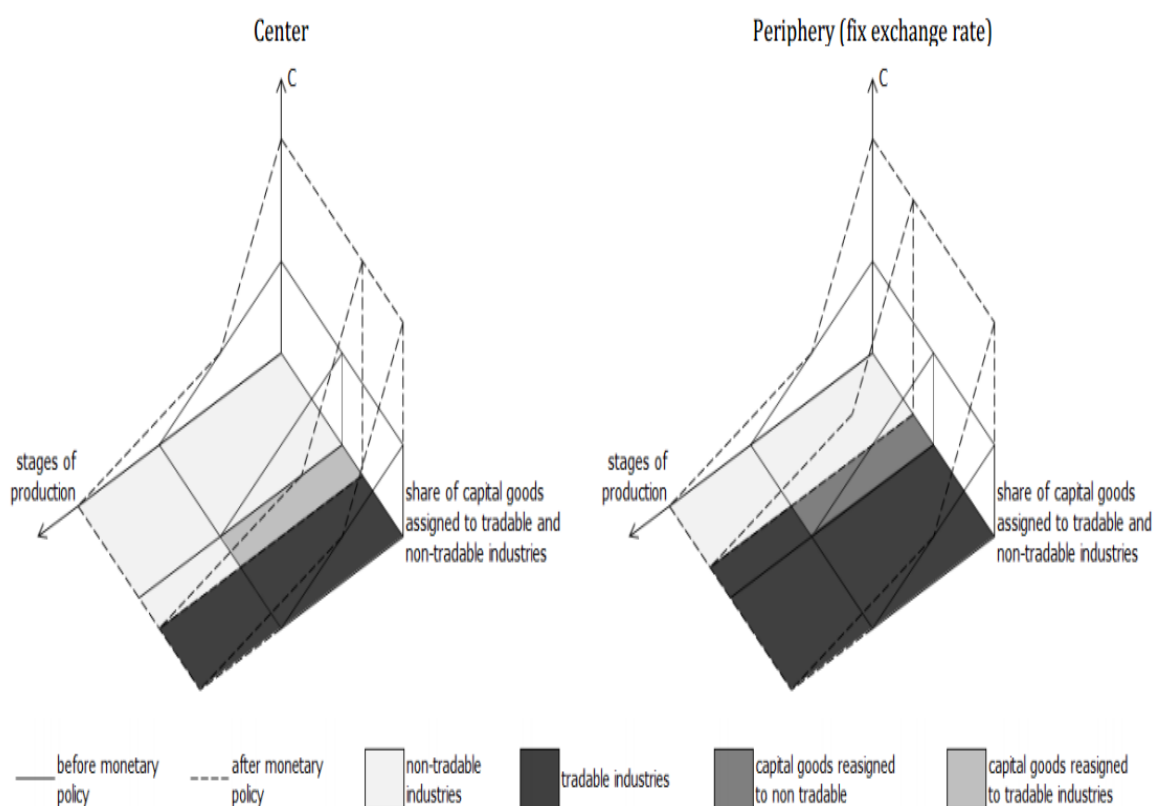


expansionary monetary (credit) shock from the center economy. As this shock permeates through the foreign exchange rate channel, the change is dependent on the exchange rate regime chosen by the periphery economy with respect to the center economy.

If the periphery has a fixed exchange rate to the center economy and the center follows an expansionary monetary policy, the periphery currency will not appreciate as the periphery central bank will intervene in the foreign exchange market in order to keep the exchange rate fixed. The fixed exchange rates by the periphery make the center's tradable industries (export sector) less competitive, as expansionary monetary policy increases the price of an exporting firm's inputs (wages), while the competitiveness of the firm's output is prevented from increasing due to depreciation by the periphery not allowing its currency to appreciate. The result is that in the center, a share of resources is reallocated to the non-tradable industries. In *Figure 10*, the ratio of non-tradable industries increases to  $2/3$ , while the ratio of tradable goods decreases to  $1/3$ .

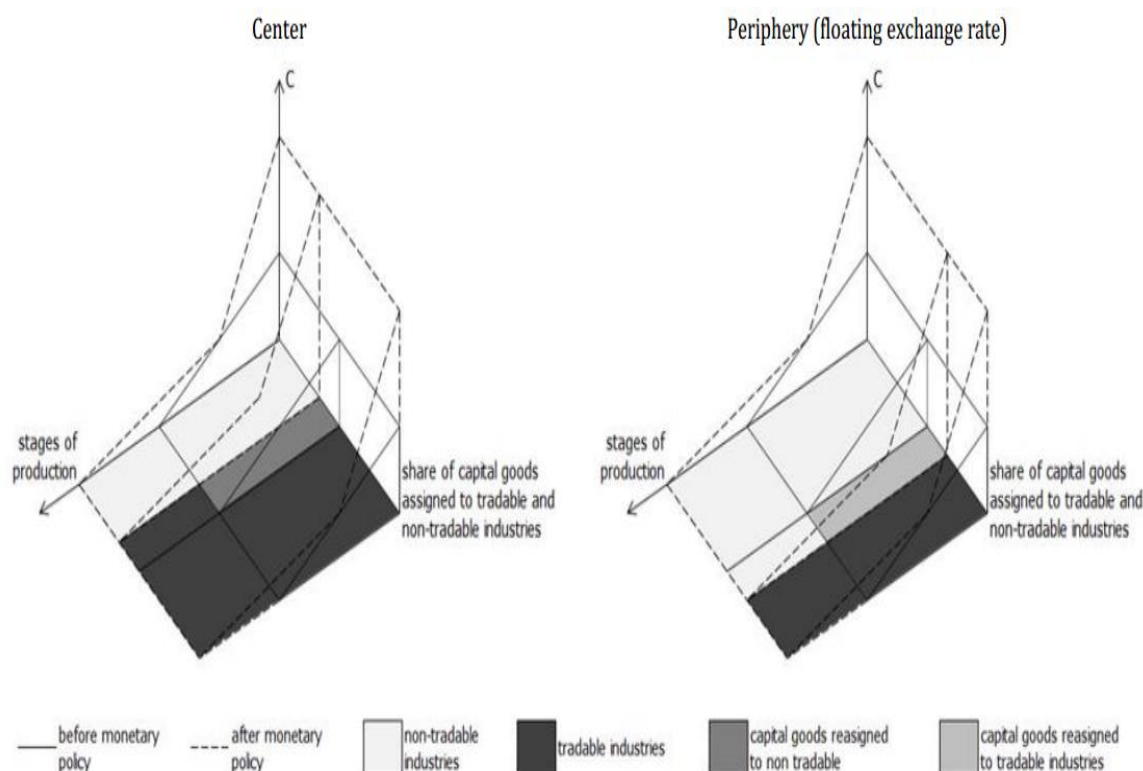
The exact opposite happens in the periphery country with a fixed exchange rate, as the country experiences an export-led boom due to the increased competitiveness of its tradable industries and the increased demand in the center economy. Hence, in *Figure 10* the ratio of non-tradable industries decreases to  $1/3$ , while the ratio of tradable goods increases to  $2/3$ .

*Figure 10: Effects of an Expansionary Monetary Shock on Relative Shares of Tradable Goods and Non-Tradable Goods in the Center Economy and in the Periphery Economy under a Fixed Exchange Rate*



Source: N. Cachanosky, *The Mises-Hayek Business Cycle Theory, Fiat Currencies and Open Economies*, 2012a, p. 25.

*Figure 11: Effects of an Expansionary Monetary Shock on Relative Shares of Tradable Goods and Non-Tradable Goods in the Center Economy and in the Periphery Economy under a Floating Exchange Rate*



Source: N. Cachanosky, *The Mises-Hayek Business Cycle Theory, Fiat Currencies and Open Economies*, 2012a, p.26.

If the periphery chooses a floating exchange rate relative to the center, the transmission of an expansionary monetary shock is just the opposite than in the case of fixed exchange rates. With the periphery allowing its currency to appreciate in response to the center's expansionary monetary policy, the center's depreciated currency stimulates its tradable goods industry. The ratio of tradable industries in the center thus increases to  $\frac{2}{3}$ , while the non-tradable industries decrease to  $\frac{1}{3}$ . On the other hand, the periphery's non-tradable industries are stimulated by the appreciated currency and purchasing power of the periphery's citizens while its tradable goods industries are hurt by the appreciation. The result is a reallocation towards the non-tradable sector ( $\frac{2}{3}$ ), while the tradable industries shrink ( $\frac{1}{3}$ ).

Therefore, credit expansion in the center economy distorts the structure of production in different ways depending on the exchange rate regime. However, the point is that credit expansion will eventually have to come to an end as credit expansion cannot permanently suppress the rate of interest. In the meantime though, entrepreneurs in both economies will receive false price signals in two forms. First, in the form of suppressed interest rates that will lead to overconsumption, overinvestment and a misallocation of resources towards more future-oriented (interest-sensitive) early-stages of production. Second, in the form of changes in the foreign exchange rate, which are due to monetary interventions from the center (in the case of floating exchange rates) or a reactionary monetary intervention from the periphery (in the case of fixed exchange rates).

## 4 INTERNATIONAL CAPITAL FLOWS IN PERIODS OF GLOBALIZATION

### 4.1 Empirical Methodology

In *Chapter 2*, the Austrian business cycle theory in a closed-economy setting was presented while in *Chapter 3* the theory was extended to the open economy setting. In this chapter, the aim is to determine how well the theory stacks up to empirics. Exploring empirics inevitably leads to the question of what to look for given the theory. The main problem the theory is set up to explore is whether credit expansion in a creditor (center) economy can create a credit-induced business cycle in the debtor (periphery) economy by way of capital inflows to the periphery economy.

That is why we have to look for evidence of (i) loose global liquidity conditions in key financial centers, (ii) big international capital inflows to the periphery economies, (iii) high growth of money and credit in the periphery economies and (iv) macroeconomic instability due to the first three conditions being present.

Therefore, in line with the theoretical model, we have to look for relatively loose credit conditions in the center (creditor) economy, large capital inflows to the periphery economy and a credit boom in the periphery economy. When it comes to the credit boom, we have to be cautious as high credit growth to the private sector could also be a consequence of financial deepening (Beck et al. 2000), new technology or institutional change.

Likewise Eichengreen and Mitchener (2003) point out that a high growth rate of credit is not necessarily an indication of a credit boom, even though high credit growth is a necessary condition for a credit boom. However, there are some quantitative measures, which indicate that a credit boom is occurring. When analyzing the boom in the 1920s prior to the Great Depression, Eichengreen and Mitchener (2003) employ the following measures:

1. Money/GDP ratio,
2. Investment/GDP ratio,
3. The movement of asset prices.

We have to be careful in using the first measure, the Money/GDP ratio. As Schularick and Taylor (2009) found out in their econometric study of credit booms from 1870 to 2008, in the post-WWII period structural changes occurred in the financial system occurred that changed the relationship between money and credit. These changes caused credit growth to decouple from money supply growth. This implies that while money supply growth is a good measure of credit growth in the 1870-1914 period, it is less so for the post-1980 era.

Additionally we have to look at changes in the structure of production. The theoretical expectation of an increase in investment and consumption to occur simultaneously, but not only that, as the production and prices of capital goods (early-stages of production), should rise relative to the production and prices of consumer goods (late-stages of production).

In practice, however, delineating industries according to their position in the stages of production (Hayekian triangle) is not straightforward. In the empirical literature, two approaches have been identified. Cachanosky and Lewin (2014) list two approaches. The first

is to identify industries in the different stages of production and compare their dynamics. The second approach is to identify industries according to their interest rate sensitivity, with the expectation that the rate of growth in more interest-sensitive industries like finance, real estate, construction should outpace other sectors like manufacturing, retail and services.

Finally, from the perspective of the transmission of credit booms through the foreign exchange channel, we have to look for evidence of differences in allocation between the tradable and non-tradable sectors. The expectation is that periphery countries that fix their exchange rates to a center economy should experience higher growth in the tradable goods sector relative to the non-tradable goods sector. On the other hand, a periphery country with a fully floating exchange rate should experience higher growth in the non-tradable goods sector relative to the tradable goods sector. That is because it allows capital inflows to have an appreciation effect on its currency relative to the center country's currency.

## **4.2 Crises and International Capital Flows in the First Era of Financial Globalization (1880-1914)**

The explanations of systemic financial crises connected with capital inflows from abroad (sudden stops) are usually based on recent experience. However, remember that we are not living in the first period of globalization. In the pre-WWI period, globalization was comparable in scale to the modern globalization period and so was the size of international capital flows. It is because of this similarity that we venture to study the first period of financial globalization, to explore if such crises were also present back then.

At the time, increased lending from Great Britain and other major European countries was underway in a time when the economic situation in Western Europe was depressed. The depression led to low interest rates and sluggish investment in the core countries. Therefore, as Bordo (2006) points out, the depressed situation in the core made the higher rates of return in the periphery economies (the Americas and Australasia at the time) very attractive for investors. However, the lending was significantly reduced at the end of the 1880s as the European economy recovered, and investment opportunities reappeared.

In the 1879-1914 period the world had relatively free flows of capital between countries and the financial markets of major industrial countries were integrated to a large extent. The modern period of globalization resembles the late-nineteenth and early-twentieth century in terms of the volume of international capital flows (scaled by GDP) and in the lack of restrictions that inhibit the free international flow of capital. As the level of financial integration back then was very similar to modern times, this begs the question as to whether sudden stop crises were also present in the late-nineteenth century (Mitchener & Weidenmier, 2006).

Indeed, crises characterized by a sharp stop of capital flows, which we now call sudden stops, have indeed occurred during the first era of globalization according to Bordo (2006). There is a striking resemblance in the events in emerging markets in the late 1880s and the early 1890s to the ones today. Namely, in the late nineteenth century many emerging markets experienced drastic declines and reversals in capital flows from the core countries such as Great Britain, Germany and France. Consequently many emerging markets experienced currency, financial and debt crises, which are reminiscent of the modern era of globalization.

Bordo (2006) describes the pattern of events that happened during the late 1880s and the early 1890s and they align remarkably with modern sudden stop episodes. The pattern of events goes along similar lines to modern times. It is initiated by a monetary tightening in the core, which prompts a rise in sovereign yield spreads between the core and the periphery, a decrease in capital flows, a current account reversal, a decline in nominal exchange rates in countries with paper currencies, a decline in real output, and sometimes even financial crises.

### 4.3 Case Study: Argentina (1880-1890)

#### 4.3.1 Historical Context and the Dynamics of Key Indicators

For the purposes of this thesis, the most interesting episode in the first era of globalization is the big lending boom in the 1880s by the core countries of Europe to the peripheral countries in the New World which ended abruptly in 1889-90 (Bordo, 2006). The crisis that hit Argentina in 1890 (the Baring Crisis) was the harshest of all, and it will hence be analyzed further. Unfortunately, juxtaposing all aspects of the Argentine crisis to the open economy model developed in *Chapter 3* was not possible, as all the relevant data is not available.

The Baring Crisis of 1890 was a major international financial crisis. As della Paolera and Taylor (2001) point out the Baring Crisis originated in Argentina but it was felt all over the world, first of all in Great Britain. Most capital inflows to the periphery in the 1880s were financed by borrowing from Great Britain. Therefore, a crash in the periphery hurt the periphery's major creditors. One of the largest creditors was the world's largest merchant bank at the time – Baring Brothers & Co., which was heavily exposed to Argentine securities. Therefore, the crisis bears the name Baring crisis. Most studies have focused on the impact of the crisis on Great Britain, although it was Argentina who suffered most, as it experienced a financial (liquidity) crisis in 1890-1891 with severe macroeconomic implications for its economy.

The Argentine experience is interesting because it is very reminiscent of modern crises in emerging markets. The defining feature of such crises in modern times is the exuberant capital inflows prior to the crisis. Argentina's pre-crisis period (1884-1890) is no different, as it was marked by heavy foreign borrowing, which showed in massive capital inflows from abroad. Foreign investors were attracted by growth opportunities that Argentina offered and by a seemingly stable macroeconomic environment. The attraction of Argentina to foreign investors was tremendous at the time. For instance, Argentina absorbed 11 percent of new portfolio issues on the London capital market, while North America (United States and Canada) – twenty times larger in terms of population absorbed only 30 percent of new issues in London (Ford, 1962). These capital inflows financed an unprecedented current account deficit that averaged 20 percent of gross domestic product (GDP) in the years 1884-1889.

*Table 2: Cumulative Gross Capital Flows from Britain to Argentina in Millions of Pound Sterling, 1880–1890*

	1880	1890	Growth rate per annum 1880-1890
Private flows	9	78	24%
Official flows	21	132	20%

*Source: I. Stone, British Direct and Portfolio Investment in Latin America before 1914, 1999, p.13.*

The rapid growth in capital inflows (growing by more than 20% per annum in the 1880-1890 period) fuelled high growth in money and credit. Even though the growth of the money supply (M1) was already high in the early 1880s, the pace of Argentine money supply growth (see *Figure 12*) accelerated to an even faster pace in the three years before the Barings' crisis (1887-1890). Money supply growth provides a reliable measure of credit growth because the money supply and the supply of credit were two sides of the same coin for the pre-WWI period. This stems from the fact that, as Schularick and Taylor (2009) pointed out, the relationship between credit and money supply was stable in the pre-WWI era.

*Figure 12: Dynamics of Argentine Monetary Indicators in the Period 1880-1899*



Source: N. Cachanosky, *The Law of National Guaranteed Banks in Argentina: 1887-1890. Free Banking Failure of Regulatory Failure?*, 2012b, p. 581.

Rapid capital inflows are not the sole reason money supply accelerated so fast in the 1887-1890 period. It is important to note that the structure of the Argentine banking system at the time was altered in a large way in the pre-crisis years. In the 1887-1890 period, the structure and operation of banking system changed due to the passage of the Law of National Guaranteed Banks<sup>9</sup>. During this period, when this law was in effect, as Schuler (1992) noted, Argentina's currency consisted of *fiat* government notes and bank notes, which were nominally backed by gold government bonds, but were in reality unbacked by gold.

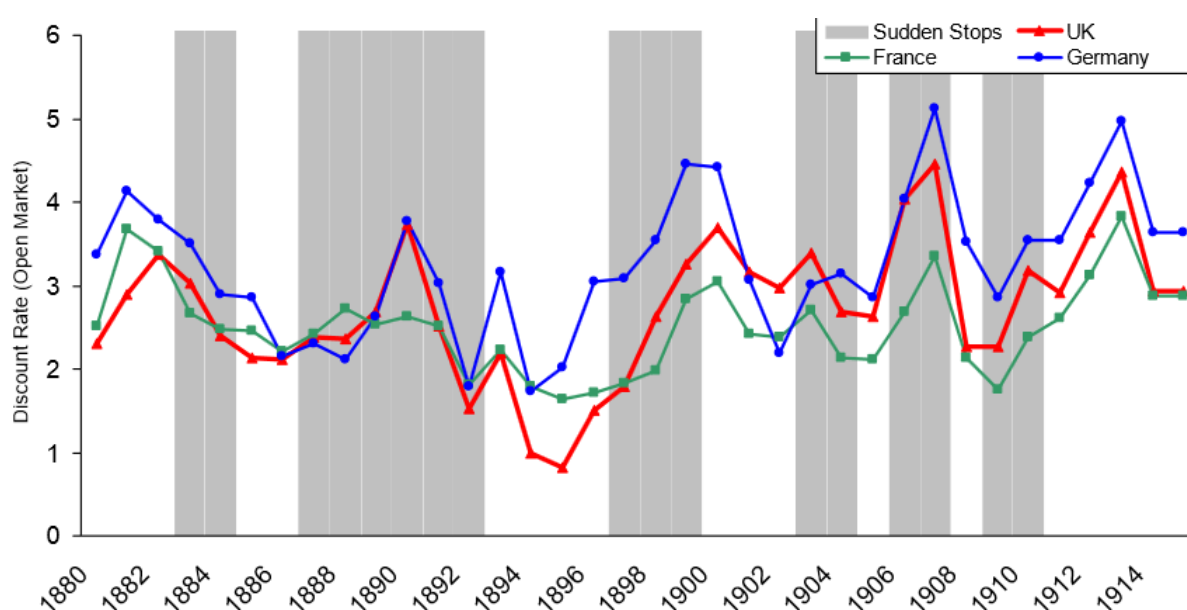
<sup>9</sup> There was no central bank in Argentina at the time, however, the Banco de la Provincia de Buenos Aires enjoyed special institutional status that made the bank the country's *de facto* central bank until the 1880s.

As Cachanosky (2012b) points out the Law of National Guaranteed Banks required banks to buy National Gold Bonds specifically created to be sold to the guaranteed banks. This purchase was not a voluntary investment on the part of the guaranteed banks; it was a requirement in order to be allowed to issue their banknotes (selected banks were allowed to issue their own banknotes<sup>10</sup>, and there was no central bank).

What is crucial about this system is that it provided Argentine banks with an incentive to issue debt in London's money market and use the borrowed gold to acquire new government gold bonds, which served as collateral against the issue of new banknotes. Due to low interest rates in world financial centers (esp. Great Britain, see *Figure 13*) the Argentine banks could get gold relatively cheaply and use it to issue banknotes against the gold-backed bonds.

Therefore, Argentina was reliant on low interest rates at the Bank of England and could sustain its economic boom only on the condition that interest rates stay low. However, as Bordo (2006) made clear, the Bank of England in reaction to domestic economic conditions (rising demand pressures) raised its discount rate from 2.5% to 6% at the end of the 1880s, another key central bank, the German Reichsbank, also matched this policy change (see *Figure 13*).

*Figure 13: Discount Rates for Core Countries (UK, Germany and France) and Sudden Stops for Emerging Countries 1880-1914*



*Note: Shaded are years in which a sudden stop started for one of the countries in the sample: Argentina, Australia, Brazil, Canada, Chile, Denmark, Finland, Italy, Norway, Spain, Sweden and the United States.*  
*Sources: M. D. Bordo, Sudden Stops, Financial Crises and Original Sin in Emerging Countries: Déjà vu?, 2006, p. 16.*

With rising interest rates in Great Britain capital inflows then came to a sudden stop in 1890, as Marichal (1989) noted. The two main characteristics of a sudden stop, as defined by Calvo et al. (2004), were present in Argentina's case. Catao (2006) noted that regardless if you look

<sup>10</sup> According to the Monetary Law, the following five banks were allowed to issue notes: (1) Banco Nacional, (2) Banco de la Provincia de Buenos Aires, (3) Banco Provincial de Santa Fe, (4) Banco Provincial de Cordoba, and (5) Otero & Company.



at net or gross capital inflows, Argentina experienced a sudden stop in the 1889-1895 event window. As *Figure 14* shows, the fall in capital flows was in line with the Calvo et al. (2004) definition of a sudden stop. As the initial fall in capital flows was *large* (recording an annual fall of more than one standard deviation below the mean) and *unexpected* (at least one observation in the annual variation in capital flows is at least two standard deviations below its sample mean).

It is also important to note that this had a hugely contracting effect on Argentina's money supply, which contracted substantially in the 1890-1892 period (see *Figure 12*). What is also important to mention is that the sudden stops were not limited to Argentina in this period, with rising interest rates in Britain and Germany capital flows to emerging economies decreasing dramatically, as *Figure 15* depicts.

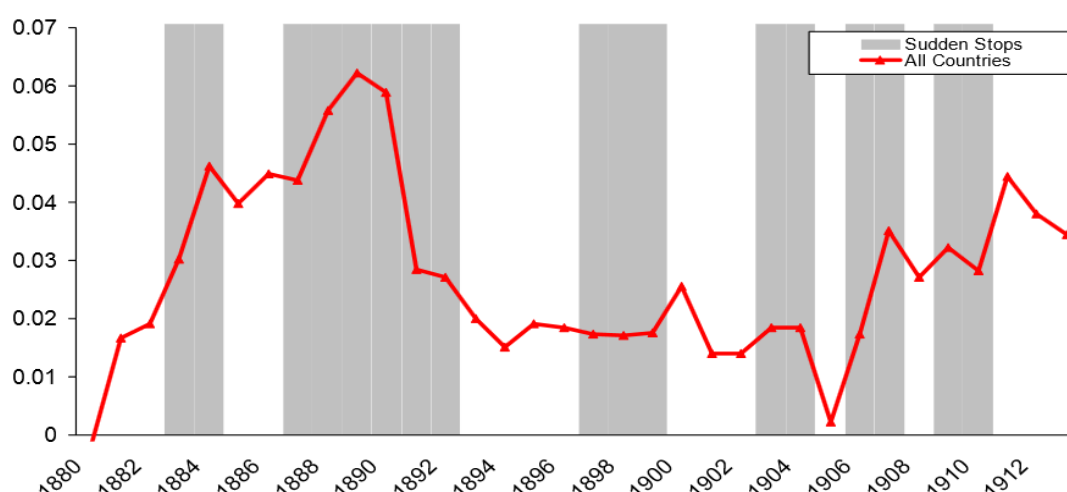
*Figure 14: Net Capital Inflows in Percent of GDP for Argentina 1880-1914*



*Note:* Data unavailable prior to 1880. The Figure is adapted to only capture Argentina.

*Source:* L. A. V. Catao, *Sudden Stops and Currency Drops: A Historical Perspective*, (2006), p. 28.

*Figure 15: Net Capital Flows to Emerging Countries 1880-1914 (Average % of GDP)*



*Note:* Sample includes Argentina, Brazil, Canada, Chile, Denmark, Italy, Spain, US, Canada, Australia, Norway and Sweden.

*Source:* M. D. Bordo, *Sudden Stops, Financial Crises and Original Sin in Emerging Countries: Déjà vu?*, 2006, p. 10.



### 4.3.2 The Results of Increased Credit and Capital Inflows

Many activities that sprung up as a result of a low interest rate environment were, hence, found to be unsustainable. Therefore, investors realized their folly and with the Baring's crisis revealing that many of their investment projects initiated in the 1880s are unprofitable at the new interest rates. In Argentina's case, the large capital inflows in the 1880s were, as Mitchener and Weidenmier (2006) note, mainly used to finance long-term investment projects in infrastructure (see *Table 3* for the growing share of investment towards the end of 1880s). The main activities financed were the building of railroads and transportation networks and the improvement of cultivable lands.

*Table 3: Argentina's Saving, Investment and the Current Account, 1885-1893*

	Y	I	CA	S/Y	I/Y	CA/Y
1885	463	54	-42	2.5%	11.6%	-9.1%
1886	478	44	-73	-6.1%	9.2%	-15.3%
1887	513	44	-95	-10.0%	8.5%	-18.5%
1888	565	64	-115	-9%	11.4%	-20.4%
1889	795	93	-242	-18.7%	11.7%	-30.4%
1890	1068	176	-262	-8.1%	16.5%	-24.5%
1891	1482	181	16	13.3%	12.2%	1.1%
1892	1285	95	-3	7.1%	7.4%	-0.03%
1893	1265	90	-95	-0.03%	7.1%	-7.5%

*Notes: Units of investment (I), gross domestic product (Y), savings (S) and the current account (CA) are millions of pesos.*

*Source: A. Taylor, Capital Accumulation in della Paolera & Taylor, A New Economic History of Argentina, 2003, p.176.*

All of these investments in railroads, the transportation network and in land development were capital-intensive and time-intensive. Meaning that these industries are very sensitive to changes in interest rates, and as the relevant interest rates in Argentina during this period were British interest rates, the policy of the Bank of England seemed to have a big impact on the Argentine economy. This is because the economy of Argentina was reliant on low interest rates in Great Britain continuing indefinitely, for the highly interest sensitive investments to remain sustainable. This seems to fit the story of the transmission of credit expansion through the interest rate channel presented in *Chapter 3.3*.

It is important to note here that the low interest rates in Great Britain during the 1880s were the result of monetary policy decisions and not due to an increase in thriftiness by British citizens. Keep in mind that while Great Britain was under the gold standard in this period, monetary policy decisions by the Bank of England still played a large role in the British economy, as Cassel (1936) pointed out. For instance, the Bank of England prevented gold outflows by raising discount rates or engaging in open market operations (Cassel, 1936).

As for Argentine monetary policy, Argentina went off the gold standard regime in 1884 and had a paper currency prior and during the crisis. This caused a currency mismatch, as Mitchener and Weidenmier (2006) note, because the Argentine banks went to borrow gold in London (its liabilities), while it held assets in the form of loans denominated in domestic paper currency (its assets). The maturity mismatch between the liabilities of Argentine banks and its assets was also a problem, as its loans went towards long-term illiquid investments.

Another indication this was a liquidity crisis, are huge discrepancies between changes in the monetary base and the money stock, as della Paolera and Taylor (2001) pointed out. For instance, in 1890, the monetary base increased by 40 percent, while the money stock only increased by 11 percent. Such contractionary effects were the result of the public's behavior.

The best description of Argentina's currency at the time is that it was *de jure* backed by government gold bonds (a type of gold backing), however as Dowd (1992), *de facto* the peg to gold was not credible before long. With double-digit growth of the money supply of Argentina's currency, which manifested itself in an average yearly rate of inflation of 48% during the 1889-1891 period, the pressure on Argentina to defend its (gold-linked) exchange rate became enormous. As Mitchener and Weidenmier (2006) noted, Argentina could not defend its exchange rate beyond December 1889, as its stock of gold rapidly dwindled, they had to let the exchange rate depreciate.

*Figure 16: The pre-Baring Crisis Inflation in Argentina*

Rate of Inflation, Subperiods, Argentina, 1820–1891		
Period	Events	Rate of Inflation (% per Annum)
1820–30	war	20–22
1830–38		0
1838–42	war	25–45
1842–45		–11
1845–48	war	14
1848–61		4
1861–64	war	9
1864–67		–15
1867–75	gold standard	0
1875–78		9
1878–84	gold standard	–4
1884–89		8
1889–91		48

Source: G. della Paolera and A. Taylor, *A Monetary and Financial Wreck: The Baring Crisis, 1890-1891 in The Argentine Currency Board and the Search for Macroeconomic Stability 1880-1935*, 2001, p.14.

Therefore, Argentina's currency regime is reminiscent of exchange rate regimes in countries, which suffered in the Asian financial crisis of 1997. Their currency could be said to be fixed during the pre-crisis period to its anchor gold. Thus from the perspective of the transmission of credit booms through the foreign exchange rate channel, the expectation would be that there would be higher growth in the production of tradable goods. Unfortunately, the data on particular industries from this period in Argentina's history is too scant, to adequately assess effects of the foreign exchange channel on Argentina's structure of production.

#### **4.4 Financial Crises in the Modern Era of Financial Globalization (1980-today)**

In this section international capital flows in the Gold standard era (1879-1914) and the era of modern financial globalization will be explored. A description of the causes and the nature of crises, which were triggered by financial and external factors or sudden stops, will be the main issue of concern. In connection with these types of crises, some parallels and differences will be drawn.

Keep in mind that international capital flows have increased immensely since the start of financial globalization. The exact time is imprecise, but the most widely used starting point is the mid-1980s. From this time on, and especially after the collapse of the Soviet Union in 1991, developing countries (emerging markets) have come to rely more and more on international capital flows as a source of external financing.

The flows of external financing have, however, turned out to be more volatile and disruptive to macroeconomic stability than most people predicted. These rapid, unanticipated stops in capital inflows (sometimes turning into net capital outflows) have been described by the term sudden stops after Mexico's international capital inflows in the early 1990s suddenly came to a stop in 1994.

The Mexican Tequila crisis of 1994 was followed with an even worse sudden stop episode in East Asia in 1997 and the subsequent Russian default in 1998. These countries got accustomed to the inflow of foreign capital and when capital inflows suddenly stopped pouring into their countries (or even turned to a capital outflow) the activities that sprung up on the basis of foreign capital inflows suddenly proved to be unsustainable.

A similar story occurred in ten countries of Central and Eastern Europe, which joined the European Union in 2004 and 2007<sup>11</sup>. Similar to East Asian countries in the 1990s, these countries received high capital inflows in the period 2001-2008, followed by a sudden stop in 2008.

However, in contrast to East Asian countries, which experienced a crisis in 1997/98, the countries of Central and Eastern Europe provide more heterogeneity in their exchange rate regimes. All the countries most that were most affected by the Asian financial crisis of 1997 (South Korea, Thailand, Malaysia, Indonesia and the Philippines) informally pegged their currencies to the US dollar (McKinnon & Schnabl, 2004). Given that all these countries followed the same exchange rate policy (so-called *soft peg*), the effect that the exchange rate regime has on the relative production of tradable goods and non-tradable goods, as described in *Chapter 4.4* is hard to observe. On the other hand, countries in Central and Eastern Europe followed different foreign exchange policies in relation to the dominant currency in the region – the Euro. We present a case study of these countries below.

## **4.5 Case Study: Central and Eastern Europe (2001-2008)**

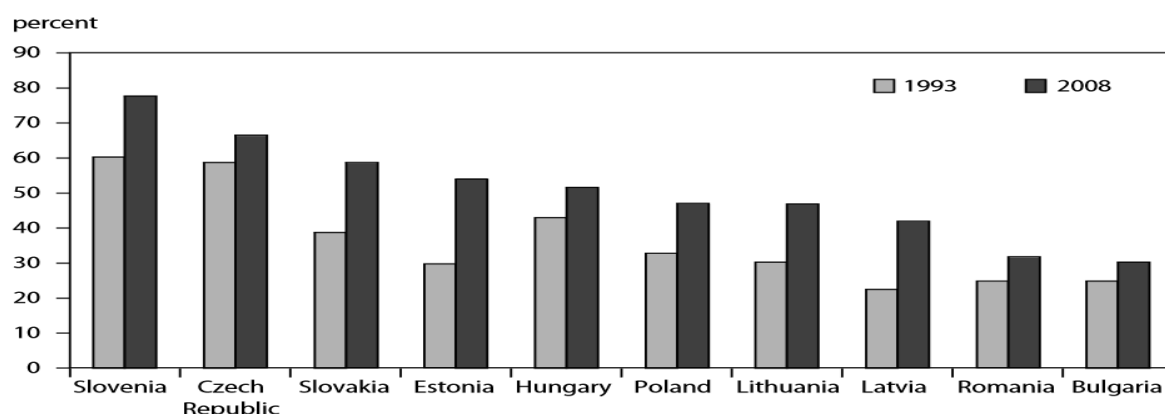
### **4.5.1 Background and the Dynamics of Key Indicators**

In this chapter we are going to explore the developments in ten Central and Eastern European countries that became new EU member states in 2004 and 2007 respectively. First of all some background, all the ten countries have been in transition to a market economy since the early 1990s and were playing catch-up to the developed Western European economies. The convergence process towards the living standards of Western Europe appeared to be quite successful as can be seen in *Figure 17*.

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<sup>11</sup> In 2004 the following countries joined the European Union: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. In 2007, Bulgaria and Romania also joined.

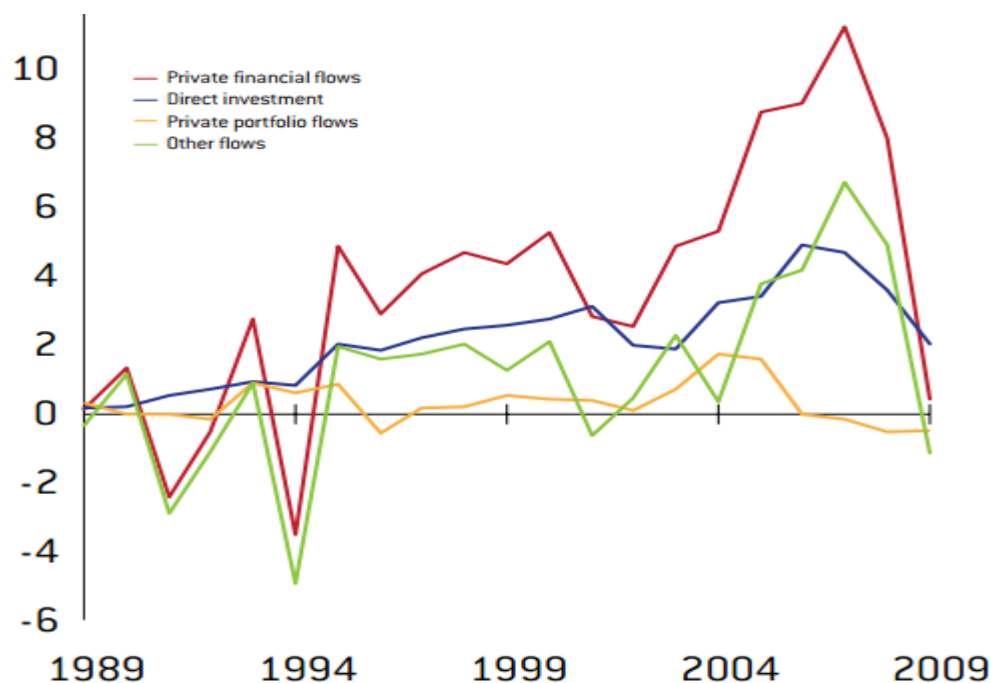
Figure 17: GDP per Capita (in Constant PPP 2005 International Dollars) in Central and Eastern European Countries as a Share of the Average EU-15 GDP per Capita



Source: A. Aslund, *The Last Shall be the First: East European Financial Crisis*, 2010, p. 50.

However, this convergence hit a snag in 2008, as Central and Eastern Europe was hard hit by the Great Recession of 2008 and the resulting turmoil in the world economy. As the crisis permeated through the world economy, investors fled to safer forms of investment in advanced economies and vastly reduced their investments in Central and Eastern Europe (emerging Europe) in the process. The result was a large and unexpected fall in capital inflows (a sudden stop), as the 2008 collapse of net private financial flows to the region is shown in Figure 18.

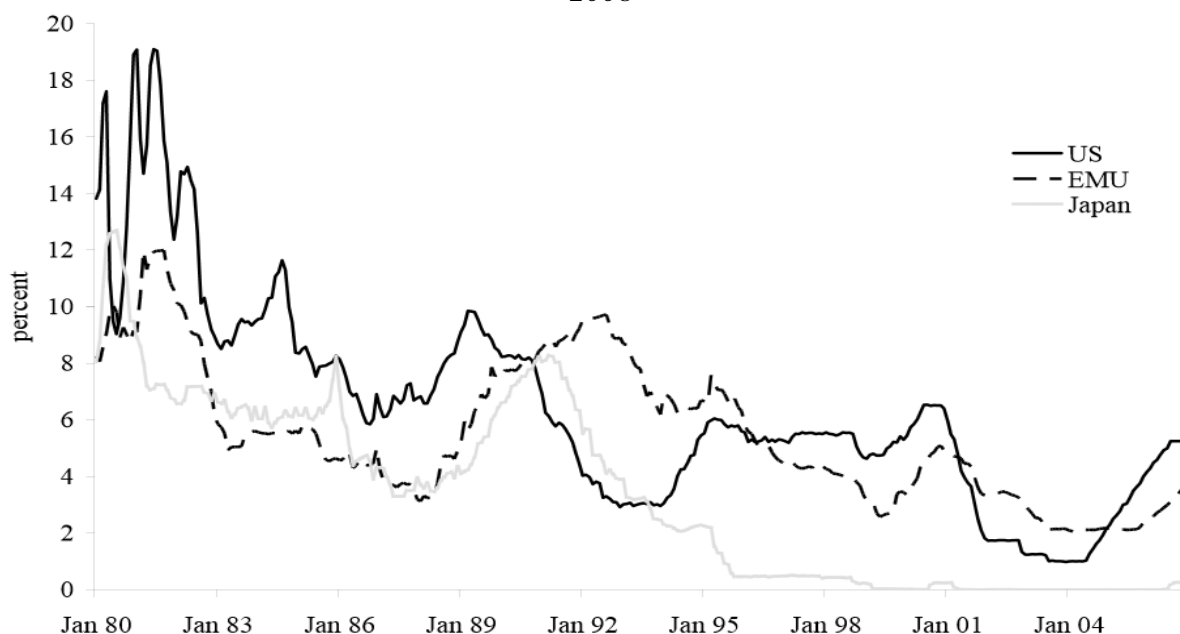
Figure 18: Net Private Financial Flows in Central and Eastern Europe (% GDP) in the Period 1989-2009



Source: T. Becker et al., *Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe*, 2010, p. 6.

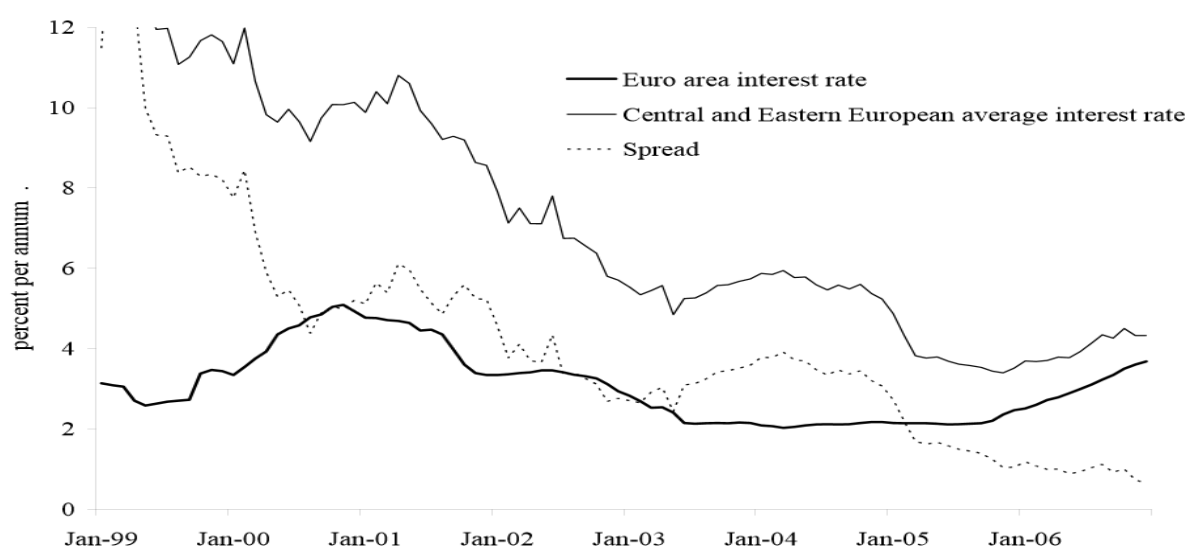
The collapse of net capital inflows came on the back of massive capital inflows in the 2004-2008 period (see *Figure 18*). These capital inflows, in turn, were largely funded by low interest rates (see *Figure 19* and *Figure 20*) in the US and the euro area (the core), from where credit was transmitted to the Central and Eastern European economies (the periphery).

*Figure 19: Money Market Interest Rates in the Euro Area, United States and Japan, 1995-2008*



Source: G. Schnabl and A. Hoffmann, *Monetary Policy, Vagabonding Liquidity and Bursting Bubbles in New and Emerging Markets: An Overinvestment View*, 2007, p. 3.

*Figure 20: Money market Interest Rates Spread between Euro area and Central and Eastern European Countries, 1999-2007*



Note: The arithmetic average is taken for the ten Central and Eastern European countries.

Source: G. Schnabl and A. Hoffmann, *Monetary Policy, Vagabonding Liquidity and Bursting Bubbles in New and Emerging Markets: An Overinvestment View*, 2007, p. 4.

As *Table 4* shows, these capital inflows resulted in large current account deficits prior to the crisis. In 2007, countries with floating exchange rate regimes (Poland, Czech Republic, Hungary, Romania, and Slovakia<sup>12</sup>) averaged a current account deficit of 6.7% (as a rule of thumb 4.5% is sustainable). While countries with fixed exchange rate regimes (Baltic countries, Bulgaria and Slovenia) averaged a staggering 17.3% current account deficit.

*Table 4: Key Indicators for Central and Eastern European Countries*

	Countries with floating exchange rates	Countries with fixed exchange rates
Current Account Balance/GDP 2007 (%)	-6.7	-17.3
Inflation average of 2004-2008 (%)	4.7	6.2
Credit/GDP, change from 2004-2008	20.7	37.4
FDI to finance and real estate sectors, 2007 (% of total FDI stock)	30.6	44.8
Gross external debt, 2009 (% of GDP)	86.6	123.6
Real interest rate, average of 2004-2008 (%)	1.4	-2.5
GDP growth, 2009 (%)	-4.1	-11.1
Change in unemployment rate from 2007-2010 (%)	2.5	8.9

*Note:* Group of five countries with floating exchange rate: Czech Republic, Hungary, Poland and Slovakia (Slovakia had a *de facto* floating exchange rate regime until July 2008), Romania; Group of five countries with fixed exchange rate regimes: Bulgaria, Estonia, Latvia, Lithuania and Slovenia.

*Source:* T. Becker et al., *Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe*, 2010, p. 51.

In order to finance these deficits, countries had to import capital from abroad. This imported capital, in turn, fuelled the growth in the amount of credit. As in the 2004-2008 period a cumulative increase in the credit to GDP ratio is recorded to be on average 20.7% in floating exchange rate countries (which could sterilize their capital inflows – at least somewhat) and 37.4% in countries with fixed exchange rates.

Consequently, as the supply of credit was steadily growing, it did not take long for inflation to flare up as well, with inflation running way above the 2% level<sup>13</sup> in the 2004-2008 period. With rising inflation and low nominal interest rates as a result of plentiful credit, real interest rates were low as well. However, real interest rates by and large remained positive in countries with floating exchange rate regimes, while in countries with fixed exchange rates real interest delved deep into negative territory as they averaged a real interest rate of -2.5% (see *Table 4*). Aslund (2010) attributes this divergence to better monetary policies of floaters (in particular Poland, the Czech Republic and Slovakia), which did not let their economies overheat as much as, for instance, the Baltic countries.

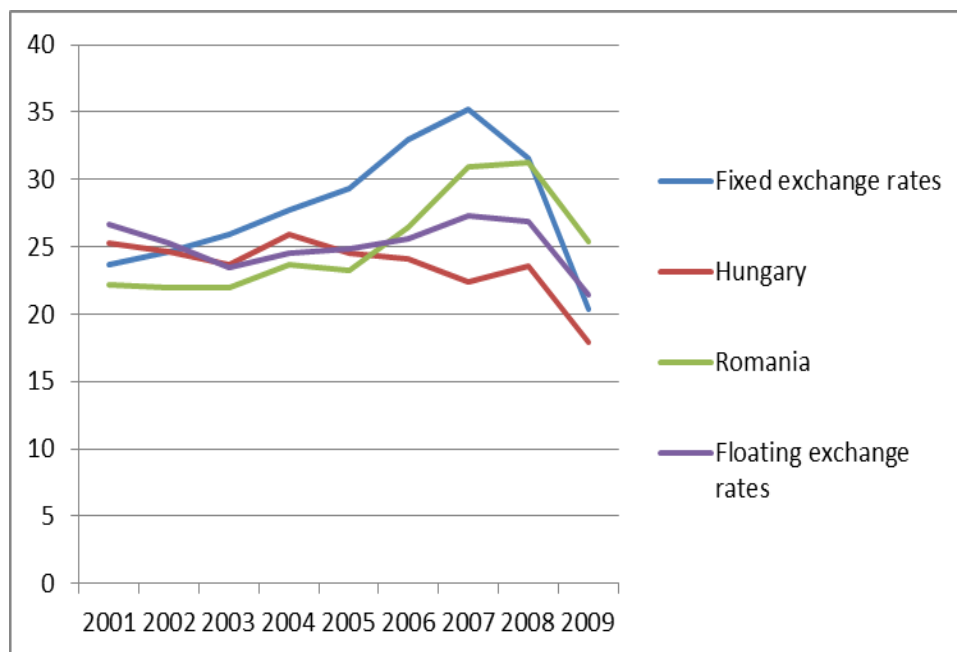
<sup>12</sup> Even though it adopted the Euro in 2009, Slovakia ran a *de facto* floating exchange rate regime until July 2008.

<sup>13</sup> This 2% level of inflation in the Consumer price index (CPI) is the target for most major central banks in the world and it is a level deemed appropriate by most economists.

With low and negative real interest rates, the attractiveness of investment in Central and Eastern Europe increased. However, as real interest rates across the region diverged, so did the growth in investment.

Hence, countries on fixed exchange rates to the Euro had little choice but to allow its capital inflows to translate into credit expansion, with the accompanying negative real interest rates and stimulus to investment. On the other hand, countries with floating exchange rates like Poland did not run such a loose monetary policy, keeping real interest rates higher and damping the growth in investment. As a result, Poland's investment to GDP ratio was quite stable in the pre-crisis period, while Estonia's investment as a percentage of GDP peaked at 38% prior to the crisis (see *Figure 21*). Interestingly though, the two countries with managed floating regimes (Romania and Hungary) record large differences in the dynamics of their investment to GDP ratio (*Figure 21*) and asset prices dynamics (*Figure 23*). Hoffmann (2010) suggests that this might be due to macroeconomic instability in Hungary at the time, which damped investment demand.

*Figure 21: Investment in Percentage of GDP by Exchange Rate Regime in Central and Eastern Europe, 2001-2009*



*Note:* Arithmetic means are calculated for each group of countries. The countries are grouped in the following way: fixed exchange rate countries – Estonia, Latvia, Lithuania, Bulgaria and Slovenia, floating exchange rate countries – Poland, Czech Republic and Slovakia. Two countries with managed floating exchange rates – Romania and Hungary, are shown separately because of a large difference in their investment to GDP dynamics in this time period. Investment is expressed as a ratio of total investment in current local currency and GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector. Data source the International monetary fund database (2012).

Thus far it has been noted that credit and investment have expanded in proportion to GDP, following the methodology of Eichengreen and Mitchener (2003). Another sign of a credit bubble is a rapid acceleration of asset prices in the countries of Central and Eastern Europe (see *Figure 22*), even compared to other emerging markets such as Latin America and Asia. As predicted by theory the growth of asset prices in fixed exchange rate countries and

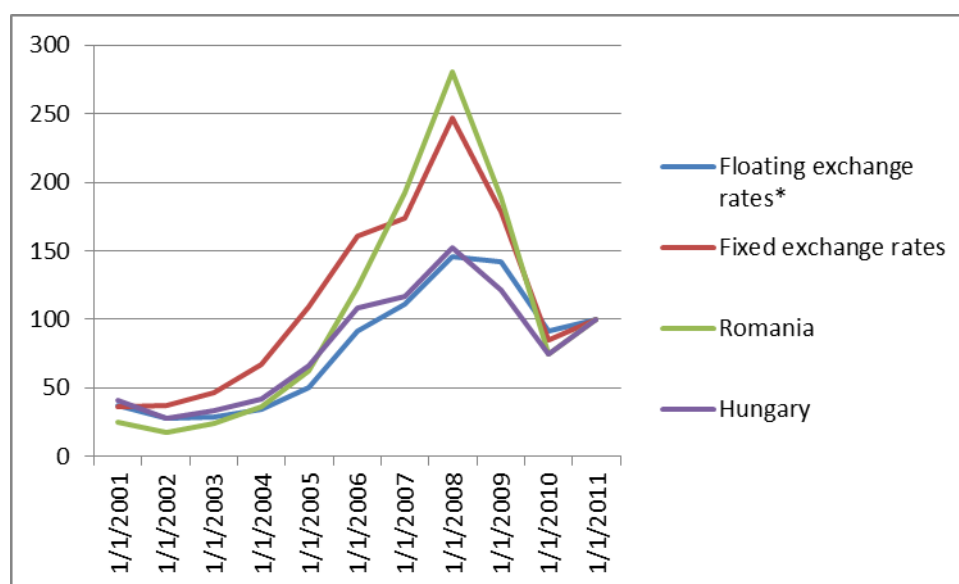
Romania outpaced that of countries with floating exchange rates, and Hungary (see Figure 23).

Figure 22: Asset Prices in Central and Eastern Europe Compared to other Emerging Markets



Source: M. Cali et al., *The Global Financial Crisis: financial flows to developing countries set to fall by one quarter*, 2008, p. 10.

Figure 23: Stock Market Indices by Exchange Rate Regime in Central and Eastern Europe, 2001-2011 (1/1/2011=100)



Note: Arithmetic means of stock market indices are calculated for each group of countries. The countries are grouped in the following way: fixed exchange rate countries – Estonia, Latvia, Lithuania, Bulgaria and Slovenia, floating exchange rate countries – Poland, Czech Republic and Slovakia. Two countries with managed floating exchange rates – Romania and Hungary, are shown separately because of a large difference in the dynamics of their stock market prices in this time period. Local equity markets are valued in US\$ terms.

\* Under floating exchange rates in the period 2001-2005, the data for Slovakia was unavailable, hence only the mean of the Czech and Polish stock markets is calculated for the 2001-2005 period.

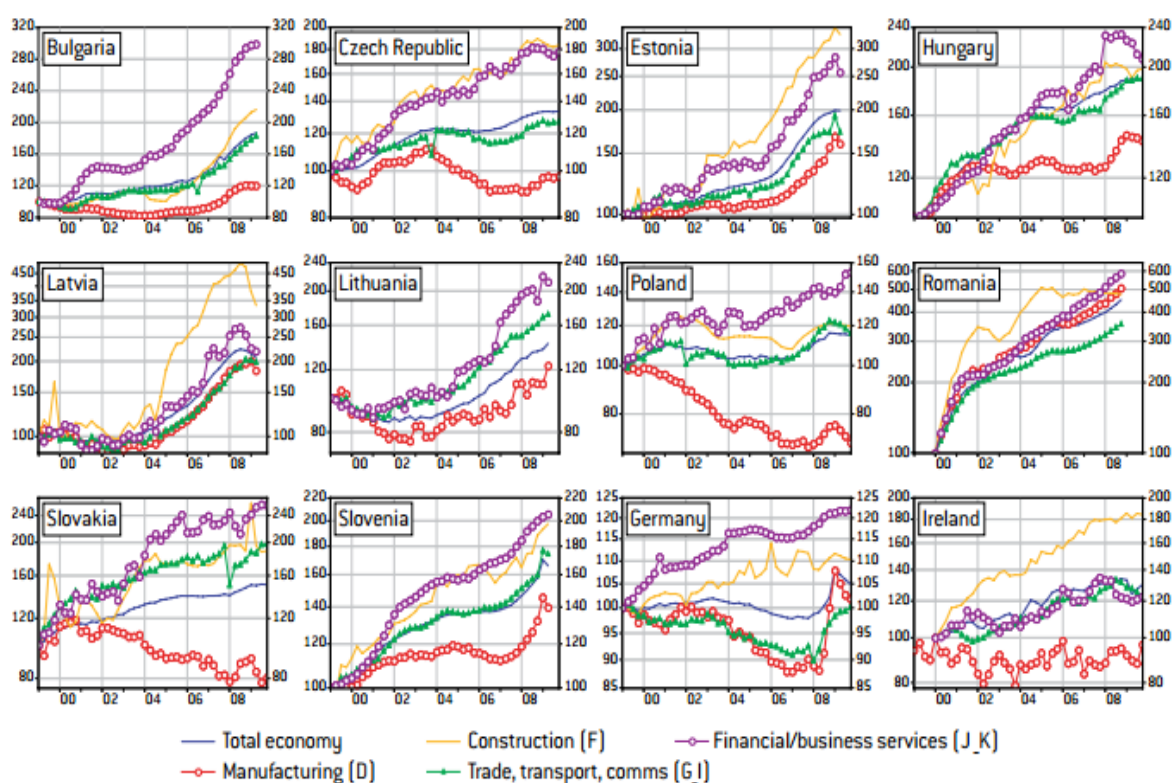
Data source: The World Bank database (2014).



#### 4.5.2 The Effects on the Structure of Production

All the features of a credit bubble seem to be present, however, from an Austrian business cycle theory standpoint we also have to look at changes in the structure of production. The expectation being that we should observe a disproportional growth in early-stage (or the most interest-sensitive industries) compared to late-stage (or the least interest-sensitive) industries. The disproportionate expansion by stages also disproportionately affects the labor markets of each stage differently, with the wages in early-stage sectors rising faster than late and medium-stage sectors. Therefore, we can use unit labor costs as a proxy for different rates of expansions in different industries (see *Figure 24*).

*Figure 24: Unit Labor Costs by Sectors, 1999Q1-2009Q4, 2000Q1=100*



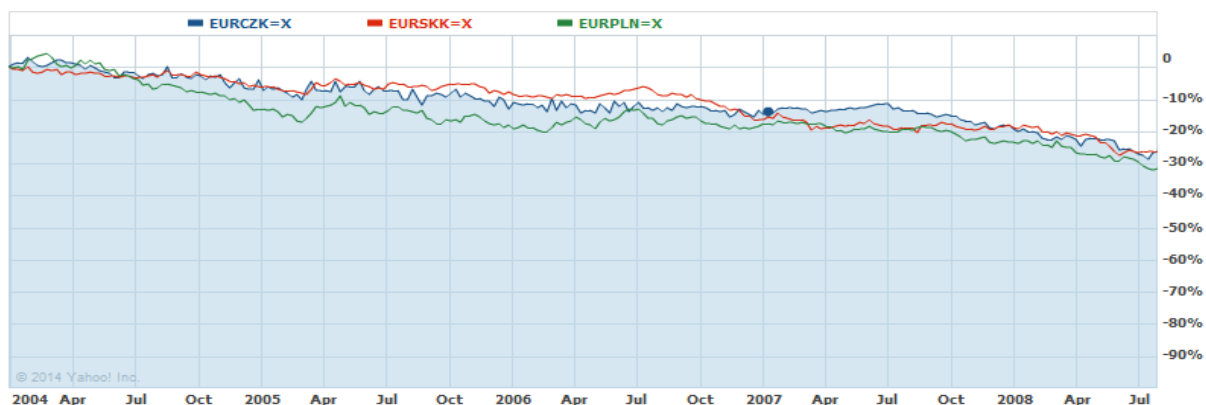
*Note: The scales of expansion from the starting point of the index for each country are different.*

*Source: T. Becker et al., Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe, 2010, p.62.*

*Figure 24* depicts large differences in Central and Eastern European countries with regards to the magnitude of expansion in different sectors of the economy, especially in the 2004-2008 period. There are large discrepancies in the rates of growth between countries on fixed exchange rate regimes (Baltic countries, Bulgaria and Slovenia) and those on managed floating regimes (Romania and Hungary) in comparison to countries coming closest to freely floating exchange rate regimes (Poland, Czech Republic and Slovakia). The discrepancy could appear because these countries (Poland, Czech Republic and Slovakia) let their currencies appreciate prior to the crisis, thus sterilizing the rapid capital inflows and dampening their credit expansions. In *Figure 25* notice the stable appreciation of the Czech Koruna, Slovakian Koruna and the Polish Zloty against the Euro. While in *Figure 26* notice the much more volatile managed floating regimes of the Hungarian Forint and the Romanian

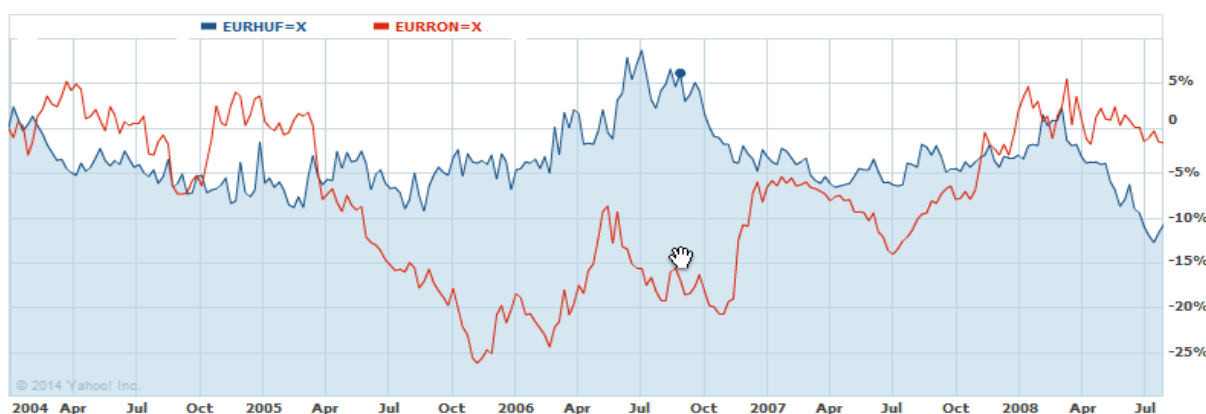
Leu, which ultimately appreciated substantially less than the Czechs, Slovaks and the Polish.

*Figure 25: Euro to Czech Koruna, Polish Zloty and Slovakian Koruna for the Period December 29<sup>th</sup> 2003 – July 28<sup>th</sup> 2008*



Source: Yahoo! Inc., 2014.

*Figure 26: Euro to Hungarian Forint and the Romanian Leu for the Period December 29<sup>th</sup> 2003 – July 28<sup>th</sup> 2008*



Source: Yahoo! Inc., 2014.

Looking back at *Figure 24* we can also notice large discrepancies in the performance of the manufacturing sector, which we can take as a proxy for tradable goods and sectors such as construction and financial/business services, which we can take as a proxy for non-tradable goods. Particularly eye-piercing is the stagnation and decline in the unit labor costs in the manufacturing sectors of the Czech Republic, Poland and Slovakia. This observation seems to match the theory of the transmission of credit booms through the exchange rate channel presented in *Chapter 3.4* and depicted in *Figure 11*. On the other hand, other countries on fixed and managed floating exchange rate regimes experienced growth in unit labor costs in manufacturing, as would be expected in *Figure 10* in *Chapter 3.4*.

Even though it is true that even in these countries, generally speaking, the magnitude of expansion in manufacturing lagged behind that of construction and financial/business services. This is unsurprising though, if we look at it from the perspective of *Figure 7*, which

depicts the consequences of credit expansion on the structure of production in a closed economy. As *Figure 7* shows and as Murphy et al. (2012) point out central bank-induced expansions have the smallest effect in the middle of the triangle (the manufacturing sector). While the most interest-sensitive industries like construction and financial services grew with the rapidest pace, as would be expected.

Having this in mind, we conclude with a comparison of the theory's predictions with the developments prior to the Asian financial crisis of 1997, which is the most notable sudden stop episode in the last period of globalization. The conclusions are presented in *Table 5*:

*Table 5: Comparison of the Austrian Business Cycle Theory in the Open Economy with Empirical Episodes*

Theoretical predictions	Asian financial crisis, 1990-1998 (for data see Appendix B)	Central and Eastern Europe, 2001-2008
<b>Rapid credit growth</b>	Yes, consistent double-digit growth	Yes (see <i>Table 4</i> )
<b>Rapid capital inflows</b>	Yes	Yes
<b>Low interest rates in core countries</b>	Yes, at least in the 1990-1995 period (in 1995 U.S. and Japanese money market rates diverged with the reverse plaza accord*)	Yes, low money market interest rates in core economies (Euro area, US, Japan)
<b>Increase in the ratio of investment to GDP</b>	Ratio stable, but stable at high levels of around 35% on average (with the exception of the Philippines with the ratio in the low 20% range).	Yes, but large differences in the magnitude of the increase according to the exchange rate regime
<b>Increase in asset prices</b>	Yes, rapid increase for the most part, with the notable exception of Indonesia	Yes, but large differences in the magnitude of the increase according to the exchange rate regime.
<b>Disproportionate growth in capital-intensive and time-intensive industries</b>	There are signs of a real estate bubble, with the accompanying boom in the construction industry and in the financial sector.	Signs point towards such developments prior to the crisis (see <i>Figure 24</i> ).
<b>Allocation of resources to tradable and non-tradable industries according to the exchange rate regime</b>	All crisis countries effectively pegged to the U.S. dollar. The real trade-weighted exchange rates and the current account dynamics are inconsistent with the theory's predictions.	Yes, as predicted by theory, there seems to be a difference in the changes of allocation between tradable and non-tradable industries according to the exchange rate regime.

*Note:* \*The reverse plaza accord of 1995 was a concerted official foreign exchange intervention on the part of the U.S. Federal reserve, the Bank of Japan and the German Bundesbank to depreciate the Japanese Yen and the German Mark in relation to the U.S. dollar (Brenner, 2002).

## CONCLUSION

In conclusion, we find that the expanded open economy version of the Austrian business cycle theory that we have developed in *Chapter 3* stacks up rather well to empirics when applied to the Central and Eastern European crisis of 2008. On the other hand, we can be less certain in the case of the Argentine crisis of 1890. This is because the lack of appropriate data precludes us from analyzing all the important aspects of the crisis in terms of the theory. However, some telltale signs of a credit bubble are present (credit expansion, a disproportionate expansion in capital-intensive and time-intensive sectors) in the Argentine experience that align well with the theory. This is similar to the Asian financial crisis, although our representation of the transmission of the credit bubble through the foreign exchange channel seems to be inconsistent with the experience prior to the Asian financial crisis.

However, we have succeeded in developing the Austrian business cycle theory in an open economy and the transmission mechanisms involved on the basis of the standard Austrian business cycle theory in order to address the problematic of sudden stops presented in *Chapter 1*. As we have seen in *Chapter 1*, since the liberalization of international capital flows in the 1980s, many emerging market economies have suffered sudden stop crises, which were linked to the dynamics of international capital flows.

These international capital flows are nowadays seen by many prominent economists to be fuelling credit bubbles in emerging economies and have suggested using the insights of the Austrian business cycle theory to explain the developments during credit bubbles. The expansion of credit through policy measures, as the Austrian business cycle theory explains (*Chapter 2*), is unsustainable, as it impacts relative prices and hence alters the structure of production towards more capital-intensive and time-intensive (interest-sensitive) industries. As interest rates cannot be permanently maintained below their natural rate (which depends on the time preferences of consumers) by policy measures, the expansion of production in interest-sensitive industries turns out to be unsustainable when interest rates rise.

Though, as we have seen in the expanded open economy version of the Austrian business cycle theory in *Chapter 3*, the expansion of credit is not necessarily triggered by domestic policy measures. Credit expansion can also be put into motion on the basis of credit expansions in big financial centers, which is then transmitted to small open economies tied to the big financial center.

We identified two major transmission channels, which transmit credit expansion from one economy to another economy. One is the interest rate channel, where investors are driven by interest rate differentials to over-invest in periphery (small-medium) economies. This can lead to credit expansion in the periphery economy, which brings about all the features described in the standard version of the Austrian business cycle theory. The other is the foreign exchange channel, which brings another layer on top of the standard Austrian business cycle theory, as the effects of the foreign exchange rate policy on the relative production of tradable and non-tradable goods and services are examined.

From applying these theories to the empirical cases of Central and Eastern Europe in the 21<sup>st</sup> century and Argentina in the 19<sup>th</sup> century, we can draw several conclusions. The first is that the Austrian business cycle theory seems to be a useful tool to analyze sudden stop crises as it aligns well with empirical observations. At least when it comes to the Argentine crisis of

1890, the Asian financial crisis of 1997 and the Central and Eastern European crisis, the prediction of the Austrian business cycle of a credit bubble being a precursor to a bust is confirmed. When it comes to the effects of credit expansion on the structure of production, the Austrian business cycle also seems to explain the changes in the structure of production during the boom phase of the business cycle rather well.

Furthermore, the transmission of credit expansions to periphery economies seems to stack up well to empirics. Although, it seems that prudent foreign exchange rate and monetary policies (e.g. Poland, Czech Republic, Slovakia) can to a large degree mitigate the overly exuberant boom phase, as well as cushion the bust phase.

However, future research should make a more detailed study of such episodes of sudden stops from the perspective of the Austrian business cycle theory. This is because our study does not have all the resources available for an in-depth study of the Argentine crisis of 1890 and because we did not account for all the country-specific factors in the study of Central and Eastern European crisis. Even though, our development of the Austrian business cycle theory in an open economy provides a good foundation for such a study.

## POVZETEK

Mnogi akademski ekonomisti in ekonomski strokovnjaki v mednarodnih inštitucijah, kot je Mednarodni denarni sklad (MDS), so vpleteni v aktivno debato o učinku mednarodnih kapitalskih tokov na mednarodno ekonomsko stabilnost. V zadnjih letih so številni ekonomisti izrazili zaskrbljenost, da mednarodni kapitalski tokovi (tokovi kapitala med državami) povzročajo pojav tako imenovanih kriz nenadnih ustavitvev (ang. *sudden stop*) v državah v razvoju.

Krize nenadne ustavitve (ang. *sudden stop*) so definirane kot obdobja, v katerih vsaj eno opazovanje kapitalskih tokov na letni ravni leži vsaj dva standardna odklona pod svojo vzorčno mediano (Calvo in drugi, 2004). Takšne krize so bile vir velike makroekonomske nestabilnosti v državah v razvoju, merjeno z variacijo BDP od vrha do dna. Ko se kapitalski tokovi v države v razvoju hitro upočasnijo (ali obrnejo smer) je lahko variacija BDP-ja ogromna v razmaku nekaj mesecev.

Takšni primeri so bili v Indoneziji (December 1997 – December 1998: -17,3% sprememba v BDP), na Tajskem (September 1996 – September 1998: -15,1% sprememba v BDP), v Maroku (December 1994 – Junij 1995: -13,3% sprememba v BDP) in mnogih drugih državah, v katerih so doživeli dvoštevlični padec BDP v obdobju nekaj mesecev (Ortiz, Ottonello, Sturzenegger, & Talvi, 2009). Najbolj zloglasna kriza nenadne ustavitve, ki je vključevala skupino držav v razvoju, je Azijska finančna kriza leta 1997 v kateri so jo najhuje odnesle Indonezija, Tajska in Južna Koreja.

Pozneje, v tem tisočletju, je tudi Srednja in Vzhodna Evropa doživela krizo, ki zelo spominja na omenjeno Azijsko finančno krizo v 1990-ih letih. Podobno kot v Aziji pred krizo, je tudi Srednja in Vzhodna Evropa v 2000-tih letih prejela ogromne prilive tujega kapitala. Prilivi tujega kapitala so se odrazili v velikih deficitih na tekočih računih, poleg tega so povzročili visoko rast v ponudbi kredita. Nakar so se kapitalski tokovi nenadoma zaustavili ob začetku Velike recesije 2008, kar se je odražalo v velikih padcih BDP v Srednji in Vzhodni Evropi (čeprav je bil padec v nekaterih državah manjši kot v drugih).

Pri čemer je potrebno poudariti dejstvo, da krize nenadne ustavitve niso nov fenomen, kot se morda zdi na prvi pogled. Potrebno si je zapomniti, da so bili mednarodni kapitalski tokovi zatrti v velikem delu 20. stoletja, še najbolj opazno v obdobju Bretton Woods (1945-1971/1973), zato so imeli mednarodni kapitalski tokovi zelo majhen vpliv na gospodarstva. Vendar, si je potrebno zapomniti, da krize nenadne ustavitve niso omejene na naše moderno obdobje liberaliziranih kapitalskih tokov (1980-danes). Že primer Argentine v poznih 1880-ih in zgodnjih 1890-ih kaže, da takšne krize vsekakor niso nov fenomen.

Vendar, ne glede na časovno obdobje, se (čemur zdaj pravimo) krize nenadne ustavitve večinoma pojavljajo zaradi procikličnosti mednarodnih kapitalskih tokov. Z drugimi besedami, mednarodni kapitalski tokovi potencirajo tako gospodarske ekspanzije kot tudi gospodarska krčenja in se jih zato pogosto krivi za povečano gospodarsko nestabilnost. To opažanje še posebej velja za majhna odprta gospodarstva, ki so v splošnem veliko bolj odvisna od tuje trgovine in pritokov tujega kapitala kot velika gospodarstva.

Da bi pojasnili zakaj lahko veliki prilivi tujega kapitala v obdobju pred krizo povzročijo ekonomsko nestabilnost, velik del sodobne literature izpostavlja sočasno hitro rast v ponudbi

kredita, ki je bila opažena v državah pred nastankom kriz nenadnih zaustavitvev. Empirična opazovanja namreč kažejo, da so krize nenadne zaustavitve v splošnem doživele samo tiste države, ki so dovolile, da so se veliki prilivi kapitala prelevili v kreditni balon. Pokreditnega balona sčasoma vodi do velike turbulence v gospodarstvu med katero se kapitalski prilivi močno znižajo.

V skladu z osredotečenjem na kredit kot gonilno silo poslovnih ciklov, Lane in McQuade (2014) ugotavljata, da so (i) pred nastankom kriz nekatere države (npr. Irska in Španija) doživele hitro rast kredita, ter da so bila prisotna (ii) velika zunanja neravnotežja v nekaterih državah. Pomembnost rasti kredita in zunanjih neravnotežjih v obdobju pred finančnimi krizami je bila ugotovljena v velikem delu sodobne literature (med drugimi: Jorda, Schularick, & Taylor, 2011; Gourinchas & Obstfeld, 2012).

Mednarodni vidik domačih kreditnih balonov je, kot izpostavlja Mendoza (2010), da so domači kreditni baloni mnogokrat napihnjeni s hitrimi prilivi tujega kapitala, kar vzpostavi povezavo med domačimi kreditnimi baloni in mednarodnimi kapitalskimi tokovi. Zato bi bila za raziskovanje te povezave uporaba standardnih makroekonomskih modelov verjetno neprimerna, saj imajo standardni makroekonomski modeli, kot opozarjata Hume in Sentence (2009), težavo s pojasnjevanjem kreditnih balonov in z vključevanjem vseh relevantnih makrofinančnih elementov v modele. Medtem Schularick in Taylor (2009) ugotavljata v svoji ekonometrični študiji makroekonomske nestabilnosti v obdobju 1870-2008, da je pretekla rast kredita najboljši pokazatelj bodoče finančne nestabilnosti.

Na drugi strani, Calvo (2013a) ugotavlja, da so kreditni baloni osrednja tema Avstrijske teorije poslovnega cikla, kot je predstavljena v Hayek (1935, ponatisnjeno 1967) in v von Mises (1949, ponatisnjeno 1998). Slednja avtorja sta se osredotočala na spremembe v relativnih cenah, ki se dogajajo med gospodarsko ekspanzijo v okolju zaprtega gospodarstva.

Res je sicer kot ugotavlja Calvo (2014), da sta se Hayek in von Mises osredotočala na kreditne balone znotraj zaprtega gospodarstva, vendar je njuno argumentiranje prav tako lahko uporabljeno za prilive kapitala in krize nenadne zaustavitve. Še več, White (2006) ugotavlja, da je Hayekovo in von Misesovo pojasnjevanje poslovnih ciklov celo še bolj uporabno pri majhnih odprtih gospodarstvih, ko kapitalski prilivi vodijo do kreditnih balonov, katerih gonilna sila je tuj kredit.

Podobno McKinnon in Pill (1997) krivita prekomerno tuje kreditiranje, ki vodi do nevzdržne ravni investicij v majhnih odprtih gospodarstvih. V povezavi z Azijsko finančno krizo iz leta 1997/1998, so tudi Corsetti in drugi (1999) prišli do istega zaključka, da je prekomerno zadolževanje in prekomerno investiranje vodilo do krize.

Skladno s takšnimi pomisleki, sta se tudi Hayek (1935) in von Mises (1949) bala, da bo kreditni balon povzročil velike spremembe v relativnih cenah, ki bodo predstavljale velik strošek, ko se bo kredit vrnil na normalne ravni. Mehanizem, ki sta ga imela v mislih vključuje napačno kalkulacijo na strani ekonomskih agentov, ki zaradi kreditnega balona živijo v zmoti in zamenjajo umetne pogoje za realne pogoje (White, 2006).

S tem mehanizmom v mislih in glede na atraktivnost Avstrijske teorije poslovnega cikla s stališča uspeha teorije v razlaganju kreditnih balonov, namerava ta teza opisati Avstrijski teoretični okvir in ga aplicirati na okolje odprtega gospodarstva. Vendar, preden se spustimo

na okolje odprtega gospodarstva, moramo pogledati standardno različico teorije v okolju zaprtega gospodarstva.

Za izumitelja Avstrijske teorije poslovnega cikla, Ludwiga von Misesa (1949), je ključno vprašanje na katerega njegova teorija odgovarja ali je možno permanentno znižati obrestne mere preko kreditne ekspanzije? Preprosti odgovor je ne, ker so obrestne mere lahko znižane samo na kratki rok (začasno), kar povzroči začasno obdobje blaginje, kateremu pa sledi zlom na dolgi rok.

Torej je glavno vprašanje ali so spremembe obrestnih mer vzdržne. V primeru, kjer je sprememba osnovana na povečanju realnega varčevanja, so takšne spremembe vzdržne. Vzdržne so, ker so potrošniki znižali njihovo sedanjo potrošnjo in lahko zato potrošijo več v prihodnosti. Medčasovna koordinacija potrošniških odločitev in investicijskih odločitev se zato poklaplja. To razmišljanje je osnovano na Wicksellovi (1936, ponatisnjeno 1962) ideji naravne obrestne mere (direktno je ne moremo opazovati), ki je konsistentna z medčasovnimi preferencami potrošnikov in stvarnimi omejitvami (npr. redkost resursov).

Vendar lahko obrestna mera na kapitalskih trgih (ki jo lahko direktno opazujemo) odstopa od naravne obrestne mere zaradi monetarnih šokov. Ti monetarni šoki, kot pojasnjuje Hayek (1937), so problematični ker delujejo le začasno. Delujejo le začasno v smislu, da bodo spremembe, ki jih sprožijo le začasne, zato ker niso osnovane na skladnih spremembah v realnih dejavnikih.

Problem pri spremembah obrestne mere na kapitalskih trgih je, da ekonomski subjekti težko ločijo med spremembo povzročeno s strani realnih dejavnikov, kot je večje varčevanje (tudi tehnologija in drugi faktorji), in s strani monetarnih dejavnikov – ekspanzije kredita. Namreč kreditna ekspanzija zniža obrestne mere, kar pošlje enak cenovni signal ekonomskim subjektom kot povečano varčevanje. Zato investitorji napačno kalkulirajo sedanje vrednosti projektov v prid bolj v prihodnost usmerjenim (ang. *roundabout*) produkcijskim procesom.

Z drugimi besedami, če ekspanzija kredita ni osnovana na povečanem varčevanju in je posledica povečane ponudbe denarja, se bo konfiguracija produkcijske strukture gospodarstva sčasoma izkazala za nevzdržno. To se zgodi zaradi prej omenjene napačne kalkulacije sedanjih vrednosti s strani podjetnikov, katerih napovedi so zdaj osnovane na nižjih obrestnih merah (ki so rezultat rasti ponudbe denarja). Sčasoma se te napovedi izkažejo za napačne, ker dejansko ni bilo sprememb v medčasovnih potrošniških preferencah v smeri bolj v prihodnost usmerjene potrošnje (povečano varčevanje), ki se bi skladala z zdaj obstoječo bolj v prihodnost usmerjeno produkcijsko strukturo.

Podjetniki se napačno odločajo, ker so njihove finančne kalkulacije izkrivljene zaradi odločitev monetarne politike, ki z nižanjem obrestne mere daje napačen cenovni signal podjetnikom. Ti se lahko na osnovi te informacije odločijo za drugačen investicijski projekt kot če bi obrestna mera ostala konstantna, saj so sedaj pristranski do projektov, ki so bolj občutljivi na spremembe obrestne mere (bolj kapitalsko in časovno intenzivni projekti). Zato se prekomerno investira v panoge, ki so bolj občutljive na spremembe v obrestni meri.

Takšna napaka je prepoznana, ko postane očitno, da predvideno prihodnje povpraševanje ne obstaja. Ta sistematična množica podjetniških napak, v nasprotju s samo običajnimi in relativno milimi poslovnimi nihanji, je značilen znak poslovnega cikla po Rothbardu (1963a, ponatisnjeno 2000).

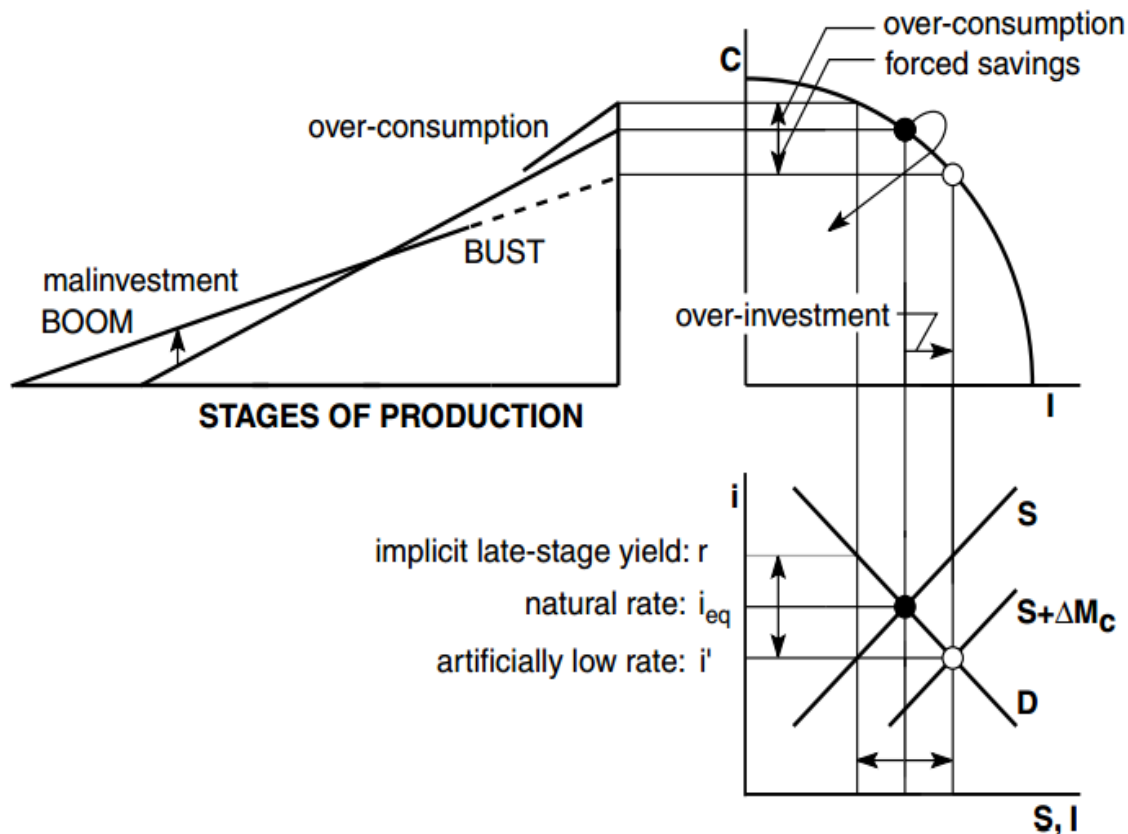


Za prikazovanje tega procesa je Garrison (2001) razvil preprost grafični okvir. Garrison je to dosegel s tem, da je združil Hayekov trikotnik (prikazuje strukturo proizvodnje), prilagojeno krivuljo alternativnih možnosti produkcije (prikazuje medčasovni kompromis (ang. *trade-off*), ki ga imajo potrošniki pri odločanju med potrošnjo in investiranjem) in kreditni trg (prikazan s trgom posojilnih skladov).

Povezava med strukturo proizvodnje, krivuljo produkcijskih možnosti in kreditnim trgom je prikazana v Sliki 27. V Sliki 27 sta kreditni trg (trg posojilnih skladov) in krivulja produkcijskih možnosti povezana s skupno horizontalno osjo, ki meri raven investicij. Medtem ko sta krivulja produkcijskih možnosti in struktura produkcije (Hayekov trikotnik) povezana s skupno vertikalno osjo, ki meri raven potrošnje. Pojasnjevanje naklona hipotenuze v trikotniku ni tako preprosto, najbolj preprosta interpretacija je, da naklon hipotenuze prikazuje raven obrestne mere na kreditnem trgu, s katero se trg očisti.

Slika 27 prikazuje odziv gospodarstva na s politikami spodbujene ekspanzije kredita, ob predpostavki konstantne tehnologije in konstantnih preferenc glede potrošnje in varčevanja. Kot prvo lahko opazimo, da se povečanje količine denarja v obtoku najprej pojavi na kreditnih trgih. Kot drugo lahko opazimo, da so učinki sprva podobni učinkom povečanega varčevanja. Vendar, obstajajo ključne razlike v učinkih kreditne ekspanzije na gospodarstvo. Te učinke bom poskušal pojasniti korak za korakom.

Slika 27: Posledice kreditne ekspanzije na strukturo proizvodnje



Vir: R. Garrison, *Time and Money: The Macroeconomics of Capital Structure*, 2001, str. 69.

Neposredni učinek višje ravni posojil je gibanje ponudbene strani na trgu posojilnih skladov (spodnji desni diagram) desno od  $S$  na  $S + \Delta M_c$  ( $\Delta M_c$  prikazuje nov denar v obliki dodatnega kredita). Lahko opazimo, da se krivulja ponudbe premakne, čeprav ni nobenega odrekanja v obliki znižane potrošnje, ki bi sprostila resurse, ki bi bili lahko potem uporabljeni drugje v gospodarstvu. Kljub temu povečana ponudba kredita (posojilnih skladov) povzroči padec obrestnih mer, kar povzroči povečano zadolževanje na strani podjetij. V diagramu je to prikazano s premikom iz črne točke ( $S, D$ ) v belo točko ( $S + \Delta M_c, D$ ).

Poleg tega nižja obrestna mera odvrča varčevanje, kar je v diagramu prikazano kot premik iz črne točke ( $S, D$ ) v razsečišče med  $S$  in  $i'$  (umetno nizka obrestna mera). Tako si prideta nasproti dve nasprotni sili, četudi so medčasovne preference ostale nespremenjene. Po eni strani nižje obrestne mere vodijo do znižanega varčevanja, medtem ko povečana ponudba kredita poveča investiranje. Z drugimi besedami, kreditni trg odpove in nastane razkorak med varčevanjem in investicijami oz. tržni proces odpove pri medčasovni koordinaciji.

Na krivulji produkcijskih možnosti (zgornji desni diagram v *Sliki 27*) se povečano investicijsko povpraševanje po kreditu prevede v višjo raven investicij in premik v smeri urinega kazalca po krivulji produkcijskih možnosti. Vendar, kot izpostavlja Salerno (2012), je prekomerna potrošnja tudi pomembna značilnost v času kreditnega balona. Kreditni balon, kot ugotavlja von Mises (1949, ponatisnjeno 1998), izkrivi monetarno kalkulacijo in povzroči, da tako podjetniki kot gospodinjstva precenijo njihove dohodke in neto premoženje (ang. *wealth effect*). Alternativno razlago prekomerne potrošnje v času kreditnega balona je podal Garrison (2001), ki vidi povečano potrošnjo kot posledico nizke obrestne mere, ki motivira potrošnike da manj varčujejo in več potrošijo, kar bi se v *Sliki 27* prevedlo v premik v nasprotni smeri urinega kazalca na krivulji produkcijskih možnosti. V vsakem primeru, je končni rezultat povečana potrošnja in povečano investiranje naenkrat, kar potisne gospodarstvo nad krivuljo produkcijskih možnosti.

Vendar, si je potrebno zapomniti, da najbolj pomemben aspekt kreditnega balona ni prekomerno investiranje (ali potrošnja), ampak zgrešeno investiranje (ang. *malinvestment*). Zgrešeno investiranje, ki je definirano kot zmotna alokacija kapitalne strukture. Alokacija je zmotna, ker je kapital napačno investiran z vidika, da ni več v skladu z medčasovnimi preferencami potrošnikov. Kot poudarja Oppers (2002), je zato kapitalna struktura nevzdržna. Ta nevzdržnost je, kot izpostavlja Rothbard (1995), rezultat monetarne inflacije preko posojil podjetjem, ki povzroči prekomerno investiranje v kapitalne dobrine, še posebej na področjih kot so gradbeništvo, dolgoročne investicije, strojna orodja in industrijske surovine. Ne samo to, ker so delnice in nepremičnine oblika posedovanja kapitalnih dobrin, pride tudi do prekomernega povečanja cen delnic in nepremičnin. Na drugi strani, obstaja relativno nezadostno investiranje v panoge potrošnih dobrin.

Rezultat tega neravnovesja je, da se začasna gospodarska ekspanzija ne more nadaljevati v nedogled, saj bodo začetni investicijski projekti sčasoma razočarali, ko pričakovanega prihodnjega povpraševanja ne bo (potrošniki niso predstavili svoje potrošnje v prihodnost, kot je signalizirala obrestna mera, zato so bili resursi napačno alocirani). To bo postalo jasno ko bo povprečno tveganje investicijskih bankrotov začelo počasi rasti in, kot izpostavljata Hoffmann in Schnabl (2011), ko se bo začela obrestna mera na kapitalnih trgih višati na naravno raven (v odsotnosti novih izven tržnih posegov).

Do sedaj smo govorili o modelu Avstrijske teorije poslovnega cikla v okviru zaprtega gospodarstva, ki je relativno dobro razvit. Medtem, ko se je model v okviru odprtega gospodarstva začel razvijati šele v zadnjih letih v delih Hoffmanna in Schnabla (2011) in Cachanoskyega (2012a).

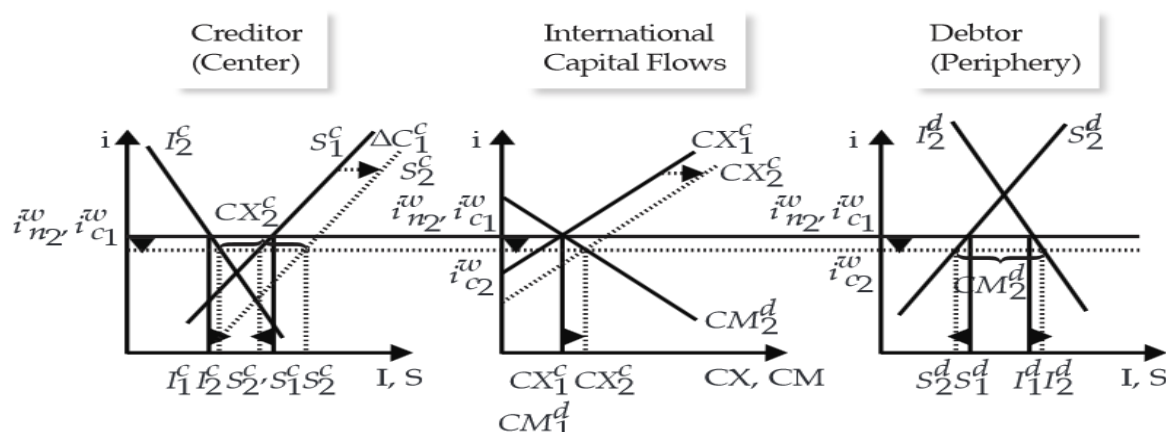
Glavna razlika med modelom v okviru zaprtega gospodarstva in odprtega gospodarstva je dejstvo, da model odprtega gospodarstva vključuje mednarodno transmisijo povečane ponudbe kredita od središčnih gospodarstev do perifernih gospodarstev. To je možno v primeru, ko povečana ponudba kredita in nižje obrestne mere, ne pomagata spodbuditi investicijsko dejavnost v domači državi, ker imajo investitorji črnogledne napovedi za domače gospodarstvo.

Kot poudarja Steil (2007), razlog tiči v tem, da je politika povečevanja kredita za spodbujanje domače rasti v središčnih gospodarstvih neučinkovita, če ta novi kredit uide v obliki kapitalskih odlivov. Podobno, Portes (2012) poudarja, da lahko z integriranimi globalnimi finančnimi trgi nizke obrestne mere v svetovnih finančnih središčih zadovoljijo povečano investicijsko povpraševanje v perifernih gospodarstvih, za katera investitorji napovedujejo hitro rast z spremljajočimi visokimi donosi za investitorje.

Kot poudarjajo Hoffmann (2010) ter Löffler in drugi (2010) nastane problem, ko se kreditna ekspanzija in posledično znižanje obrestnih mer v središčnih državah prenese v majhna odprta gospodarstva s slabo razvitimi kapitalskimi trgi v obliki kapitalskih prilivov. Ti prilivi lahko torej služijo kot sredstvo, s katerim se kreditni balon izvozi iz središčnih ekonomij.

Po Hoffmannu in Schnablu (2011) je začetek analize mednarodno prenešenih kreditnih balonov na točki, kjer je svetovna naravna obrestna mera (izenačuje svetovno varčevanje z svetovnim investiranjem) enaka za obe gospodarstvi (*Slika 28*). Vendar, se s kreditno ekspanzijo centralne banke v središču diskontna stopnja v *Sliki 28* zniža na  $i_{cb2}^c$  pod naravno obrestno mero  $i_{n1}^w$ . V odzivu na znižano obrestno mero  $i_{cb2}^c$  finančni sektor ustvari dodatni kredit  $\Delta C_1^c$ . Ponudba kredita  $S_2^c$  se sedaj poveča za  $\Delta C_1^c$  na  $S_2^c$ . Dodatni kredit ima enake učinke na kreditne trge kot povečanje varčevanja, zato se ponudba kredita poveča iz  $S_1^c$  na  $S_2^c$ . Posledično, obrestna mera na kapitalskih trgih pade iz  $i_{c1}^w$  na  $i_{c2}^w$ .

*Slika 28: Kreditna ekspanzija v središčnem gospodarstvu prenesena prek mednarodnih kapitalskih tokov v periferno gospodarstvo*



Vir: G. Hoffmann and A. Schnabl, *National Monetary Policy, International Economic Instability and Feedback Effects - An Overinvestment View*, 2011, str. 10.

Zaradi nižjih svetovnih obrestnih mer je investicijska dejavnost spodbujena v obeh državah (iz  $I_1^c$  na  $I_2^c$  in iz  $I_1^d$  na  $I_2^d$ ), medtem ko varčevanje pade v obeh državah (iz  $S_1^c$  na  $S_2^c$  in iz  $S_1^d$  na  $S_2^d$ ). Izvoz kapitala iz središčnega gospodarstva naraste, kar se vidi v visokem presežku na tekočem računu ( $CA_1^c$  to  $CA_2^c$ ), medtem ko v periferiji deficit na tekočem računu narastejo ( $CA_1^d$  na  $CA_2^d$ ). Torej se kapitalski odlivi ( $CX_2^c$ ) iz središčnega gospodarstva povečajo, kot tudi kapitalski prilivi v periferijo ( $CM_2^d$ ).

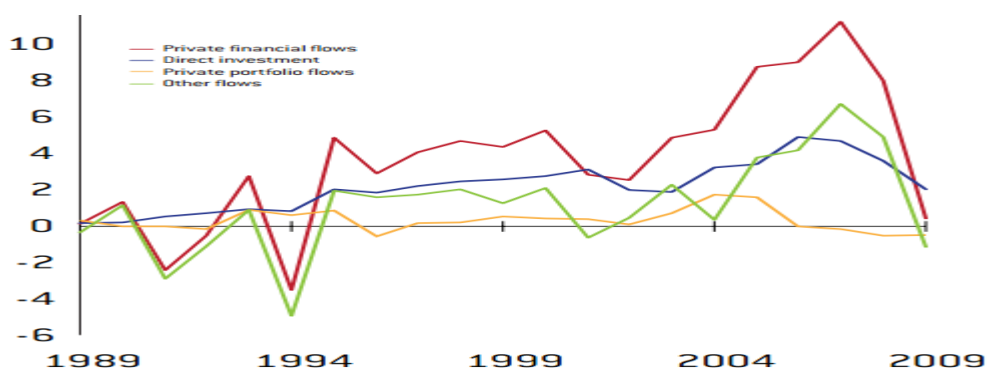
Svetovno naravno obrestno mero smo definirali kot takšno v kateri je svetovno varčevanje izenačeno s svetovnim investiranjem, vendar z ekspanzijo kredita, obrestna mera na kapitalskih trgih pade pod naravno obrestno mero ( $i_{c2}^w < i_{n2}^w$ ). Agregirano varčevanje ( $S_2^c + S_2^d$ ) in agregirano investiranje ( $I_2^c + I_2^d$ ) nista več v ravnotežju ( $S_2^c + S_2^d \neq I_2^c + I_2^d$ ). Torej svetovna struktura proizvodnje ni več v skladu z agregiranimi medčasovnimi preferencami posameznikov v obeh gospodarstvih, kot smo videli v okviru zaprtega gospodarstva. Ravno tako kot v okviru zaprtega gospodarstva je nova struktura proizvodnje nevzdržna, ker so cenovni signali (obrestne mere na kapitalskih trgih) izkrivljeni, zato se tudi investicijski projekti sčasoma izkažejo za nevzdržne.

Empirično smo preverili model odprtega gospodarstva na dveh študijah primerov. Na primeru Argentine v letih 1880-1890 v prvem obdobju globalizacije, kot tudi na primeru Srednje in Vzhodne Evrope v letih 2001-2008. V povzetku bo na kratko predstavljen primer Srednje in Vzhodne Evrope v letih 2001-2008.

V študiji obravnamo 10 držav: Slovenijo, Slovaško, Češko, Poljsko, Estonijo, Latvijo, Litvo, Romunijo, Madžarsko in Bolgarijo. Vse te države so tranzicijske države že od zgodnjih 1990-ih in so se v obdobju po tranziciji približevale (konvergirale) k življenski ravni v razvitih gospodarstvih Zahodne Evrope.

Vendar, je približevanje naletelo na oviro leta 2008, ko je Srednjo in Vzhodno Evropo močno prizadela Velika recesija 2008. S tem, ko se je kriza širila skozi svetovno gospodarstvo, so investitorji začeli preferirati bolj varne oblike investicij v razvitih gospodarstvih in so znatno znižali investicije v Srednji in Vzhodni Evropi. Posledica je bil velik in nepričakovan padec v kapitalskih prilivih (kriza nenadne zaustavitve), kot kaže *Slika 29*.

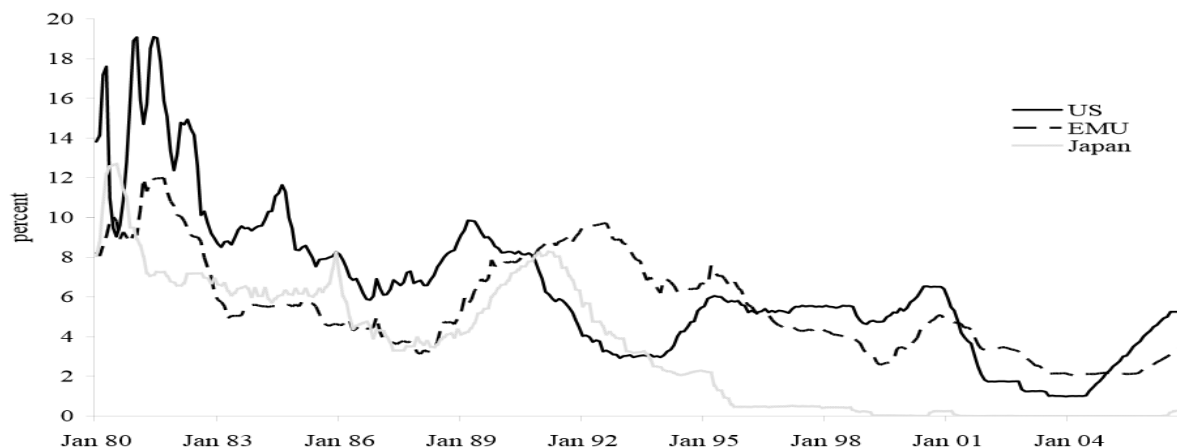
*Slika 29: Neto zasebni finančni prilivi v centralno in vzhodno evropo (v % BDP), 1989-2009*



Vir: T. Becker in drugi, *Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe*, 2010, str. 6.

Ti kapitalski prilivi so bili v veliki meri posledica nizkih obrestnih mer v ZDA in Evroobmočju (središčna gospodarstva), od koder je bil kredit prenešen na Srednje in Vzhodno Evropske države (periferna gospodarstva) kot kaže *Slika 30*.

*Slika 30: Obrestne mere na denarnem trgu v Evroobmočju, ZDA in na Japonskem, 1995-2008*



Vir: G. Schnabl and A. Hoffmann, *Monetary Policy, Vagabonding Liquidity and Bursting Bubbles in New and Emerging Markets: An Overinvestment View*, 2007, str. 3.

V Srednji in Vzhodni Evropi smo zaznali vse ključne znake kreditnega balona, kot jih predstavljata Eichengreen in Mitchener (2003). Ti so rast razmerja med denarno maso in BDP, med investicijami in BDP ter hitra rast tečajev delnic. Vendar je potrebno poudariti, da je obstajala velika razlika v magnitudi teh indikatorjev med državami, ki so imele fiksni devizni tečaj in državami, ki so vodile bolj drseči devizni tečaj (*Tabela 6*).

*Tabela 6: Ključni indikatorji za države Centralne in Vzhodne Evrope*

	Države z drsečimi deviznimi tečaji	Države s fiksnimi deviznimi tečaji
Bilanca tekočega računa/BDP 2007 (%)	-6,7	-17,3
Inflacija povprečje 2004-2008 (%)	4,7	6,2
Kredit/BDP, sprememba od 2004-2008	20,7	37,4
NTI v finančni in nepremičninski sektor, 2007 (% od vseh NTI)	30,6	44,8
Bruto eksterni dolg, 2009 (% of BDP)	86,6	123,6
Realna obrestna mera, povprečje 2004-2008 (%)	1,4	-2,5
BDP rast, 2009 (%)	-4,1	-11,1
Sprememba ravni brezposelnosti 2007-2010 (%)	2,5	8,9

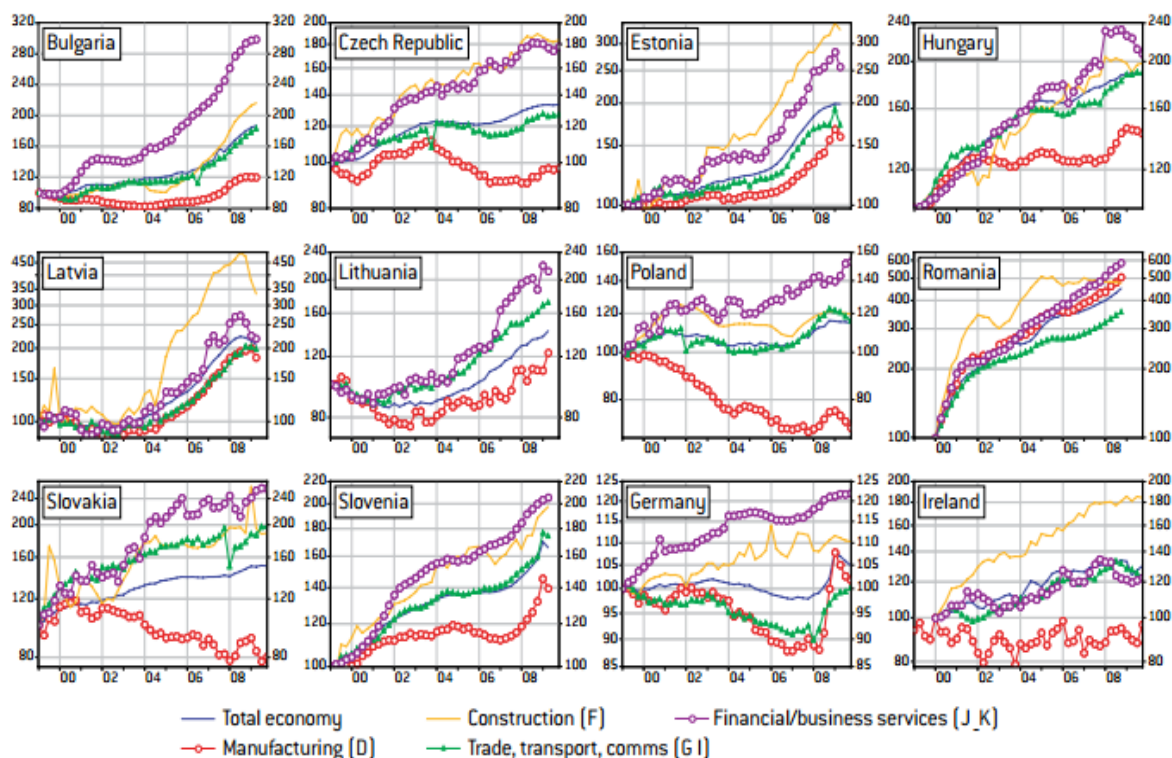
Opomba: Skupina držav z drsečim deviznim tečajem: Češka, Madžarska, Poljska, Slovaška (Slovaška je imela de facto drseči devizni tečaj do julija 2008) in Romunija; Skupina držav s fiksnimi deviznimi tečaji: Bolgarija, Estonija, Latvija, Litva, Slovenija.

Vir: T. Becker in drugi, *Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe*, 2010, str. 52.

Iz *Tabele 6* je razvidno, da so prisotni vsi značilni znaki kreditnega balona (kot je naraščanje razmerja med kreditom in BDP), vendar moramo iz perspektive Avstrijske teorije poslovnega

cikla pogledati tudi spremembe v strukturi produkcije. Teoretično pričakovanje je, da bi morali videti prekomerno rast v zgodnji fazi (v sektorjih, ki so najbolj občutljivi na obrestne mere) v primerjavi s poznimi fazami (v sektorjih, ki so najmanj občutljivi na obrestne mere). Prekomerna ekspanzija v zgodnji fazi bi morala vplivati tudi na trg delovne sile v zgodnji fazi drugače kot v poznejših fazah, saj naj bi plače v zgodnjih fazah rasle hitreje kot v poznejših fazah. Zato lahko uporabimo stroške dela na enoto proizvoda kot približek za različne ravni ekspanzije v različnih sektorjih (Slika 31).

Slika 31: Stroški dela na enoto proizvoda po sektorjih, 1999Q1-2009Q4, 2000Q1=100



Opomba: Skale za magnitudo ekspanzije od začetne točke indeksa za vsako državo so različne.

Vir: T. Becker in drugi, *Whither Growth in Central and Eastern Europe? Policy Lessons for an Integrated Europe*, 2010, str. 62.

Slika 31 prikazuje velike razlike v Srednji in Vzhodni Evropi v magnitudah ekspanzije po različnih sektorjih gospodarstva, še posebno v obdobju 2004-2008. Obstajajo veliki razkoraki v stopnjah rasti, še posebno med državami s fiksnimi deviznimi tečaji (Baltске države, Bolgarija in Slovenija) in državami na omejeno drsečih deviznih tečajih (Romunija in Madžarska) v primerjavi z državami, ki so imele najbolj drseče devizne tečaje (Poljska, Češka in Slovaška). Te države so pustile svoje valute apreciirati in so tako sterilizirale velike kapitalske prilive in s tem ublažile kreditno ekspanzijo.

V zaključku ugotavljamo, da model Avstrijske teorije poslovnega cikla v odprtnem gospodarstvu razmeroma dobro pojasnjuje krizo v Srednji in Vzhodni Evropi leta 2008. Po drugi strani, ne moremo biti tako sigurni kar se tiče primera Argentinske krize iz leta 1890. Zaradi pomanjkanja podatkov namreč ne moremo analizirati vseh pomembnih vidikov te krize. Kljub temu pa smo zaznali nekatere značilne znake kreditnega balona (kreditna ekspanzija, prekomerna rast v kapitalsko in časovno intenzivnih sektorjih), ki se dobro pokrivajo s teorijo. Podobno lahko trdimo za obdobje pred Azijsko finančno krizo leta 1997,



čepprav so teoretične napovedi kar se tiče transmičijskega kanala deviznega tečaja nekonsistentne z Azijsko izkušnjo.

Po drugi strani, smo uspeli razviti Avstrijsko teorijo poslovnega cikla v odprtem gospodarstvu in znotraj tega transmičijski mehanizem, ki smo ga razvili na osnovi standardne Avstrijske teorije poslovnega cikla, zato da lahko analiziramo problematiko kriz nenadnih zaustavitev (ang. *sudden stop*). Krize nenadne zaustavitve so se začele pojavljati z liberalizacijo kapitalskih tokov v 1980-ih letih, po kateri so mnoge države v razvoju trpele za krizami, ki so bile povezane z dinamiko mednarodnih kapitalskih tokov.

Mednarodni kapitalski tokovi danes po mnenju mnogih eminentnih ekonomistov predstavljajo gorivo za nastanek kreditnih balonov v državah v razvoju, zato so predlagali uporabo nauk Avstrijske teorije poslovnega cikla za razlago dogajanja med kreditnimi ekspanzijami. Ekspanzija kredita prek monetarne politike, kot pojasnjuje teorija, je nevzdržna, saj vpliva na relativne cene in zato izkrivi strukturo proizvodnje v smeri bolj kapitalsko in časovno intenzivnih (občutljivih na obrestne mere) sektorjev. Ker obrestne mere ne morejo biti permanentno znižane pod naravno raven (te so odvisne od medčasovnih preferenc potrošnikov) z ukrepi monetarne politike, se izkaže ekspanzija v sektorjih, ki so občutljivi na spremembe obrestnih mer za nevzdržno, ko se obrestne mere dvignejo.

Vendar, kot kaže Avstrijska teorija poslovnega cikla v odprtem gospodarstvu, ekspanzija kredita ni nujno sprožena s strani domače monetarne politike, saj je lahko rezultat ekspanzije kredita v velikih finančnih središčih, katera je potem prenesena na majhna odprta gospodarstva, ki so vezana na velika finančna središča.

Identificirali smo dva velika transmičijska kanala, ki prenašata kreditno ekspanzijo iz enega gospodarstva v drugega. Eden je kanal obrestne mere, kjer so investitorji motivirani z razlikami v obrestnih merah, da prekomerno investirajo v periferna gospodarstva. To lahko vodi do kreditne ekspanzije v perifernem gospodarstvu, ki s sabo prinese vse značilnosti opisane v standardni verziji Avstrijske teorije poslovnega cikla. Drug kanal je kanal deviznega tečaja, ki doda še eno plast k teoriji, saj so analizirani še učinki politike deviznih tečajev na relativno produkcijo menjalnih ter nemenjalnih dobrin in storitev.

Z uporabo teorij na empirična primera Srednje in Vzhodne Evrope v 21. stoletju in Argentine v 19. stoletju, lahko pridemo do več zaključkov. Prvi je, da je Avstrijska teorija poslovnega cikla uporabno orodje za analizo kriz nenadnih zaustavitev, saj se dobro pokriva z empiričnimi opazovanji. Vsaj kar se tiče kriz v Argentini 1890, v Azijski finančni krizi 1997 in v Srednji in Vzhodni Evropi 2008, je moč opaziti hitro rast kredita v skladu s teorijo. Ko pride do učinkov kreditne ekspanzije na strukturo proizvodnje, se teorija ponovno relativno dobro izkaže v pojasnjevanju sprememb v strukturi produkcije med konjunktorno fazo poslovnega cikla.

Nadalje, se tudi transmisija kreditne ekspanzije v periferna gospodarstva ujema z empiričnimi opazovanji. Čepprav kaže, da lahko kombinacija preudarne politike deviznih tečajev in preudarne monetarne politike (kot na Poljskem, Češki in Slovaški) v veliki meri ublaži prekomerno segrevanje gospodarstva med konjunkturo in posledično tudi padec med recesijo.

Vendar, bi prihodnje študije morale podati bolj podrobne analize takšnih kriz nenadne zaustavitve iz perspektive Avstrijske teorije poslovnega cikla. To je zato, ker naša študija ni imela na voljo vseh resursov za bolj poglobljeno analizo Argentinske krize leta 1890 in tudi ni

zajela vseh dejavnikov specifičnih za posamezne države v študiji Srednje in Vzhodne Evrope. Vendarle, naš razvoj Avstrijske teorije poslovnega cikla v okviru odprtega gospodarstva daje dobro podlago za takšno študijo.



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## **APPENDIXES**





## **TABLE OF APPENDIXES**

APPENDIX A: Table of Sudden Stop Episodes as Defined by Calvo et al. (2006), 1980-2006 .....	1
APPENDIX B: Data on the Asian financial crisis of 1997 .....	1



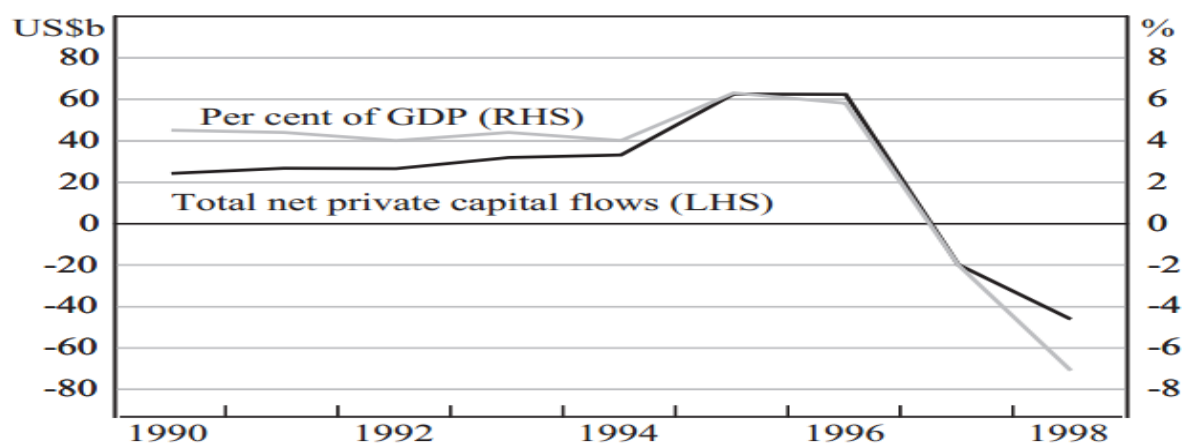
## Appendix A: Table of sudden stop episodes as defined by Calvo et al. (2006), 1980-2006

Country	Peak	Trough	Recovery	Output decline
Argentina	1980	1982	1984	-10.36%
Argentina	1998	2002	2004	-18.36%
Brazil	1980	1983	1985	-7.12%
Chile	1981	1983	1986	-13.72%
Côte d'Ivoire	1982	1984	1986	-6.50%
Ecuador	1998	1999	2001	-6.30%
El Salvador	1980	1982	1992	-16.10%
Indonesia	1997	1998	2003	-13.13%
Malaysia	1997	1998	2000	-7.36%
Mexico	1981	1983	1985	-4.80%
Mexico	1994	1995	1997	-6.17%
Morocco	1994	1995	1996	-6.58%
Nigeria	1980	1984	1989	-21.88%
Peru	1981	1983	1986	-12.33%
Russia	1997	1998	1999	-5.30%
South Africa	1981	1983	1984	-6.07%
South Korea	1997	1998	1999	-6.85%
Thailand	1996	1998	2002	-11.74%
Turkey	1993	1994	1995	-5.46%
Turkey	1998	1999	2000	-4.71%
Uruguay	1981	1984	1991	-19.95%
Venezuela, Rep. Bol.	1980	1983	1986	-6.10%

Source: G. Calvo et al., *Phoenix Miracles in Emerging Markets: Recovering Without Credit from Systemic Financial Crises*, 2006, p. 42.

## Appendix B: Data on the Asian financial crisis, 1990-1998

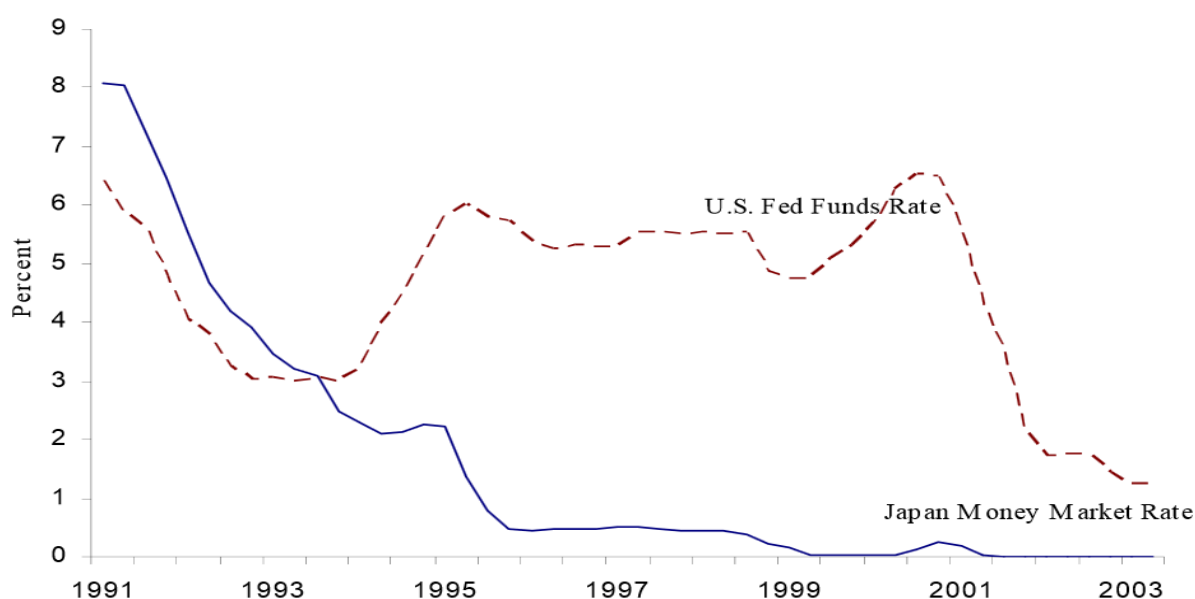
Figure 32: Net capital flows to the affected Asian countries, 1990-1998



Note: The Affected countries are South Korea, Indonesia, Malaysia, Thailand and the Philippines.

Source: G. de Brouwer, *Capital Flows to East Asia - the Facts in Capital Flows and the International Financial System*, 1999, p. 78.

Figure 33: Money market rates in the U.S. and Japan, 1991-2003



Source: R. McKinnon, *Why Japan should Fix its Exchange Rate at ¥120 to the US\$1*, 2003, p. 5.

Table 7: Bank lending to private sector in the affected Asian countries (% growth), 1991-1997

Country	1991	1992	1993	1994	1995	1996	1997
South Korea	20.78	12.55	12.94	20.08	15.45	20.01	21.95
Indonesia	17.82	12.29	25.48	22.97	22.57	21.45	46.42
Malaysia	20.58	10.79	10.80	16.04	30.65	25.77	26.96
Thailand	20.45	20.52	24.03	30.26	23.76	14.63	19.80
Philippines	7.33	24.66	40.74	26.52	45.39	48.72	28.79
Arithmetic Average	17.39	16.16	22.80	23.17	27.56	26.12	28.78

Source: G. Corsetti et al., *What caused the Asian currency and financial crisis?*, 1999, p. 45.

Table 8: Money and credit – M2 annual growth rates for affected Asian countries, 1991-1996

Country	1991	1992	1993	1994	1995	1996
South Korea	21.9%	14.9%	16.6%	18.7%	15.6%	15.8%
Indonesia	17.5%	19.8%	20.2%	20.0%	27.2%	27.2%
Malaysia	16.9%	29.2%	26.6%	12.7%	20.0%	21.8%
Thailand	19.8%	15.6%	18.4%	12.9%	17.0%	12.6%
Philippines	17.3%	13.6%	27.1%	24.4%	24.2%	23.2%

Source: S. Radelet and J. Sachs, *The Onset of the East Asian Financial Crisis in Currency Crises*, (1998), p. 49.

Table 9: Investment rates for affected Asian countries (% of GDP), 1990-1997

Country	1990	1991	1992	1993	1994	1995	1996	1997
South Korea	36.9	38.9	36.6	35.1	36.1	37.1	38.4	35.0
Indonesia	36.2	35.5	35.9	29.5	31.1	31.9	30.8	31.6
Malaysia	31.3	37.6	33.5	37.8	40.4	43.5	41.5	42.8
Thailand	41.1	42.8	40.0	39.9	40.3	41.6	41.7	35.0
Philippines	24.2	20.2	21.3	24	24.1	22.2	24	24.8
Arithmetic Average	33.94	35	33.46	33.26	34.4	35.26	35.28	33.84

Source: Source: G. Corsetti et al., *What caused the Asian currency and financial crisis?*, 1999, p. 45.

Table 10: Real exchange rate index for affected Asian countries (based on WPI; trade-weighted, 1990=100; base month December)

Year	Indonesia	Malaysia	Philippines	Thailand	South Korea
1990	100	100	100	100	100
1991	99	99	82	97	99
1992	92	87	69	90	94
1993	88	88	71	88	93
1994	92	86	62	89	91
1995	89	84	63	87	88
1996	80	78	56	80	88
1997	150	108	75	124	157

Source: S. Radelet and J. Sachs, *The Onset of the East Asian Financial Crisis in Currency Crises*, 1998, p. 48.

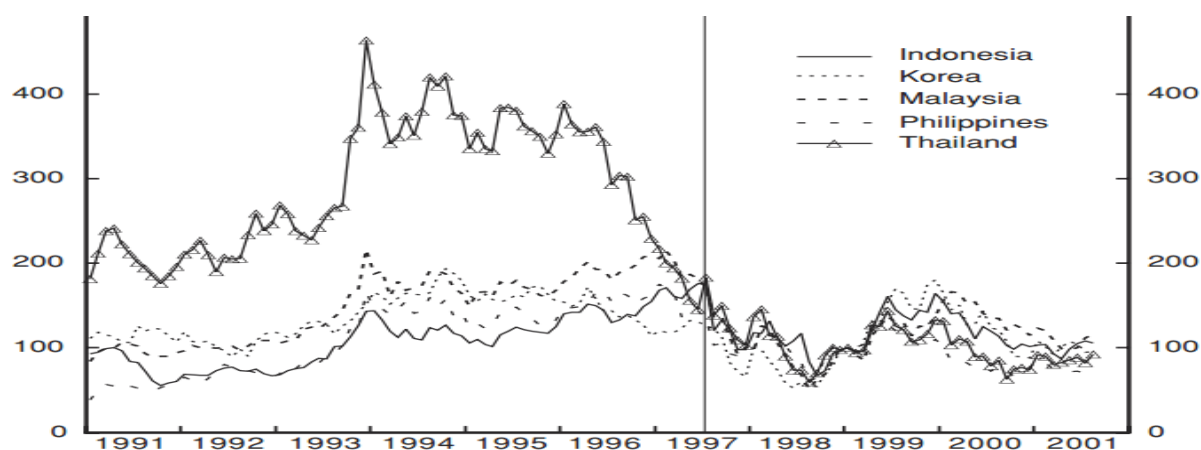
Figure 34: Balance of payments for affected Asian countries, 1985-1996

(% of GDP)

	Korea		Indonesia		Malaysia		Philippines		Thailand	
	1985-89	1990-96	1985-89	1990-95	1985-89	1990-95	1985-89	1990-96	1985-89	1990-95
Current Account	4.3	-1.7	-2.5	-2.5	2.4	-5.6	-0.5	-3.3	-2.0	-6.8
Balance of Trade	3.6	-1.2	5.9	4.5	13.7	3.2	-2.9	-8.7	-2.2	-4.7
Exports	30.7	25.0	21.9	24.2	56.1	73.2	17.1	17.4	22.9	29.6
Imports	-27.2	-26.2	-15.9	-19.7	-42.5	-70.0	-20.0	-26.1	-25.1	-34.3

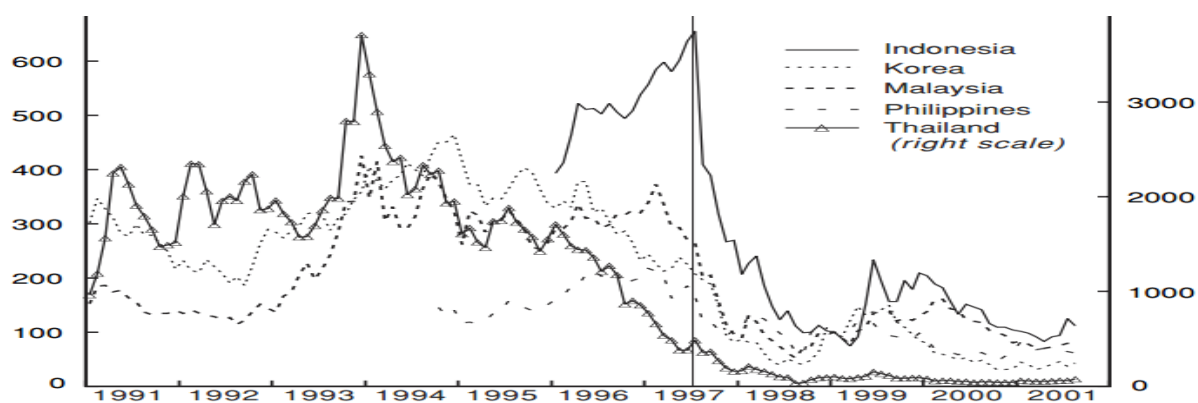
Source: S. Radelet and J. Sachs, *The Onset of the East Asian Financial Crisis in Currency Crises*, 1998, p. 47.

Figure 35: Stock market prices indices for affected Asian countries, 1991-2001



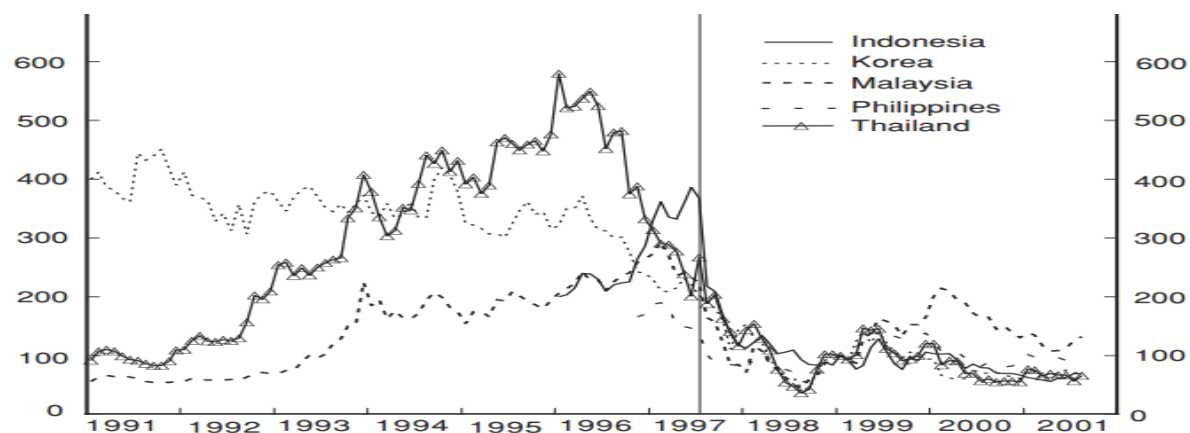
Source: C. Collyns and A. Senhadji, *Lending Booms, Real Estate Bubbles, and the Asian Crisis in Asset Price Bubbles: The Implications for Monetary, Regulatory, and International Policies*, 2003, p. 25.

Figure 36: Property stock index for affected Asian countries, 1991-2001



Source: C. Collyns and A. Senhadji, *Lending Booms, Real Estate Bubbles, and the Asian Crisis in Asset Price Bubbles: The Implications for Monetary, Regulatory, and International Policies*, 2003, p. 27.

Figure 37: Stock market indices for banks and financial institutions for affected Asian countries, 1991-2001



Source: C. Collyns and A. Senhadji, *Lending Booms, Real Estate Bubbles, and the Asian Crisis in Asset Price Bubbles: The Implications for Monetary, Regulatory, and International Policies*, 2003, p. 26.