BUSINESS CYCLES IN EMERGING ECONOMIES

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ABSTRACT

BUSINESS CYCLES IN EMERGING ECONOMIES

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Until very recently, most emerging market economies have achieved higher growth rates for the last decade. It is controversial whether this good economic environment is due to domestic reforms or due to favorable external factors. In this framework, the main aim of this study is to investigate the structure and sources of business cycles in emerging market economies and to determine how these cycles differ than those in developed countries. The role of external and domestic factors on business cycles are analyzed by applying not only the conventional panel data estimations but also common correlated effects panel mean group method which is introduced by Peseran (2006). Besides, the convergence of business cycles in emerging market economies to the business cycles in developed countries is discussed based on factor analysis. The major results indicate the common global factors are the leading source of the business cycles both in emerging market economies and developed countries. However, domestic determinants of fluctuations differ across two groups of countries. In addition, results show that in the last two decades fluctuations in emerging market economies have started to be more dependent on the fluctuations in developed countries.

Keywords: Business cycles, autoregressive distributed lag (ARDL) method, panel data, common correlated effects panel mean group method, emerging market economies

ÖZ

YÜKSELEN PİYASA EKONOMİLERİNDE İŞ ÇEVRİMLERİ

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Son zamanlara kadar, yükselen piyasa ekonomilerinde yüksek büyüme oranları gözlenmiştir. Ancak, bu olumlu ekonomik koşulların iç reformlara mı yoksa olumlu dışsal etkenlere mi bağlı olduğu henüz çözümlenmemiştir. Bu bağlamda, bu çalışmanın temel amacı yükselen piyasa ekonomileri iş çevrimlerinin yapısı ve kaynaklarını araştırmak ve gelişmiş ülke çevrimleri ile nasıl farklılık gösterdiğini belirlemektir. İş çevrimleri üzerinde içsel ve dışsal etkenlerin rolü sadece geleneksel panel veri tahmin yöntemleri ile değil, ayrıca Pesaran (2006) tarafından geliştirilen karma ortalama grup tahmin yöntemi uygulanarak da incelenmiştir. Ayrıca, yükselen piyasa ekonomileri iş çevrimlerinin gelişmiş ülke iş çevrimlerine yakınsaması faktör analizi yöntemi kullanılarak araştırılmıştır. Sonuçlar, küresel etkenlerin hem yükselen piyasa ekonomileri hem de gelişmiş ülke iş çevrimlerinin ana etkeni olduğunu göstermektedir. Ancak, iş çevrimlerinin içsel etkenleri iki ülke grubunda değişmektedir. Diğer taraftan, son iki on yıl içinde yükselen piyasa ekonomilerindeki dalgalanmaların gelişmiş ülke dalgalanmalarına yakınsadığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: İş çevrimleri, oto-regresif dağıtılmış gecikmekler modeli (ARDL), panel veri, karma ortalama grup tahmini, yükselen piyasa ekonomileri

To Duygu and Musa Erdem, and to Utku

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CHAPTER 1
INTRODUCTION

Business cycles are defined simply as the deviations of key macroeconomic variables around their long run path. It has been one of the major research areas in macroeconomics to understand and to explain business cycles. Understanding the structure and the sources of business cycles and developing optimal stabilization policies to surmount them is one of the most important problems in macroeconomics. Classical business cycles studies focus mainly on how to determining turning points, identifying recessions and expansions and analyzing co-movements of macroeconomic series and business cycles[1]. On the other hand, modern business cycles studies are based on computing and deriving cycle components from long run trend by using macro-econometric techniques[2].

As econometric methodology to investigate business cycles advances and world economies become more integrated, business cycle studies have begun to focus more on the sources of business cycle diversifications and synchronizations in both emerging market economies (EMEs) and developed countries[3]. In this regard, bunch of studies aim to explain different underlying patterns of business cycles in EMEs in order to develop optimal policies to stabilize macroeconomic fluctuations in these countries. Studies considering both macro econometric tools and general equilibrium models provide deeper understanding of the mechanism of business cycles across these two groups of countries. Yet, it is not possible to provide a full explanation of the diversity of business cycles in EMEs and in developed countries.

Documenting the stylized facts of macroeconomic fluctuations in EMEs is the first step in analyzing the pattern of business cycles in these economies. First of all, EMEs are characterized by their highly volatile output fluctuations compared to developed countries due to the fact that these economies have experienced tremendous financial crises on one hand and rapid growth rates on the other during last three decades. Other stylized facts on business cycles of EMEs mainly are, as

[1] Classical cycles are developed by the work of Burns and Mitchell (1946).

[2] Such as Hodrick and Prescott ((1997) and Baxter and King (1999).

[3] For instance, Aguiar and Gopinath (2007a), Neumeyer and Perri (2005), Izquierdo *et. al.* (2008), Calderon and Fuentes (2010). See Chapter 2 for the review of literature.

Calderon and Fuentes (2010) discussed briefly, as follows: (i) Consumption is more volatile than output. (ii) Net exports are strongly countercyclical with output. (iii) Real interest rates are highly volatile, countercyclical and lead the cycle. (iv) Remarkable differences in duration and amplitudes of cycles across EMEs and developed countries. Based on these stylized facts, researchers mainly focus on two topics considering business cycles in EMEs. First group of studies aim to understand the structure of business cycles in EMEs by examining the driving factors of fluctuations. Meanwhile, the second group investigates whether or not macroeconomic fluctuations in EMEs converge to the fluctuations in developed countries, in other words, it analyses synchronization of business cycles.

The major factors driving business cycles have been seen as country specific factors including not only macroeconomic fundamentals but also institutional structures such as weak institutions and political instability. The recent studies on business cycles, on the other hand, have also focused on the role of external factors such as external demand shocks, commodity price shocks, and global financial conditions. Identifying impacts of external and domestic sources of macroeconomic fluctuations is fundamental for macroeconomists to develop better stabilization policies and to make the economy more strong against these unfavorable external shocks. Recently, most EMEs have achieved higher growth rates and lower inflation rates for the last decade. It is controversial whether this good economic environment is the result of domestic reforms or favorable external factors[4]. Calvo *et al.*'s (1993) seminal paper draw attention to the role of external factors on economic performance of EMEs within the context of international capital flows. Besides, there are other noteworthy studies that point out the role of external factors in business cycles for EMEs such as Kim (2001), Lane (2003), Mackowiak (2007), Izquierdo, Romero and Talvi (2008) etc[5].

The other strand of studies focus on synchronization of business cycles in EMEs and in developed countries. In the literature, there are two main views on synchronization of business cycles. First one is so-called "coupling" hypothesis which states that as a result of globalization, increased trade and financial linkages, free capital mobility, and floating exchange rate regimes, it is expected to experience an increase in synchronization of business cycles between EMEs and developed

[4] Until to recent global financial crises in 2008 and in August 2011.

[5] Detailed information on this kind of studies is given in Chapter 2.

countries. On the other hand, there is “decoupling” hypothesis on business cycles. As Kose, Ortok and Prasad (2008) point out EMEs have become important actors in the global economy especially China and India. These countries have been affected marginally by the recent financial crisis in 2008. In addition, increased financial linkages lead to portfolio diversifications which dampen the negative financial shocks. Finally, increased trade linkages may cause regional specializations thus business cycle fluctuations may diverge due to industry specific shocks. These three aspects supports decoupling hypothesis that business cycles of EMEs move independently from business cycles in developed countries.

In this framework, the main aim of this study is to investigate the structure and sources of business cycles in EMEs and to determine how these cycles differ than those in developed countries. To that end, driving factors of business cycles will be investigated first, focusing on the role of external factors. Afterwards, coupling and decoupling hypotheses is planned to be examined in the context of globalization and increased financial linkages. Clarifying these questions will enable policy makers to develop more effective macroeconomic and microeconomic policies to reduce the vulnerability of EMEs against unfavorable external factors and thus to help prevent crises.

We aim to contribute to the business cycles literature in several aspects. Firstly, the role of external and domestic factors on business cycles are analyzed by applying not only the conventional panel data estimations but also common correlated effects panel mean group method, introduced by Pesaran (2006), which incorporates heterogeneity to the model by allowing country-specific coefficients while accounting for the effects of common global shocks. We estimate also the long-run and short-run impacts of the driving factors employing panel autoregressive distributed lag procedures. We also check robustness of our results to a potential simultaneity and thus endogeneity by considering generalized methods of moments methods for dynamic panels developed by Arelleno and Bond (1991).

This study considers the impact of not only U.S. but also Chinese cycles on the evolution of business cycles of EMEs and of developed countries since Chinese economy has became an important actor in the global economy recently. The literature often maintains that business cycles are invariant to the prevailing exchange rate regimes. In this context, we also take into account the impact of exchange rate regimes on both determinants and synchronization of business cycles.

The choice of an exchange rate regime is a crucially important research and policy topic in international macroeconomics. It is often argued that floating exchange rate regimes act as buffers by absorbing adverse foreign shocks by allowing exchange rates to adjust. Successful fixed exchange rate regimes, on the other hand, often advocated as providing economic stability and decreasing uncertainty by imposing policy discipline.

In the second part of the study, we investigate the coupling and decoupling hypotheses of business cycles. To this end, we estimate common factors driving business cycles by employing factor analysis. Although, increased financial integration since mid 1980s is often maintained as one the main causes of synchronized business cycles, the empirical literature is yet to explicitly take into account this issue. It is believed that well-functioned financial markets foster efficient resource allocation and faster long run growth[6]. However, there are studies that discuss financial integration may hurt growth since increased financial linkages make EMEs more vulnerable to external shocks which may deteriorates economic performance (Obstfeld, 2009). In this context, we investigate whether business cycles synchronization differs with the degree of financial integration.

The plan of this study is as follows. In Chapter 2, literature on business cycles studies is reviewed in two parts such as in section 2.1 studies that examine driving sources of business cycles and in section 2.2 studies that discuss coupling and decoupling hypotheses of business cycles are presented. Chapter 3 documents stylized facts of business cycles in EMEs to demonstrate the big picture of the diversity between business cycles of EMEs and developed countries.

In the Chapter 4, it is aimed to identify driving factors of business cycles both in EMEs and developed countries by using quarterly data. Impacts of domestic[7] and external factors[8] are estimated by using panel autoregressive distributed lag (ARDL) model. Panel ARDL model is preferred since it enables to analyze empirically the long run relationship with short run dynamics among the variables of interest when it is not known with certainty whether variables of interest are stationary (I(0)) and

[6] Frankel and Rose (1998), Kose et. al (2003b) and Imbs (2006)

[7] Real Exchange rate, real interest rate, change in net foreign assets, terms of trade.

[8] VIX index and U.S. business cycles.

non-stationary (I(1)) or mutually cointegrated[9]. Business cycles are proxied by Hodrick-Prescott filtered GDP which is presumed to be stationary I(0). The results by Aguiar and Gopinath (2007a), on the other hand, suggest that, in the EMEs case "the cycle is the trend" as that EMEs are subject to substantial volatility to trend growth. Consequently, the cycles in EMEs might be more persistent. Consistent with this argument, unit root tests for individual EMEs tend to suggest non-stationarity albeit panel unit root tests for the whole sample suggest the reverse. This does not preclude the use of ARDL as the procedure allows the inclusion of both I(1) and I(0) variables. Based on panel ARDL procedure, long run and short run impacts of both domestic and external factors are estimated.

After that, Pesaran's (2006) common correlated effects pooled estimator is implemented in section 4.2 since this new approach gives consistent and asymptotically normal parameter estimates with the presence of cross sections dependence. Controlling cross section dependence is crucial while studying countries as cross sections because omitted common effects, spatial spillover effects, interactions within socioeconomic networks, integrated financial and trade linkages cause cross section dependence which should be taken into account in modeling. Next, as a robustness check of the results against a potential simultaneity and thus endogeneity problem, generalized methods of moments for dynamic panels developed by Arelleno and Bond (1991) is considered in section 4.3. In section 4.4, the role of Chinese business cycles on the business cycles both in EMEs and developed countries is analyzed. As Chinese economy has started to play a crucial role in the global economy the question of how the Chinese economy influences the economic performance of other countries have been raised. Therefore, Chinese business cycles is included in the model as another external factor.

In section 4.5, we ask the question if determinants of business cycles differ with different choice of exchange rate regimes. In the literature, the linkage between economic performance and the choice of exchange rate regime is ambiguous. In one hand, it is discussed that floating exchange rate regime promotes economic growth since it acts as a shock absorbers[10]. On the other hand, fixed exchange rate regimes

[9] Pesaran *et. al.* (2001) show that ARDL model provides consistent estimates for the long run coefficients that are asymptotically normal regardless of the order of integration of the variable of interest.

[10] Levy-Yeyati and Sturzenner (2003), Edwards and Levy-Yeyati (2005) and Reinhart and Rogoff (2004).

might provide policy confidence and foster investment[11]. Thus, to have a contribution in this debate determinants of business cycles are analyzed under different exchange rate regimes in this part.

After investigating the roles of domestic and external factors on the evolution of business cycles, in Chapter 5, it is aimed to provide empirical evidence on co-movements of business cycles of EMEs and developed countries over time. During the past three decades, financial and trade linkages have become stronger among EMEs and developed countries. This new landscape raise the question whether business cycles synchronization have increased such that the large body of studies tries to answer this question. Thus, we try to acquire better understanding of the effects of globalization on business cycles synchronization in Chapter 5.

The business cycles synchronization analysis in this study is based on static factor analysis by using balanced annual data. To analyze the co-movement between business cycles of different groups of countries factor analysis is preferred because it enables to identify unobserved common elements from covariance of observable macroeconomic time series; in this case output cycles of countries. By using identified common factors, the linkage between business cycles and common factors is analyzed over two periods such as first phase of globalization (1970-1990) and second phase of globalization period (1990-2009) to see whether business cycles of different group of countries become more dependent to the cycles of other group of countries. In addition, we contribute to the research on business cycle synchronization by considering different exchange rate regimes and different degrees of financial integration in section 5.1.2 and 5.1.3, respectively to see underlying sources of synchronization of cycles. Furthermore, as robustness check of the results, the interaction of business cycles and common factors is examined by rolling window estimation in section 5.2. Finally, the last chapter concludes the study.

[11] Artis and Zhang (1999).

CHAPTER 2
REVIEW OF LITERATURE

2.1. DRIVING SOURCES OF BUSINESS CYCLES

Business cycles are defined as the short-run macroeconomic fluctuations around the long run path. The fluctuations with peaks are named as expansions and the fluctuations with deep troughs are called contractions. The early studies on business cycles focus on the measurement of fluctuations[1]. Burns and Mitchell's (1946) study is the preliminary study of traditional business cycles which has provided basis for National Bureau of Economics Research's Business Cycles Dating Committee for U.S. They define business cycles as follows:

> "Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycle vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitude of approximately their own". (Burns and Mitchell, 1946:3)

Unlike the early studies of business cycles, the recent studies are mainly dominated by the "real business cycles" (RBC) modeling which was introduced in the seminal study of Kydland and Prescott (1982). This is considered as a milestone for the business cycles studies. RBC theory uses real shocks, especially technology shocks to explain both growth and business cycles. They provide three new revolutionary ideas on business cycles. First, their study suggests that business cycles can be studied by using dynamic stochastic general equilibrium models. Secondly, their study shows that it is possible to integrate business cycles and growth theory which were viewed as separate and unrelated. And last, they also suggest using calibrated models to generate artificial data and to compare them with the actual data (Rebelo, 2005).

[1] Juglar (1862), Schumpeter (1939), Kuznet (1940).

Understanding the structure of business cycles and their sources is one of the most important problems in macro economy that should be enlightened to develop optimal stabilization policies. Debates concerning the causes of expansions and recessions in business cycles do not completely come to a conclusion. To figure out if fluctuations are dominated by external factors or by domestic factors and how these shocks affect the macroeconomic patterns, and to identify transmission mechanisms of these shocks across countries are challenging problems.

There are many driving factors of business cycles, which have been studied for many years, such as total factor productivity shocks, fiscal and monetary shocks, oil price shocks, terms of trade shocks, shocks to preferences, news, etc. In addition, various domestic and external conditions affect these forces. Thus, understanding the role of these factors is important to identify the channels through which driving factors affect business cycles (Crucini *et al.*, 2011). Moreover, to understand the role of domestic and external conditions in business cycle fluctuations is important for developing optimal stabilization policies, especially for emerging market economies (EMEs).

During the five years prior to recent financial crisis in 2008, it had been good times for EMEs with higher growth rate[2]. However, it has been discussed in the literature that whether this good economic environment depends on external factors such as good economic conditions in the rest of the world, strong world growth rate, high commodity prices and more financially integrated countries or whether this good economic environment is a result of improved conditions and strong policies at EMEs[3]. Understanding this argument is crucial in the sense of recent unfavorable developments in world financial markets we have experienced since July 2007. If macroeconomic performances of EMEs are largely dependent on the external factors, a bust period in EMEs for the forthcoming periods should be anticipated.

Moreover, the role of EMEs in the world economy has become important in the last two decades as a result of the increased trade and financial linkages between countries. It has been argued widely in the literature that financial openness and increased trade linkages make economies more vulnerable to external and global

[2] According to IMF, World Economic Outlook Database (2011), the average growth rate of EME and developing economies is 7.6% over the period 2003-2007 whereas average G-7 growth rate is 2.4%.

[3] All That Glitters May not be Gold: Assessing Latin America's Recent Macroeconomic Performance by Izquierdo and Talvi, Research Department , Inter-American Development Bank, April 2008.

shocks. On the other hand, strong growth performance of EMEs in recent years, now accounting for about a quarter of world output, indicates that these countries seem to have been affected little by the current global economic crisis[4]. Kose, Otrok and Prasad (2008) point out that EMEs, specifically China and India, are affected from the global economic slowdown slightly which leads to a question about the international linkages of business cycles. And, some researchers believe that business cycles dynamics in EMEs are no longer tightly linked to business cycles in industrialized countries.

These two views attract attention for the study of international business cycles and the examination of different patterns of business cycles in EMEs and in industrialized countries more deeply. The theories behind these two views are that, firstly, increased financial linkages could lead to higher business cycles co-movement by external factors and wealth effects but also, that these linkages could cause lower business cycles co-movement by specialized production. Secondly, trade linkages could generate both demand and supply side spillover effects across countries thus causing higher business cycles convergence. However, trade linkages could also increase specialized production so they could cause decline in convergence of business cycles (Kose, Otrok and Prasad (2008), Baxter and Kouparitsas (2005)).

Based on increased trade and stronger financial linkages, it has been expected that current global economic crisis and international spillover effects make changes in the patterns of international business cycle fluctuations. Therefore, identifying impacts of external and domestic sources of macroeconomic fluctuations is fundamental for macroeconomists to develop better stabilization policies and to make the economy stronger against the unfavorable external shocks. In this chapter, previous studies that discuss external and domestic sources of business cycle fluctuations are reviewed.

2.1.1. Studies Based on Macro-Econometric Methods

One of the preliminary studies that examine the role of external factors on EMEs is Calvo *et al.*'s (1993) study. Although, Calvo *et al.* (1993) focused on the

[4] In 2008 and 2009, the average growth rate of advanced economies is -0.2 percent and 2.2 percent respectively; and for the EME the average growth rate is 6.1 percent and 2.7 percent respectively (IMF, World Economic Outlook Database, April 2011).

role of external factors within the context of capital inflows and real exchange rates in Latin American countries, their study is important as a demonstration of the importance of external factors on economic performance of EMEs. They discuss that despite the wide differences in macroeconomic policies in Latin America, capital flows to the region increased, economic performance of the countries became stronger, the real exchange rate appreciated, accumulation of international reserves had grown and stock and real estate markets experienced a boom. An important part of these developments is due to economic and political reforms going on in these countries to restructure their external debts. However, according to Calvo *et al*. (1993), although domestic reforms are necessary for reviving capital flows and stronger economic performance, domestic reforms alone cannot explain why capital sometimes flowed to these countries and sometimes it did not. They argue that the impact of external factors on renewal of capital flows to Latin America should be considered and point out that external shock is common for the region. Falling interest rates, a continuing recession and balance of payments developments in the U.S.A. had encouraged investors to shift their investments to EMEs. Therefore, economic developments outside the EMEs help to explain economic fluctuations in these countries.

Calvo *et al.* (1993) explain the impact of capital flows on Latin American economies in four aspects: (i) increase in capital flows allow domestic agents to smooth their consumption over time and investors react to expected changes in profitability (ii) capital flows cause appreciation of real exchange rate; (iii) they have impact on domestic policies since central banks aiming for appreciation of real exchange rate, they intervene to the markets and purchase part of the flow from the private sector and (iv) they can provide important signals for global financial markets. Increase in capital flows can be interpreted as more favorable investment opportunities in the receiving countries.

Based on these aspects of capital inflows, Calvo *et al.* (1993) study the macroeconomic indicators of ten Latin American countries over the period 1973 to 1991 in the framework of external factors. First, they present stylized facts on capital inflows, real exchange rate, rates of return differentials and on other macroeconomic indicators of the Latin American economies. According to their study, there is a little co-movement in domestic interest rates and in spreads across the countries. And, countries that have highest return rate, have the greatest volatility of the returns and

in these countries, rate of inflation decreased, real GDP increased, fiscal deficits and external debt declined.

The external factors that are discussed by Calvo *et al.* (1993) are (i) sharp drop in U.S. short term interest rates, (ii) continuing recession in the U.S. and in other developed countries, (iii) continued decline in Latin American terms of trade which reflects the decrease in petroleum and other commodities prices, (iv) sharp swings in the private capital account of the U.S. balance of payments in the form of increased outflows, (v) important changes in regulations in the capital markets of developed countries. In the second part, they analyze the role of external factors on capital flows empirically. They used the monthly data for these ten Latin American countries over the period January 1988 to December 1991. They first examine the co-movements of official reserves and real exchange rates as a proxy for capital flows by using principal components method. It is concluded that the extent of co-movement in reserves during the capital inflow period is considerable. Also, the degree of co-movement of the real exchange rate had increased during that period as well. Thus, the results of principal component analysis indicate that effects of external shock common to this region have increased.

Second, they study the effects of external factors by using VAR estimation. They include first and second principal components of the observed time series of U.S. that affect Latin American countries in the model as external factors[5]. And, they consider logs of reserves and real exchange rate in the model as proxy of capital inflows. From the estimation results and impulse response analysis, it is concluded that external factors have 50 percent share of the behavior of capital flows to these countries, thus it is concluded that external factors have played a reasonable role in recent economic condition in Latin America. Their main point is that external factors deteriorate as easily as they had improved the economic performance in Latin America[6]. They suggest that policy makers should consider the role of external

[5] First and second principal components of U.S treasury bill rates, certificate of deposit rate, commercial paper rate, treasury long bond rates, one-month capital gain in S&P 500, 12-month capital gain in S&P 500, one-month capital gain in real estate, 12-month capital gain in real estate and deviations from trend in real disposable income.

[6] Calvo and Talvi (2006) also point out that extraordinary improvement in macroeconomic fundamentals in EME might be due to high world economic growth, ample private financing and high commodity prices. Thus, this argument leads to the question that if external conditions worsen, how EME are affected?

factors and develop policies to make the economy less vulnerable to negative external shocks.

Kim (2001) studies the international transmission of U.S. monetary policy shocks to non U.S. G-6 countries during the flexible exchange rate regime. He aims to answer the questions if monetary expansion in the U.S. leads to recessions or booms in other countries and if monetary expansion improve or worsen the trade balance of these countries. He provides empirical evidence for the impact of U.S. monetary policy shocks on primary variables such as trade balance and foreign output and on related variables such as interest rates, terms of trade etc. According to Kim (2001), the empirical evidence on primary variables can help to develop optimal policies since if a monetary expansion leads to an improved trade balance, then a country with trade deficits may use a monetary expansion to improve it. Furthermore, evidence on related variables can help to construct correct model for international policy analyses.

Kim (2001) focused on the two main consequences of international transmission: the effects on the trade balance and the effects on the foreign output. He states that theoretical models such as Mundell-Flemming-Dornbusch model and the sticky price intertemporal models have different perspectives for the effects of the international monetary transmission mechanisms. For the effects of international transmission on trade balance, the basic Mundell-Flemming-Dornbusch model suggests that a monetary expansion leads to terms of trade deterioration or real exchange rate depreciation, which improves trade balance[7]. However, monetary expansion leads to an increase in domestic income and that causes to increase in domestic import demand which may worsen the trade balance[8]. On the other hand, the intertemporal model based on forward looking intertemporal decisions that a monetary expansion increases income level so that the current account may improve due to consumption smoothing behavior of economic agents. However, if investments increase due to a fall of the real interest rate, current account may get worse. For the effects of international transmission on foreign output, Mundell-Flemming-Dornbusch model predicts that domestic monetary expansion worsens the

[7] Expenditure-switching effect.

[8] Income-absorption effect.

trade balance through expenditure-switching effect and a decrease in foreign output[9]. However, foreign output may increase if foreign trade balance improves due to income-absorption effect. Moreover, according to intertemporal model foreign output may decrease due to expenditure-switching effect. On the other hand, fall in world real interest rate may increase world aggregate demand for current goods and that may increase foreign output as well. Thus, it is aimed to study which theory is supported with the empirical evidence.

A VAR model is estimated over the flexible exchange rate period 1974-1996. It is assumed that real GDP, the implicit price deflator and the commodity price are exogenous to the monetary policy instruments. Kim (2001) examines the effect of U.S. monetary policy shocks by considering both contemporaneous effect of policy and non-contemporaneous effect of policy. The impulse-response analyses indicate that monetary policy expansion worsens trade balance within a year. Also, monetary policy expansion leads to exchange rate depreciation while terms of trade does not increase on impact but becomes positive within 6 months. In general, these results support Mundell-Flemming-Dornbusch model. Kim (2001) claims that in the short run income-absorption effect and in the long run expenditure-switching effect are observed. Moreover, it is concluded that consumption, investment and savings increase but real interest rate decreases by monetary expansion. In the light of these findings, Kim (2001) states that the basic intertemporal model without investment / production opportunity cannot fully explain the short run current account dynamics.

Secondly, effects of monetary policy shocks on foreign output are examined. Monetary expansion in U.S. leads to increase in real GDP and industrial production of other countries. The transmission mechanisms for the positive spillover effects to non-U.S. countries are investigated. Trade balance is examined firstly as a transmission mechanism which is suggested by Mundell-Flemming-Dornbusch model. However, findings indicate that trade balance is not affected by monetary policy shock of U.S. Thus, Mundell-Flemming-Dornbusch model could not be supported for this case. According to intertemporal model, exports and imports may increase substantially but trade balance does not change depended on fall of real interest rate. It is concluded that due to a drop in the non-U.S. real interest rate causes to an increase in consumption and investment and in exports and imports. This

[9] Begger-thy-neighbor policy.

finding is consistent with intertemporal model. Consequently, drop in world real interest rate following a monetary expansion seems to be a major transmission mechanism for positive spillover effect on foreign output.

The main conclusion of Kim's (2001) study is that U.S. monetary expansion has a positive spillover effect on output of non-U.S. G-6 countries. A monetary expansion of U.S. decreases the world interest rate and increases world aggregate demand thus leads to increase in foreign output. Another finding of the study is that a U.S. monetary expansion worsens trade balance in the short run but improves persistently in the long run. In addition, Kim (2001) points out that the results of the empirical work do not support the Mundell-Flemming-Dornbusch model or the basic intertemporal models completely.

Lane's (2003) study documents stylized facts of business cycles in both developing and developed countries and discusses policy implications of the cyclical links. He takes attention to the different behaviors of business cycles in EMEs and in industrial countries. He states that a slowdown can be observed both in EMEs and in industrial countries; EMEs have some more additional experiences which cannot be observed in industrial countries such as risks of full-blown crises, contagion, time-varying external credit constraints, the currency denomination of liabilities and underdeveloped financial markets. In his study, Lane (2003) analyzes the interaction of business cycles and macroeconomic policies in EMEs. He also examines problems of monetary, fiscal and exchange rate policies of these economies. His point of origin is that cyclical fluctuations in EMEs are more persistent and larger than in developed economies, thus stabilization policies for EMEs are costly. According to Lane (2003), EMEs are more vulnerable and they are not good at smoothing the impact of fluctuations.

Lane (2003) firstly provides some key stylized facts of the cyclical performance of a sample of 42 countries grouped by industrial, East Asian, Latin American and Caribbean countries. He examines the determinants of output and consumption volatility across countries by considering GDP per capita, population, exports and imports ratio over output, volatility of terms of trade, ratio of private credit to GDP and net foreign asset position. It is concluded that, opposite to expectations, trade openness reduces output volatility. And, it is also observed that terms of trade volatility contribute to the output volatility but there is no relation between volatility and domestic financial depth or the net foreign assets. He also runs

a panel regression to explore the cyclical co-movements of key macroeconomic variables with output by considering the difference between the groups of countries. He provides evidence that savings rate is procyclical for all groups of countries but it is more procyclical for developed countries. In addition, current account surplus is counter cyclical for all groups. However, fiscal surplus is procyclical for industrialized and East Asian countries; it is countercyclical for Latin American and Caribbean countries. Finally, he shows that real exchange rate is acyclical for industrial countries but strongly procyclical for EMEs[10]. With this brief empirical analysis he points out that business cycles in EMEs is structurally different than the business cycles in industrialized countries.

Secondly, Lane (2003) discussed domestic and external factors that contribute to procyclical pressures on macroeconomic policies in EMEs. In the framework of exchange rate and monetary policies, he states that to understand the business cycles in EMEs, the presence of substantial foreign currency debt and credit market frictions in these countries should be considered. He pointed out that although domestic monetary reforms improve stabilization, external shocks such as changes in commodity prices, the high yield spread in corporate debt markets, etc., have also significant role on economic performance for EMEs. According to Lane (2003) it should be possible to design contingent claim securities, well regulated banking sector, monetary independence, inflation targeting and independent fiscal policy council to protect EMEs better from external disturbances.

Ahmed (2003) studies the sources of economic fluctuations in six Latin American countries and focuses on whether the economic fluctuations in these countries are driven mainly by external shocks or by domestic shocks. The primary goal of this study is to examine implications of the results for the choice of exchange rate regimes in developing countries. He discusses three questions: (i) Are the business cycles of these six countries related to those of their trading partners? (ii) What are the main causes of the recessions in these countries? And do these causes have external or domestic origin? (iii) Do real exchange rate movements have important role in supporting economy against external or domestic shocks?

[10] Procyclical real exchange rate with output means real appreciations occur in good times and depreciations in bad times. Countercyclical real exchange rate means depreciations occur in good times and appreciations in bad times. Acyclical real exchange rate means it is not related to the business cycles.

In Ahmed's (2003) study, a panel VAR model is estimated for Argentina, Brazil, Chile, Colombia, Mexico and Venezuela over the period of 1989-1999. The variables that are involved in the model are terms of trade, foreign output and U.S. real interest rate as external variables and real exchange rate, output and price level as domestic variables. First, findings of the estimation are interpreted in order to examine if business cycles in these six Latin American countries are related with the cycles in their trading partners in such a way that the monetary policy in these trading partners would be the right policy for these Latin American countries. It is found that a positive shock to a foreign output does not have much effect on domestic output. Moreover, domestic output falls in response to a positive shock to the U.S. real interest rate which means that tighter monetary policy in U.S. leads to a decrease in capital flows and in output. And the variance decomposition findings indicate that U.S. real interest rates explain a statistically significant 11 percent of domestic output growth. To sum up, it can be concluded that Latin American business cycles are not driven by output shocks from their trading partners but U.S. real interest rate changes have a significant impact on business cycles of these countries. According to Ahmed (2003) results suggest that these six Latin American countries are unlikely to form an optimal currency area with the U.S.

Secondly, Ahmed (2003) searches if recessions in Latin America are mainly caused by external shocks or by domestic shocks. When impacts of external shocks are discussed totally, it has been seen that external shocks explain at most about fifth of the domestic output fluctuations, which is not a very high proportion. On the other hand, domestic shocks as a group explain about 95 percent of the domestic output fluctuations. Increase in real exchange rate causes an increase in domestic output, which implies that devaluations have a contractionary impact on domestic output. Moreover, domestic output fluctuations are explained by their own shocks with a large fraction. To sum up, results imply that although external factors have significant impact on domestic output fluctuations, they have a smaller share in the explanation of the variation in domestic output.

Thirdly, Ahmed (2003) examines if real exchange rate movements in these six Latin American countries have been important in promoting appropriate adjustments of the economy to external and domestic shocks. To answer this question, responses of real exchange rate to external shocks are studied. A positive foreign output shock and a rise in U.S. real interest rate lead to depreciation of the

currency, while a positive terms of trade shock leads to appreciation of the currency. Ahmed (2003) points out that in order for exchange rate changes to promote appropriate adjustment of the economy to various shocks, not only real exchange rate need to depreciate in response to adverse external shocks, but also real exchange rate depreciation needs to improve external balances which means having an expansionary impact on domestic output.

Ahmed's (2003) study provides mixed results but it can be concluded that external factors have a limited impact on Latin American business cycles. He claims that the absence of common business cycles suggests that rigidity in exchange rate arrangements is not an appropriate policy. However, Ahmed (2003) emphasizes that the sample period covers a mix of exchange rate regimes so that findings must be discussed considering different regimes. And, the set of external variables is limited so that there could be omitted variables problem in the estimation.

Kaminsky *et al.* (2005) analyze the cyclical properties of capital flows and fiscal and monetary policies of developing and developed countries. In their study they present some stylized facts of business cycles for both developed and developing countries. They state stylized facts as the following for sample of 104 countries over the period of 1960–2003;

- Net capital inflows are procyclical with output in most of the developed and developing countries[11], while for developing countries it is/they are more strongly procyclical,
- Developing countries have procyclical fiscal policy, while developed countries have either countercyclical or acyclical fiscal policy[12],
- Most of the developed countries have countercyclical monetary policy while developing countries have procyclical or acyclical monetary policy[13],

[11] Capital flows are countercyclical when economy borrows from abroad in bad times and lends in good times, procyclical when economy lends in bad times and borrows in good times and acyclical when international borrowing and lending are not related to the business cycles.

[12] Procyclical fiscal policy means higher (lower) government spending and lower (higher) tax rates in good (bad) times (fiscal policy is expansionary in good times and contractionary in bad times). Countercyclical fiscal policy means lower (higher) government spending and higher (lower) tax rates in good (bad) times (fiscal policy is contractionary in good times and expansionary in bad times). Acyclical fiscal policy means constant government

[13] Monetary policy is countercyclial when the interest rate is raised in good times and reduced in bad times; procyclical when the interest rate is reduced in good times and raised in bad times; acyclical when the interest rate does not change systematically over the business cycles.

- In developing countries the capital flow cycle and macroeconomic policy cycle reinforce each other[14].

Kaminsky, *et al.* (2005) examine business cycles properties according to good and bad times of the economies. They consider international credit ratings as an indicator of capital market access and they present behavior of these ratings. According to their results, there is no significant difference between good and bad times for wealthy OECD countries and low income countries. However, in middle income countries, which are defined as EMEs in their study, ratings are procyclical with output. Their main findings indicate that macroeconomic policies in developed countries stabilize the business cycles, while macroeconomic policies in developing countries reinforce the business cycles. In short, according to their description "when it rains it pours" in developing countries. Kaminsky *et al.* (2005) state that reasons of this phenomenon are political distortions, weak institutions and capital market imperfections in EMEs[15].

Mackowiak (2007) presents an empirical evidence for the impact of external shocks, especially U.S. monetary policy shocks, on macroeconomic fluctuations in EMEs. He aims to answer a few questions on the impact of U.S. monetary policy shocks such as how U.S. monetary policy shocks affect business cycles in EMEs, if U.S. monetary policy shocks are more effective than U.S. economy itself, if U.S. monetary policy shocks are transmitted quickly or slowly, etc. He estimates a structural VAR model for each eight of EMEs (Hong Kong, Korea, Malaysia, Philippines, Singapore, Thailand, Chile and Mexico) considering main macroeconomic variables both in EMEs and in US and world commodity prices. In the model it is assumed that an emerging market is a small open economy with block exogeneity restrictions. To test the external shocks on EMEs, Mackowiak (2007) used the Federal Funds Rate, a measure of world commodity prices, a measure of the U.S. money stock, a measure of U.S. real aggregate output and a measure of the U.S. aggregate price level as external variables in addition to short term interest rate, the

[14] Macroeconomic policies are expansionary when capital is flowing in and contractionary when capital is flowing out. In other words, there is a significant positive correlation between capital flows and government spending cycles; significant negative correlation between capital flows and inflation tax cycles; negative significant correlation between capital flows and nominal lending rate cycles in developing countries.

[15] According to Gopinath (2007) business cycles should be considered very differently in EME. She states that in these economies the trend is highly volatile and dominates the transitory shocks. Thus, according to Gopinath (2007), knowing that features of emerging and developed economies are quite different, findings of Kaminsky's *et. al.* (2005) study becomes less puzzling.

exchange rate, a measure of aggregate real output and a measure of aggregate price level as domestic variables. The model is estimated over the period between January 1986 and December 2000.

The results of the study indicate that external shocks are important source of macroeconomic fluctuations in EMEs and also it is concluded that shocks of monetary policy in U.S. affect the short term interest rate and the exchange rate in these countries quickly and strongly. It is also tested if the results are robust and it is found that the results are robust across variables and across countries. Moreover, Mackowiak's (2007) study suggests that U.S. monetary shocks are not important in EMEs relative to other external shocks. However, the size of the spillover effects of U.S. monetary policy shocks on EMEs is significant. Mackowiak's (2007) study presents once more the importance of external factors for EMEs.

Izquierdo, Romero and Talvi (2008) follow the idea of Calvo *et al.* (1993) and examine the role of external factors on business cycles for the seven largest Latin American countries[16]. They call attention to the key concern in Calvo *et al.*'s (1993) study that external factors may deteriorate the economic performance at the region as easily as they may improve it. Besides, they mention that the decline in capital flows to the region, after the Tequila crisis in 1995 and the Russian crisis in 1998, had terrifying impacts on economic performance as stated in this study. Since 2002, capital flows to Latin America have increased significantly due to abundant international liquidity and the rise in commodity prices. Moreover, stronger economic performance of Asian countries, especially China, has lead to change in landscape for commodity and financial markets and increase in the demand for primary products. Thus, they have a fresh look at the study of Calvo *et al.* (1993) and aim to examine the discussion that although Latin American economies have been experiencing a new period of boom, what if a bust period next?. Findings of Izquierdo, Romero and Talvi (2008) support Calvo *et al.*'s (1993) argument that external factors play a key role in explaining business cycles in Latin American countries.

Different from the Calvo *et al.*'s (1993) study they analyze the impact of external factors on the behavior of output performance, not on the behavior of capital flows. The other difference in their work is the set of external factors. First, they

[16] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

consider emerging market bonds spreads to observe variations in the market price of risky assets. Second, they pay attention to the sharp movements in terms of trade. In 1990s, as Calvo *et al.* (1993) suggest, terms of trade in Latin America did not play a major role. But terms of trade has dropped 10 percent after 1997 Russian crisis, thus Izquierdo, Romero and Talvi (2008) include terms of trade into their analysis. They estimate a VECM to analyze output behavior rather than estimating a VAR model. Their empirical framework enables them to emphasize the relevance of incorporating external factors into policy evaluation in Latin America. Thus, they perform counterfactual exercises to see how output dynamics could be different from observed outcomes for the period of Russian crisis and the period of boom after 2002.

The empirical model in Izquierdo, Romero and Talvi's (2008) study includes Latin American GDP growth for seven largest Latin American countries[17] and for external variables: an index of average industrial production in G-7 countries as a proxy for external demand, an index of regional terms of trade, return on 10-year U.S. T-bonds and spread on high yield bonds over U.S. T-bonds[18] as proxies for international financial conditions. Their estimation results indicate that there is one cointegrating relation between GDP growth of seven Latin American countries and external factors. Increases in T-Bond rates and in high yield spread suggest a long run fall in Latin American GDP, while increase in terms of trade or in G-7 output performance lead to increase in Latin American GDP. They also conclude that external factors can explain 54 percent of the variance of GDP growth in seven Latin American countries. According to impulse response analysis of the estimation, responses of GDP growth to external factors other than the T-bonds rates are significant at 5 percent level. A positive shock to output in G-7 countries and terms of trade generate a positive response at Latin American GDP growth rate, as expected. And, an increase in high-yield spreads and in U.S. T-Bond rates create a fall in the Latin American GDP growth rate.

At the last part of their study, Izquierdo, Romero and Talvi (2008) use the estimated model to discuss the policies in Latin America in the framework of recent

[17] Simple average of GDP indices for Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

[18] A variable that is linked to emerging market bond spread (EMBI) but is more exogenous to Latin American GDP than EMBI (Izquierdo, Romero and Talvi, 2008).

economic performance and possible global financial turmoil. They compare in-sample forecasted GDP levels with observed GDP levels for the period of 2003-2006 since they want to see if the improvement in economic performance for Latin America is a result of the success of current domestic policies as policy makers interpret or as a result of favorable external conditions at that period. Their results indicate that observed GDP growth is higher than the normal growth rate as a result of favorable external conditions. They also examine what would happen to GDP performance at the period of Russian crisis in 1998 and if the substantial negative external conditions did not take place. It has been seen that GDP growth performance would be better if external conditions remained within the dynamics of the forecasts implied by the model from the perspective of 1997. These results show that external conditions can account for large and significant difference in growth performance.

As a second exercise, Izquierdo, Romero and Talvi (2008) searched for what will happen to the economic condition in Latin America if another crisis takes place such as debt crisis in 1980 or as Russian crisis in 1998. First, a shock is applied to high yield spreads as in the period of Russian crisis. It suggests that there would be sharp decline in GDP growth after the shock. Second, they consider the case that a global turmoil could have been a result of a shock to global demand, thus shocks are applied both to terms of trade and high-yield spreads. The response of these shocks is a substantial decline in the GDP growth rate of Latin America.

Izquierdo, Romero and Talvi's (2008) study supports the argument of Calvo *et al.* (1993) that external factors can dramatically change the economic fluctuations of EMEs. According to them, growth performance, strength or weakness of macroeconomic fundamentals and the impact of domestic macro and micro policies on growth can only be properly evaluated after filtering the effects of external factors. They also point out that favorable external conditions will be associated with high commodity prices, low interest rate spreads, strong growth performance, and improvement in fiscal position and decline in public debt levels. However, the actual levels of fiscal balances and public may be misleading as indicators of the fiscal stance. For a proper assessment of the fiscal position and the burden of public debt, cycles in external factors should be considered. Thus, considering structural fiscal balances and structural levels of public debt should be first priority of fiscal policy makers.

Another study that emphasize on the role of external factors on business cycles is Sosa's (2008) study. He examines the importance of external shocks as sources of business cycles fluctuations in Mexico. According to Sosa (2008), Mexico has achieved its own "great moderation" of business cycles after increased integration with global economy and implementation of consistent macroeconomic and fiscal policies since the Mexican crisis in 1994. He points out that increased integration with the global economy helps the growth in Mexico, but also makes the economy more sensitive to external shocks. Depending on these facts, Sosa (2008) aims to analyze how external shocks are important for Mexican business cycles, if shocks from U.S. play a key role as driving source of business cycles and the transmission mechanisms that these shocks pass through. Sosa (2008) claims studying impacts of external shocks on Mexican business cycles is needful due to recent slowdown in both U.S. and global economy. So, identification of the sources of business cycles helps to design better macroeconomic policies and to improve regional trade policies.

A VAR model with block exogeneity restrictions is used to identify sources of Mexican business cycles in Sosa's (2008) study. It is assumed that foreign variables are independent of domestic variables. The model consider two blocks: block of foreign variables including oil prices, world real interest rate, and U.S. demand for Mexican exports[19], and block of domestic variables including real output, real exchange rate, and capital inflows. The model is estimated by seemingly unrelated regressions due to block exogeneity restrictions. The findings of Sosa's (2008) study indicate that shocks to U.S. demand for Mexico's export is the leading source of Mexican business cycles in the post-NAFTA period Moreover, shocks on international financial conditions and shocks on U.S. economic activity have significant roles in explaining Mexican business cycles. Sosa (2008) also concludes that changes in U.S. output fluctuations are not only effective on Mexico's exports, roughly one-fourth of Mexican output, but also effective on Mexican service sector.

Secondly, Sosa (2008) estimates bivariate VAR model to determine what fraction of the output fluctuations in Mexico is explained by changes in corresponding U.S. variable and examines the synchronization between Mexican and U.S. economies. It is concluded that U.S. industrial production, GDP and total

[19] U.S. industrial production, U.S. real GDP and U.S. real imports and exports are used as proxies for U.S. demand for Mexican exports.

imports have a large share in explaining output fluctuations in Mexico and U.S. output variables appear to be more important than U.S. demand for Mexican business cycles.

Sosa (2008) also discussed the transmission channels of shocks from U.S. to Mexican economy. Other than trade channel, he has focused on three other channels: large flow of remittances from U.S. to Mexico, large flows of foreign direct investment, and large presence of U.S. and other international banks in the Mexican banking system. He points out that a deeper understanding of these spillover effects and potential channels of transmission shocks is necessary for future research.

Franken, Le Fort and Parrado (2005) analyze the response of Chilean business cycles to external shocks by estimating a VAR model with block exogeneity. They point out that Chilean economy as a small and increasingly open economy appears less volatile and more resilient to external shocks in last half of the century. However, Chilean business cycles have been always seen as highly dependent to the external conditions. Thus, Franken, Le Fort and Parrado (2005) focus on the sources of Chilean business cycles and they also examine capacity of Chilean economy to withstand external shocks.

Franken, Le Fort and Parrado (2005) investigate Chilean business cycle empirically over the period 1950-2003. Their data set involves an expanded set of external variables compared to other studies focused on external shocks. They classified their variables in five groups: external real variables[20], external financial variables[21], domestic policy variables[22], domestic financial variables[23], and output-real GDP as the main variable of interest. In this study, a VAR model is used with block exogeneity condition to capture the small economy feature in the dynamic responses. International variables, external demand conditions, foreign interest rates and uncertainty in international financial markets are exogenous to other variables but are related among each other. However, terms of trade variable is exception such that it is affected by other external variables but it does not affect them. By this

[20] They construct a variable from sectoral indices of World Merchandise Export volume as a proxy for the external demand and terms of trade as real external variables.

[21] They use average secondary market rate of the 3-Month Treasury bill minus the annual CPI inflation of U.S. as foreign real interest rate. And, they use foreign equity variable as a proxy for the uncertainty of international financial markets and net capital flows to Chile.

[22] They use the export and import shares of GDP, the real growth of money, the real growth of fiscal revenue and fiscal expenditure and the real exchange rate.

[23] They include domestic equity as domestic financial variable to capture business confidence.

methodology, they are able to measure importance of the external, policy and other domestic variables for business cycles and resilience of the Chilean economy over the last half of the century.

By impulse-response analysis, Franken, Le Fort and Parrado (2005) examine the responses of the economy to external shocks. Their findings indicate that a positive shock to external demand causes an increase in Chilean output with a lasting effect of about two years and it causes a negative impact on terms of trade and appreciation of real exchange rate. Rise in terms of trade leads to rise of Chilean domestic output with a lasting effect of five years. Franken, Le Fort and Parrado (2005) claim that a terms of trade shock can come from either a rise in exports prices or a fall in import prices, thus they estimate a model with copper and oil prices which are important for the Chilean economy. However it is seen that impact of shocks in copper and oil prices on Chilean business cycles are overstated and it is suggested that terms of trade shock is important as a composite of export and import prices. Moreover, a rise in foreign interest rates and a rise in volatility of world equities cause a fall in domestic output while a rise in capital flows leads to increase of domestic output as expected. Secondly, Franken, Le Fort and Parrado (2005) present the sources of business cycles by variance decomposition method. It is concluded that external shocks, especially foreign demand and foreign volatility, have an important role on explaining business cycles. In addition, they test the resilience of Chilean economy against external shocks and they compute the ratio of volatility of external shocks to the volatility of output gap as a measure of resilience. The findings indicate that resilience of the economy to external shocks improved after 1990.

According to Franken, Le Fort and Parrado (2005), after sharp fluctuations in Chilean business cycles over the last half of the century, Chilean economy appears less volatile and more resilient to external shocks. However, their main conclusion is that external shocks are the main source of business cycles in Chile; monetary and fiscal policy shocks have little role on Chilean business cycles. But also, they conclude that resilience of Chilean economy to external shocks increased despite of the increased synchronization of the domestic business cycles with international cycles during late nineties.

Boschi and Girardi (2011) examine how international and domestic economic factors affect business cycles of six Latin American countries[24] over the period between 1980 and 2003 and analyze the implications of the choice of exchange rate regime. They also analyze the business cycles of these Latin American countries by comparing them with three big economies; U.S., Japan and Euro Area. Besides, Boschi and Girardi (2011) examine the role of neighboring countries of six Latin American countries to study the prerequisites for the adoption of common currency area. They focus on geographical origin to identify the shocks to business cycles by using GVAR methodology and generalized forecast error variance decomposition analysis.

Boschi and Girardi's (2011) model involves GDP per capita, net foreign assets-GDP ratio, real exchange rates and short term interest rates) as domestic variables and foreign GDP, foreign real interest rates and oil prices as external variables. According to their findings, domestic factors are the main source of fluctuations in all six Latin American countries and regional factors are less important than domestic factors but more important than the shocks from developed economies[25]. Moreover, they conclude that the impact of factors of developed countries on proportion of the forecast error variance of output is limited for all six Latin American countries.

Boschi and Girardi's (2011) results show that impacts of shocks originating from neighboring countries and regions other than U.S. to Latin American countries, on macroeconomic fluctuations should not be undervalued. Other developed countries and neighboring countries have an important role on Latin American domestic economic conditions. Boschi and Girardi (2011) point out that assuming U.S. as main origin country of external shocks is misleading, therefore they suggest that dollarization may not be an optimal option for Latin American countries and freely floating exchange rate regime is a reasonable option for these countries. Moreover, they state that investors should diversify their portfolios across continents since international risk sharing could be problematic at a regional level.

Crucini *et al.* (2011) try to answer the question of what the driving factors of international business cycles are. They analyze the driving factors of business cycles within and across the G-7 countries for the period of 1960-2005. They use dynamic

[24] Argentina, Bolivia, Brazil, Chile, Mexico, and Peru.

[25] This conclusion is true for all six Latin American countries other than Mexico.

factor modeling which enable them to differentiate the impacts of domestic and external factors. In this study, dynamic rational expectations model of the international business cycles is used, in which variables are assumed to be exogenous. According to Crucini *et al.* (2011) they contribute to the international business cycles research in three ways: (i) They use dynamic factor model that allow them to characterize the stochastic process for both endogenous and exogenous variables. (ii) Their methodology enables them to differentiate between the domestic and external factors. They model endogenous and exogenous variables as the sum of three unobserved factors: a common G-7 factor, a nation specific factor and an idiosyncratic factor. (iii) They have an expanded list of driving factors, total factor productivity, government expenditures, the monetary base, short-term interest rates, and the relative price of oil and terms of trade. In addition, they also estimate the fraction of variation of output, consumption and investment attributed to each component of each shock.

Crucini *et al.* (2011) apply a three-step procedure. First, they use national data on output, consumption and investment to estimate the common, nation specific and idiosyncratic components of each national business cycle. Secondly, they use a statistical model to estimate common, national and idiosyncratic components of each driving factor. In the third step, they project measures of the components of the shocks on components of the endogenous variables. They focus on the cyclical properties of output, consumption and investment of G-7 countries. And, they consider home and foreign total factor productivity and the inputs of labor and capital for output.

First, Crucini *et al.* (2011) analyze the role of G-7 factor on national macroeconomic aggregates. Their findings indicate that the world and national components have equal importance for output in G-7 countries. However, when countries are examined individually, it is seen that for France, Italy and Japan, G-7 factor on average accounts for more than 70 percent of the variation in output. In the perspective of consumption, G-7 factor on average has lower share than the nation-specific factor. And, for investment, nation-specific factor has a greater share and accounts for nearly 50 percent of the variation in investment. It is concluded that nation-specific and G-7 factors have larger shares on variation of macroeconomic aggregates than the idiosyncratic factor.

Secondly, they discuss each driving factor of business cycles individually. For productivity variation, it is seen that nation-specific factor dominate when physical and human capital is considered. But, when basic labor input measure of productivity is used, G-7 factor has a greater share in the variation. The correlation between G-7 business cycle and G-7 productivity factor is calculated as 0.69. Although, G-7 countries are not technologically integrated very much, there is a large common component. Moreover, G-7 component has a greater share than other components for variation in oil prices and in terms of trade.

When the monetary and fiscal policy variables are analyzed, one of the key findings is the difference between variations in two monetary policy variables; short term interest rate and money growth. While short-term interest rate is dominated by G-7 common factor, money growth is dominated by idiosyncratic component. Crucini *et al.* (2011) explain why world common factor has a greater share in variation of short-term interest rate in the framework of integrated financial markets. Since financial markets are integrated highly and large capital movements are allowed, world common factor affect short-term interest rates considerably. In addition, idiosyncratic component has a greater share on variation of fiscal policy variables such as government consumption, government expenditure and government revenue.

Thirdly, Crucini *et al.* (2011) investigate how much of a nation's output variation is generated by common and nation-specific factors of variation in each driving source of business cycles. It is concluded that the key driving source of the common component of business cycles is productivity, followed by fiscal and monetary factors for G-7 countries. Afterwards, they analyze variance decomposition at the level of individual macroeconomic aggregates including national specific components. The findings indicate that G-7 common factor explain a smaller variance than the nation-specific factor in the variation of output. However, for Canada, U.S. and Germany, G-7 common factor has a greater share. Consumption growth has a similar profile as output growth; productivity tends to dominate as a driving factor. And, for investment, the main difference is the role of nation-specific factor, which has a much bigger/ share in the variation of investment. In the case of monetary and fiscal policy variables, G-7 factor has a greater share than the nation-specific factor.

Crucini *et al.* (2011) confirm the previous studies on international business cycles that there is evidence for existence of common cycle. They also find that the major driving source of international business cycle is productivity. When analyzing the countries individually, it is concluded that G-7 common factor has considerable role for macroeconomic aggregates.

Calderon and Fuentes (2010) characterize the business cycles of EMEs and examine the co-movements of cycles among their sample of 23 EMEs and 12 developed countries. In addition, they study the average output loss during recessions and output gains during expansions in terms of external factors, openness and capital market developments. They use Harding and Pagan's (2002) algorithm to identify turning points in the business cycles and based on this approach they compute duration, amplitude of the cycles and cumulative variation of the cycles. Calderon and Fuentes (2010) discuss that both Aguiar and Gopinath's (2007a) and Neumeyer and Perri's (2005) models fall short to explain the mechanism through which the shock to trend growth occurs and that the changes in fundamentals may affect country risk. However, Calderon and Fuentes' (2010) study is different than these studies in the way of methodology such that they search for size and duration of business cycles in EMEs.

Calderon and Fuentes' (2010) sample of countries include 12 Latin American, 8 East Asian and 3 Pacific countries as well as 12 developed countries. Firstly, they report characteristics of business cycles based on duration, amplitude and accumulation of the cycles. They conclude that while the duration of contraction phases are similar across country groups, it differs during expansion phases. Also, recessions in Latin American countries are on average as long as in East Asian and developed countries but recessions take place more frequently in Latin America. According to their findings there is a big difference in the amplitude of the cycles between EMEs and developed countries. Another major conclusion is that output loses are larger among EMEs than developed countries but also output gains are larger for EMEs as well. In addition, output contractions are more costly for Latin American countries compared to Asian countries and developed economies.

Secondly, Calderon and Fuentes (2010) examine the factors that determine the depth of recessions. They consider external factors (foreign interest rate) and macroeconomic instability (inflation, flexibility of exchange rate regimes) and other structural factors (trade openness, domestic financial development, quality of

institutions) as determinants of cost of recessions[26]. And, they define the cost of recession as the ratio of the cumulative output loss during recessions. Estimation results point out that external shocks, specifically terms of trade shocks, have an important role in explaining the sources of business cycles. The impact of U.S. interest rate shock is not statistically significant in countries other than East Asian and Pacific countries. Moreover, sudden stops have impact on output losses, but with deeper credit markets, impact of sudden stops becomes lower. Their results also indicate that real exchange rate overvaluation have a strong positive impact on recessions. They argue that recessions are more costly when real overvaluation precedes currency crisis. In addition, countries with flexible exchange rate regimes have smaller cost of recession.

Thirdly, Calderon and Fuentes (2010) analyze the relationship between microeconomic regulations and recession by using scatter plots. Their main conclusion regarding to microeconomic regulations are: first, countries with large number of contractions are associated with slower processes of creation and destruction of firms. Second, countries with more rigid labor markets have larger output losses. Third, getting access to credit markets mitigate the impact of negative shocks and the more intricate and longer procedures for enforcing contracts imply more output losses. Finally, Calderon and Fuentes' (2010) study is a remarkable research on characterizing the business cycles of EMEs in many aspects such as size and duration of cycles, impacts of external factors and macroeconomic fundamentals as well as microeconomic regulations.

2.1.2. Studies Based on Dynamic Stochastic General Equilibrium Modeling

In the literature there are also leading studies that investigate business cycle fluctuations by using dynamic stochastic general equilibrium (DSGE) models. Although, in this dissertation DSGE estimations are not considered, it is worthwhile to mention these kinds of studies briefly. The DSGE modeling in business cycles goes back to Nobel Prize winner Kydland and Prescott's (1982) study. Their model showed that technology shocks are not only the source of long-run growth but also an important cause of short-run output fluctuations. As it is stated in Nobel Prize

[26] They use terms of trade, gross FDI inflows, dummy variable for sudden stops, gross equity related inflows ,G-3 countries real money market rate and US real money market rate as external factors, and GDP, Inflation, real exchange rate, private credit by deposit Money banks to GDP, political risk index by ICRG for macroeconomic factors.

laureate note in 2004 of Kydland and Prescott's (1982) study is the stochastic version of the neoclassical growth model which has changed the basic methodology of business cycles analysis.

One of the major studies that investigate sources of business cycles by DSGE modeling is Neumeyer and Perri's (2005) study. They aim to document the relation between real interest rates and business cycles in EMEs, and compare this relation with developed countries. They construct a model that is helpful to assess the effectiveness of the stabilizing policies. In recent years EMEs have faced frequent and large changes in the real interest rates in international financial markets and these changes have usually been associated with large business cycles swings. Periods of low interest rates are associated with economic booms whereas periods of high interest rates are associated with economic downturns.

Neumeyer and Perri (2005) firstly analyze business cycles statistically. Their study suggests that real interest rates in developed economies are acyclical, while in EMEs real interest rates are countercyclical and lead the business cycle. They also present that EMEs have higher output and consumption volatility than in developed economies. In addition, they provide evidence that net exports are more countercyclical in EMEs than in developed economies.

According to Neumeyer and Perri (2005) although there is a strong relation between real interest rate and business cycles in EMEs, real interest rate does not have an important place in previous models of business cycles in small open economies[27]. Thus, they construct DSGE model for a small open economy that is consistent with the empirical results for EMEs. First, they allow that firms have to pay for the part of the factors of production before production takes place in the model, creating a need for working capital. Secondly, they consider preferences that generate a labor supply independent of consumption. In short, they generate a transmission mechanism that real interest rates affect the economic performance. In addition, they decompose the real interest rate into international rate and a country risk component. The results of the model support the business cycles properties of Argentina data. They find that eliminating fluctuations in country risk would lower output volatility by around 27 percent, while elimination of international rate fluctuations would lower output volatility only by less than 3 percent. Thus, they

[27] Mendoza (1991); Correia et al (1995)

point out that to understand business cycle volatility in EMEs, one must understand the exact mechanism of how shocks affect the fluctuations in country risk.

Uribe and Yue (2006) study the argument that business cycles in EMEs are correlated with the cost of borrowing in international financial markets that these countries face. Similar to Neumeyer and Perri (2005), they focus on the linkage between interest rates and business cycles in these economies. They combine empirical and theoretical methods and consider linkages between country spreads, the world interest rate and business cycles. Firstly, they estimate a VAR model including world interest rate[28], country spreads[29], and domestic fundamentals[30] with a panel data for seven EMEs[31] over the period of 1994-2001. According to Uribe and Yue (2006), empirical results from VAR estimation enables them to identify country spread shocks and U.S. interest rate shocks and to measure the importance of these shocks on business cycles in EMEs. Their results indicate that approximately one third of business cycles in EMEs can be explained by external factors such as U.S. interest rate shocks and country spreads shocks.

Secondly, Uribe and Yue (2006) developed a small open economy. In their model they assume that in each period production and absorption decisions are made prior to the realization of that period's world interest rate and country spread. They also consider external habit formation for preferences and firms have a working-capital-in-advance constraint. Moreover, capital accumulation is subject to gestation lags and convex adjustment costs. Uribe and Yue (2006) argue that these additions to the simple small open economy model enable to explain business cycle facts in EMEs better.

Uribe and Yue's (2006) findings indicate that U.S. interest rate shocks explain about 20 percent and country spread shocks explain about 12 percent of aggregate fluctuations in EMEs. They also conclude that an increase in U.S. interest rates, country spreads first fall and then increase. Moreover, according to their results, U.S. interest rate shocks affect domestic variables via country spreads. Uribe and Yue (2006) point out the interaction between U.S. interest rates and country

[28] 3-month gross Treasury bill rate divided by the average gross U.S. inflation over the past four quarters.

[29] Sum of J. P. Morgan's EMBI+stripped spread.

[30] GDP, real gross domestic investment, trade balance to output ratio.

[31] Argentina, Brazil, Ecuador, Mexico, Peru, Philippine, and South Africa.

spreads. They claim that most of the contribution of U.S. interest rates to business cycles in EMEs is due to country spreads. In other words, if country spreads were independent of U.S. interest rates, then the impact of U.S. interest rates on business cycles would fall.

Hirata, Kim and Kose (2007) use a DSGE model to analyze the sources of macroeconomic fluctuations of Middle Eastern and North African countries (MENA). They aim to identify driving factors of business cycles in MENA and impacts of different shocks on these economies. Identifying the sources of business cycles and understanding the impacts of different types of shocks help these economies to achieve stable long-term growth rate.

Hirata, Kim and Kose (2007) firstly document the stylized facts of business cycles in these economies. They compute volatility, contemporaneous correlation and persistence of business cycles. The following stylized facts of business cycles in MENA countries are documented: (i) MENA economies are more volatile than Asian and G-7 countries. (ii) Consumption is slightly more volatile than output. (iii) Investment is more volatile than output and consumption. (iv) Consumption and investment are highly positively correlated. (v) Both exports and imports pro-cyclical.

A small open economy DSGE model is constructed considering endogenous labor-leisure choice and variety of exogenous shocks such as consumption, investment and foreign balances shocks. In the model, capital goods and intermediate inputs are grouped in two sectors: the exportable goods and non-traded goods. Their model captures several important features of MENA countries: (i) MENA countries have a narrow production base and specialization is quite high so that their model allows them to study how main sectors respond to various shocks. (ii) MENA countries are vulnerable to external shocks so that terms of trade shocks in included to the model. (iii) Financial market in MENA countries are not that much integrated with global markets. Asset markets in the model are assumed to be incomplete. (iv) MENA countries have large public sectors thus their model enables to study the impact of government spending shocks on non-traded goods sector.

Hirata, Kim and Kose (2007) firstly study to see if their model economy reflects the main features of the business cycles in MENA countries. The model is simulated and business cycle properties such as volatility, persistence and co-movements are computed. According to their findings, volatility of fluctuations in

aggregate output, non-traded sector output and investment are quite close to the observed data. However, the volatility of exported sector is higher than the data due to highly volatile and persistent terms of trade disturbances and productivity shocks in the export sector. Volatility of consumption is lower than the observed data and it is possible since the model does not consider consumption for durable goods. Moreover, the model is quite good to reflect the co-movements in the observed data. However, the correlation between output and net exports is higher than the data; highly persistent nature of terms of trade is explained as the cause of this finding.

Secondly, dynamic responses of the business cycles to the productivity, terms of trade and interest rate shocks are reported. As expected, increase in productivity leads to an increase in aggregate output, investment, labor input and consumption in the export sector and there is a slight decrease in the production and consumption of non-traded goods. For the non-traded sector, increase in productivity increases the output, investment and consumption as well. Impact of increase in terms of trade causes increase in output, investment, intermediate input and labor in the exportable sector while decrease in production of non-traded goods. Moreover, responses of output, labor input and consumption are quite small due to an increase in world interest rates. However, investment is affected largely from a world interest rate shock.

Thirdly, Hirata, Kim and Kose (2007) examine the sources of business cycles by variance decomposition method. The findings indicate that terms of trade has a leading role in explaining business cycles in MENA countries with a share of around 60 percent. In addition, domestic price shocks account for 38 percent of output variation and government spending has a very small role in explaining the business cycles.

Hirata, Kim and Kose (2007) emphasize that understanding sources of business cycles in MENA countries helps to design optimal economic policies to achieve stable growth rate. By their study, they provide fundamental analysis of business cycles in MENA countries by using DSGE model. Their estimation suggests that terms of trade shocks are the major driving source of business cycles followed by domestic shocks. Besides, another external shock, world interest rate shock, significantly affects the external balances. In the light of these results, Hirata, Kim and Kose (2007) claim that as MENA countries become more integrated with

the global financial markets, dynamics of business cycles have changed and these economies have become more sensitive to external shocks.

Another study that involves DSGE modeling for business cycle fluctuation is the pioneer study of Aguiar and Gopinath (2007a). They investigate whether standard real business cycles model can qualitatively and quantitatively explain the business cycles in both EMEs and developed small open economies. EMEs differ from developed economies that they have experienced frequent regime switches, dramatic reversals in fiscal, monetary and trade policies. So, Aguiar and Gopinath (2007a) notice that shocks to trend growth are the primary source of fluctuations in EMEs as opposed to transitory fluctuations around trend. On the other hand, in developed markets fluctuations have a relatively stable trend. Aguiar and Gopinath (2007a) state their intuition as follows: "As agents observe the economy entering a period of high growth, they optimally increase consumption and investment. The fact that a shock to the growth rate implies a boost to current output, but an even larger boost to future output, implies that consumption responds more than income, reducing savings and generating a current account deficit. If growth shocks dominate transitory income shocks, the economy resembles a typical emerging market with its volatile consumption process and countercyclical current account. Conversely, an economy with a relatively stable growth process will be dominated by standard, transitory productivity shocks. That is, a positive shock will generate an increased incentive to save that will offset any increase in investment, resulting in limited cyclicality of the current account and stable consumption". Their main aim is to explain the role of trend in EMEs and developed economies.

It is widely stated in the literature that EMEs experience strongly volatile cycles but Aguiar and Gopinath (2007a) also note that these countries are subject to strongly volatile shocks to stochastic trend and the trend shocks distinguishes EMEs from developed economies[32]. Thus, they point out that primary source of the large swings in business cycles in EMEs are the shocks to trend growth, while for developed economies the primary source of the fluctuations are transitory shocks. They based their study on the permanent income hypothesis that the response of consumption to an income shock differs if the shock is persistent or not.

[32] Shocks to trend output in EME are mostly mean changes in government, monetary, fiscal, and trade policies.

Aguiar and Gopinath (2007a), firstly, present special characteristics of economic fluctuations in EMEs and in developed countries[33] over the period 1980 to 2003. According to their results, the basic difference between the business cycles of EMEs and developed economies is the strongly countercyclical nature of trade balance in EMEs. In addition consumption is 40 percent volatile than income at business cycle frequencies and income growth and net exports are twice as volatile in EMEs.

In the second part of their study, Aguiar and Gopinath (2007a) show how a standard RBC model reproduces the business cycle features of both EMEs and developed economies by using DSGE model. Their model involves two productivity processes: a transitory shock around the trend growth rate of productivity and a stochastic trend growth rate. Their analysis provide evidence that business cycles in EMEs are driven by shocks to stochastic trend rather than transitory level shocks in contrast to developed economies that have relatively stable trends. They also analyze if their model is consistent with sudden stops. For Mexican data, they decompose solow residuals into trend and transitory components. Then, they feed the solow residuals and obtain a sharp sudden stop in 1994-95. The results from the model are similar to observed data. In the third part, by using VAR analysis, they explore the statement that "cycle is the trend" for EMEs. They perform variance decomposition method for output into permanent and transitory shocks. Their results show that 50 percent of income volatility in Canada at business cycle frequencies are due to shocks to the stochastic trend and for Mexico 82 percent of income volatility are due permanent shocks at business cycle frequencies. In this study, their hypothesis is that EMEs have volatile trend that determines the behavior of the economy at business cycle frequencies. In other words, they claim that stochastic trend is relatively more important for the EMEs.

In another study of Aguiar and Gopinath (2007b), they consider a stochastic business cycle model of a small open economy and allow that economy is driven by productivity shocks divided into permanent and transitory components and by shocks to interest rates. Different from the previous study, they introduce stochastic interest rate process but also it is different from the Neumeyer and Perri's (2005) that they

[33] Their sample consists of middle-income and developed economies but they focus on small economies such that they exclude group of seven countries other than Canada. In their sample there are 13 EMEs and 13 developed economies.

estimate interest rate process from Euler equations rather than using observed process.

Aguiar and Gopinath (2007b) conclude that the model with interest rate shocks that are orthogonal to productivity shocks does make a poor job that it is not supported by the data of EMEs. This means that interest rate shocks that do not affect productivity cannot be the main source of business cycles in EMEs. According to Aguiar and Gopinath's (2007b) results, when interest rates increase consumption decreases since individuals prefer to save more and investment also decreases since return from bonds are higher. Correlation between consumption and output and between investment and output are low because interest rate shocks are orthogonal to productivity shocks and productivity does not change and capital takes time to adjust.

Secondly, Aguiar and Gopinath (2007b) allow the interest rate respond to productivity shocks. They state that a positive productivity shock increases consumption and investment and it leads to decline in interest rates. Thus, they conclude if interest rate shocks are negatively correlated with productivity shocks, they can explain countercyclical net exports and why consumption is more volatile than income. Finally, they use generalized method of moments and estimate a model considering both exogenous interest rate shocks and productivity shocks and the interest rate shock to respond to the transitory income shock. With this estimation, Aguiar and Gopinath (2007b) support the argument in their previous study such that EMEs are subject to more volatile trend shocks than the developed economies and conclude a small negative covariance between productivity shocks and the implied interest rate. Their results also indicate that Chile has similar features as other EMEs which are presented in Aguiar and Gopinath's (2007a) study.

Garcia-Cicco, Pancrazi and Uribe's (2010) study is another study that aims to explain business cycles in EMEs by RBC models. They investigate the hypothesis that an RBC model with transitory and permanent shocks to total factor productivity can account for observed aggregate dynamics in EMEs. They focus on the trade balance since they think that to understand the business cycle characteristics of EMEs, trade balance and components of external accounts are key elements.

Garcia-Cicco, Pancrazi and Uribe (2010) firstly present characteristics of business cycles in Argentina for a longer period than the previous studies. Stylized facts of business cycles reported in the study are consistent with the results of Neumeyer and Perri (2005) and Aguiar and Gopinath (2007a). Then, they estimate

the structural parameters of a small open economy in RBC model using Argentina data over the period of 1900-2005. Their model is based on small open economy with permanent and transitory shocks as in Aguiar and Gopinath (2007a). They conclude that RBC model is not successful to capture the basic characteristics of business cycles in EMEs such as volatility of output, consumption, investment and trade balance and also they find out that trade balance to output ratio behaves as a near random walk with an autocorrelation function close to one. However, the autocorrelation of the trade balance is far below the unity which is different than the empirical results. Finally it is concluded that the RBC model does not explain the business cycles in EMEs successfully.

Chang and Fernandez (2010) compare approaches of Aguiar and Gopinath (2007a) who investigate business cycles considering a stochastic productivity trend and temporary productivity shocks and of Neumeyer and Perri (2005) and Uribe and Yue (2006) who introduce foreign interest rate shocks with financial frictions into business cycles research. They use Bayesian estimation methods and combine stochastic trends with interest rate shocks and financial frictions model which is called encompassing model. In their model they include financial frictions, spreads and working capital requirements. They also allow for permanent shocks to impact the spread and they assume preferences are Greenwood-Hercowitz-Huffman type differently from the Aguiar and Gopinath's (2007a) study.

Chang and Fernandez's (2010) main conclusion is that according to their encompassing model, interest rate shocks and financial frictions are significant in business cycles but not trend shocks. In addition, they estimate temporary productivity shocks, trend shocks, and interest rate shocks to understand the Mexican 1995 crisis. According to their estimation, temporary productivity shocks dominated at that period but financial frictions made the impact of crisis stronger. They discuss that to understand the business cycles fluctuations in EMEs, assuming financial imperfections are crucial and they claim that trend shocks impact little but their impact get stronger when financial frictions are included. Thus, their study is in favor of financial frictions model. Chang and Fernandez's (2010) study is also a contribution to the debate that whether business cycles in EMEs are dominated by domestic factor or external factors. Supporting the study of Calvo *et al.* (1993), they conclude that foreign interest rate shocks are an important factor on business cycles in EMEs.

2.2. SYNCHRONIZATION OF BUSINESS CYCLES

The empirical literature on business cycles is divided mainly into two topics; first one is the analysis of the driving factors of business cycles which is discussed in Chapter 2.1 and the second one is the co-movements between business cycles of different groups of countries. Since late 1980s, trade linkages and financial integration have increased dramatically and the role of EMEs has become crucial in the global economy. As a result of globalization, increased trade and financial linkages, free capital mobility, and floating exchange rate regimes, it is expected to observe a rise in the synchronization of business cycles between EMEs and developed countries. In other words, it is expected to see a "coupling" of business cycles. On the other hand, as Kose, Ortok and Prasad (2008) point out that EMEs have become important actors in the global economy. As a result of the strong economic performance of EMEs, especially of China and India, these countries have been affected less from the recent financial crisis in 2008 and from growth slowdowns in a number of industrialized countries over the period of 2003-2008. Thus, in the literature it has been stated that EMEs have "decoupled" from industrial economies. In addition, another view that supports decoupling hypothesis is, as Krugman (1993) states, that increased trade linkages may lead to regional specializations and that business cycle fluctuation may diverge due to industry specific shocks as a result. Therefore, in the literature there is a debate going on about whether business cycles of EMEs converge to or diverge from developed countries' fluctuations. There are a group of studies that supports coupling hypothesis and another group of studies that have evidence for decoupling of cycles.

There are various methods to measure the co-movements between business cycles of EMEs and of developed countries that are considered in the literature. The preliminary approach to examine the synchronization is bivariate correlations between business cycles of different groups of countries. Another method to examine the synchronization of business cycles is the concordance statistics which /is developed by Harding and Pagan (2002). Recently, factor based models have became popular in the literature as they can be used to identify global factors and country specific factors to explain business cycles fluctuations. By using estimated factors to measure the synchronization of cycles, sum of variances shares of the global and country specific factors are computed.

Based on Burns and Mitchell's (1946) business cycles methodology that uses classical cycles rather than de-trended cycles, Harding and Pagan (2002) develop a non-parametric binary indicator variable of recessions and expansions which is called concordance index[34]. This index measures the percentage of time when two cycles are in the same state. They consider industrial production of countries[35] in their study. They report that although pair wise correlations are small, industrial production in these countries spends much of the time in the same state of classical cycles. In addition, Harding and Pagan (2006) develop a test of synchronization of cycles using turning points and according to test results; the synchronization of industrial production cycles is not strong, whereas the synchronization of stock prices is strong.

Narayan (2008) focuses on the role of permanent and transitory shocks[36] to explain the variation in per capita GDP for G-7 countries. He uses common cycles test differently from the rest of the literature, developed by Vahid and Engle (1993) and common trend test, developed by Johansen (1988). According to Narayan (2008), common trend and common cycles tests are advantageous in two ways: (i) imposition of common cycle restrictions provide more accurate estimates than a dynamic model such as VAR model since imposing common cycles restrictions reduce the number of free parameters of VAR model (ii) since permanent and transitory shocks should not differ for a long time horizons, they do differ in short time horizons and short run dynamics are captured by common cycles and common trends methodology. He also aims to analyze if GDP of G-7 countries shares long term (common trends) and short term (common cycles) features and to examine whether transitory or the permanent components are important for macroeconomic fluctuations.

Narayan (2008) firstly performs Johansen (1988) cointegration test for GDP series and it is found that there are three cointegration relationships in GDP series for G-7 countries. Secondly, common feature test is applied based on Vahid and Engle

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[34] $I_{j,r} = \frac{1}{T}\sum_{t=1}^{T}(S_{jt}S_{rt}) + \left(1 - S_{jt}\right)(1 - S_{rt})$ where S_{jt} is equal to 1 for expansion and 0 for contraction in country j.

[35] Canada, U.K., Luxembourg, Italy, Netherlands, Germany, Belgium, U.S., Japan, France, Spain, and Ireland.

[36] Supply side shocks are seen as permanent shocks and demand side shocks are seen as transitory shocks.

(1993) methodology and existence of four co-feature vectors is accepted. Moreover, variance decompositions of GDP series for G-7 countries are computed. It is concluded that transitory shocks seem to be more influential in U.S., Japan and Italy than other countries and for U.K., Germany, France and Canada per capita GDPs are largely explained by permanent shocks for both short and long horizons. Narayan (2008) also test whether imposing common cycles' restrictions improves the accuracy of the results by using post sample one-step ahead forecasts as in Issler and Vahid (2001). He estimates two sample forecasts such that in the first model short run restrictions from the common cycle analysis are not taken into account and in the second model these restrictions are considered. Performance of forecasts are tested by root mean square error, mean absolute error and mean absolute percentage error and it is found that restricted VECM model performs better across all three performance indicators in each G-7 country. Lastly, the correlations of business cycles across countries are estimated based on two regressions: (i) regressing the cyclical component of GDP for a country on the cyclical component of GDP for all other countries. (ii) regressing the cyclical component of GDP for a country on the cyclical and trend components of GDP for all other countries. According to findings of the estimations, cyclical pattern in one country tend to contribute positively to cycles in other countries but, France seems to be outlier that French cycles impact cycles in other countries negatively.

Key findings of Narayan's (2008) study can be summarized as: (i) there are three common trends and four common features in per capita GDP of G-7 countries, (ii) transitory shocks explain 40 percent variation in the GDP in U.S., Japan and Italy over short time horizon. However, for other G-7 countries permanent shocks are most effective in the variation of GDP over both short and long time horizon, (iii) U.S., Japanese, Italian and U.K. cycles are more related to the cyclical patterns in other countries.

Another group of studies that examine co-movement of business cycles uses factor based modeling which has been widely used recently[37]. Factor modeling enables to identify variance shares of the global, group specific and country specific factors in explaining business cycles of different groups of countries. Factor modeling is based on the idea that changes in the dynamics of the international

[37] Sargent and Sims (1977) and Geweke (1978) extended the classical factor model to dynamic factor models.

business cycles are due to the changes in the nature of shocks and changes in the transmission mechanisms. Therefore, changes in the business cycles synchronization is attributed to the changes in global or common shocks and country specific shocks which can be identified by factor based models[38]. The basic assumption in factor modeling is that there exist few common factors driving macroeconomic fluctuations. They allow information to be extracted from large cross sectional datasets and combined with VAR framework to measure the proportion of common and country specific shocks in explaining the variance in cycles (Bernanke and Boivin (2003); Bernanke, Boivin and Eliasz (2005); Fiori and Iannotti (2010)).

Helbling and Bayoumi (2003) investigate business cycles synchronization in G-7 countries since 1973. They use descriptive statistics, both cross correlation and concordance statistics, and factor modeling to measure the synchronization of cycles. Their study focuses on the unexpected strong synchronization of cycles during the global slowdown over the period of 2000-2001. They follow Harding and Pagan's (2002) approach and report stylized facts on international business cycle linkages. In the second part of the study, Helbling and Bayoumi (2003) use asymptotic dynamic factor models to examine the common factors in business cycles.

Helbling and Bayoumi (2003) state that synchronized recessions and less synchronized expansions have been generally experienced since 1973 when generalized floating among the major currency areas were introduced. The concordance indices suggest that expansions and recessions generally coincide among G-7 countries with the exception of Japan. They also consider growth cycles rather than classical cycles. It is concluded that length of growth cycles differs across countries; however concordance statistics indicate that growth cycles generally move together. Overall, descriptive indicators suggest that business cycles co-movements among G-7 countries have remained unchanged during most of the period since 1973, thus synchronized slowdown in 2000-2001 should be expected after all.

To identify the common factors in business cycles of G-7 countries, Helbling and Bayoumi (2003) use the non-parametric estimator developed by Forni *et al.* (2000). Their estimation results suggest that two global factors explain around 80 percent of variance in business cycles of G-7 countries. It is also mentioned that impact of global factors is stronger during global slowdowns which indicates an

[38] See Artis, Chouliarakis and Harischandra (2011).

asymmetry between slowdowns and expansions. Another asymmetry emerges from the share of global factors in the variance of Anglo-Saxon and Euro area countries' business cycle fluctuations. They also estimate the model for the period of 1973 to 1990. The findings indicate that fewer factors explain larger proportion of fluctuations during this period compare to the period of 1973-2001. Thus, according to Helbling and Bayoumi (2003) international business cycle linkages are stronger during the period of 1973-1990 for G-7 countries.

The other pioneer study that examines international business cycles by combining factor models and VAR approach is Stock and Watson's (2005) study. They aim to present a summary of empirical facts about the moderation in output volatility and in persistence and to analyze common cyclical movements in G-7, Euro-zone and in English-speaking countries. Moreover, they search for the sources of changes in the cyclical patterns and if these sources are international or domestic based. Stock and Watson (2005) use a FSVAR[39] model that allows us to identify restrictions coming from imposing an unobserved component factor structure on the VAR innovations. With FSVAR model, both the direct effect of common international shocks and indirect effect of spillovers from the domestic shocks from one country to its trading partner can be quantified[40]. In addition, FSVAR model helps to apply counterfactual questions such as if moderation in volatility is due to a common international shock or a domestic shock or is it a result of spillover effect from any other country.

In the first part of the study, Stock and Watson (2005) report statistics on the volatility and persistence of business cycles in G-7 countries. The stochastic volatility model is estimated by Markov Chain Monte Carlo method. It has been seen that different countries exhibit different paths of stochastic volatilities. While volatility of GDP drops sharply in 1980s for U.S., there is a sharp decline in 1970s for U.K. They also test for breaks in conditional mean and conditional variance. Their findings indicate that the hypothesis for the stability of conditional variance is rejected in four countries and stability of conditional mean is rejected in all countries

[39] Previous studies that use FSVAR model are Norrbin and Schlagenhauf (1996) and Clark and Shin (2000).

[40] In the literature, it is widely accepted that synchronization of cycles have two source: first one is common global shocks (such as oil price shocks) and second one is spillover effects such that a crisis in one country may have impact on other countries' economic performance via trade or financial linkages.

other than Japan. Thus, it can be concluded that the patterns of volatility in G-7 countries are complex. For the persistence of a shock to GDP growth, AR model is constructed. The results point out that shocks are more persistent in Canada, France and U.K. While persistence has not changed for U.S. and Italy and it has declined for Germany and Japan. For all countries, persistence of a shock on GDP growth has decreased substantially.

To examine the changes in synchronization of business cycles and to understand the sources of business cycles, Stock and Watson (2005) firstly estimate a reduced VAR model. The contemporaneous correlations are calculated from the estimates of reduced VAR model parameters by using spectral density matrix of quarterly growth of GDP. The results of computed correlations indicate that there is no overall tendency towards closer international synchronization and cross-country correlation has not been changed between periods of 1960-1983 and 1984-2002. Secondly, Stock and Watson (2005) estimate a FSVAR model to identify common international shocks as the shocks that affect international output contemporaneously. And, FSVAR estimation allows identifying world shocks as the shocks that affect all countries within the same period. On the other hand, country specific shocks can lead to spillovers but those spillovers are assumed to happen with at least one quarter lag[41]. Decomposition of the h-step ahead forecast error for GDP growth in a country is computed based on three factors: (i) unforeseen common shocks, (ii) unforeseen domestic shocks, (iii) spillover effects of unforeseen domestic and other countries shocks. According to FSVAR estimation, international spillover effects account for none of the GDP growth at the one quarter horizon, for longer period horizons spillover effects have increased up to 20 percent. Most of the variation in the GDP growth is attributed to the common shocks or to idiosyncratic domestic shocks.

Stock and Watson (2005) also perform a counterfactual exercise in which they seek to answer the question of what the volatility and cross correlations would have been in 1984-2002 with common international shocks as large as G-7 economies experienced in 1960-1983. It is concluded that all countries other than Japan would have had greater volatility over the past two decades than the world experienced in the first period shocks. Moreover, cross-country correlations would

[41] However, there could be misleading interpretation that if an international shock affects several countries only with a lag than that effect may be considered as a spillover effect.

have been much higher in the second period with the shocks in the first period. Thus, international business cycles synchronization would be higher if the common shocks in the second period were as large as the shocks in the first period.

Key findings of the Stock and Watson's (2005) study can be summarized as: although there is no significant increase in the synchronization of the international business cycles in G-7 countries, there have been important changes such as correlations increased within the groups of euro-zone countries and English-speaking countries and decreased between these groups. In addition, observed moderation in individual country business cycles are attributed to the decline in the volatility of common G-7 shocks.

In Helbling's *et al.* (2007) study, the synchronization of business cycles is analyzed by involving 95 countries over the period 1960-2005 by estimating DFM. A global factor, regional factors (North America, Europe, Oceania, Asia, Latin America, Middle East and North Africa and Sub-Saharan Africa) and country specific factor are identified. The findings suggest that the global factor generally plays a more important role in explaining business cycles in industrial countries than in EMEs and developing economies. Besides, regional factors are most important in North America, Europe and Asia whereas country specific and idiosyncratic factors are most important source of cycles in the Middle East and North Africa and in sub-Saharan Africa. It is also noticed that the global factor and U.S. growth have common characteristics especially during recessions. When the later period of 1986-2005 is analyzed, results indicate that the global factor has on average played a less important role. At the same time, regional factors have become more important in regions where trade and financial linkages have increased substantially. On the whole, WEO suggest that business cycles have not become more synchronized.

Kose, Otrok and Prasad (2008) examine the global cyclical movements over the period of 1960-2005 for industrial, EMEs and other developing countries by using dynamic latent factor model. They try to present major factors that drive business cycles in different groups of countries and discuss these factors in the context of globalization. Their study is based on two views about the business cycles dynamics in EMEs: (i) Greater trade openness and increased financial linkages make EMEs more sensitive to external shocks and increase the co-movement of business

cycles[42]. (ii) Since in recent years, growth performance of EMEs has been stronger, they have not been affected from the slowdowns in industrialized countries which make business cycles dynamics more independent than the business cycles in industrialized countries.

Kose, Otrok and Prasad (2008) use extended dataset and focus on the international business cycle in the context of increased role of EMEs in world economy. Moreover, they distinguish the global factor from common factors to specific groups of countries and they consider multiple macroeconomic indicators rather than just output. They use dynamic factor model and decompose fluctuations in macroeconomic aggregates, output, consumption and investment, into (i) a global factor that is common for fluctuations across countries and variables; (ii) three groups of specific factors that captures fluctuations across countries and variables within each group of countries; (iii) country factors, which are common across all aggregates in a given country; (iv) idiosyncratic factors specific to each time series. Different from the study of Crucini *et al.* (2011), Kose, Otrok and Prasad (2008) do not interpret the factors as representing specific types of shocks such as technology, monetary policy, etc. Instead, their common shocks capture the effects of many types of shocks.

In this study, similar to Crucini's *et al.* (2011) study, first, driving sources of business cycles are analyzed by variance decompositions within the group of countries over the whole period. They measure international business cycles synchronization as the joint contribution of global and group specific factors. It is concluded that global factor explains 11 percent of output growth for all samples on average and also it has a share of 9 percent and 6 percent in the variation of consumption and investment respectively. It should be taken into account that the global factor has a greater share in the variation of macroeconomic aggregates in the group of industrialized countries. For the country factor, the findings indicate that it

[42] Increased financial linkages could lead to higher co-movement of business cycles because of the wealth effects of external shocks. However, they could reduce the co-movement because of the specialization of production through the reallocation of capital. Trade linkages could generate both demand and supply side spillover across countries, which cause higher co-movement of business cycles. On the other hand, if trade linkages increase specialization of production across countries and if sector specific shocks are dominant, trade linkages might cause lower co-movement of business cycles (Baxter and Kouparitsas, 2005). For macroeconomic aggregates, global integration should reduce investment correlations due to reduce-shifting effect in standard business cycles theory since capital shifts to countries with higher productivity growth and investment in these countries increase. However, increased financial integration should increase consumption correlations due to efficient risk sharing (Kose, Otrok and Prasad, 2008).

has a leading role to explain the fluctuations in output. However, the country factor has a smaller share than the idiosyncratic factor in the variation of consumption and investment. For EMEs, it is noticeable that country factor has a 60 percent share in the variation of output which is much higher than any other group of countries. This result means that co-movement between macroeconomic indicators is higher for EMEs and these economies are not able achieve much international risk sharing that consumption is highly correlated with their output fluctuations. Another important finding is that for other developing countries the most important factor for the variation of all macroeconomic aggregates is the idiosyncratic factor, which accounts for 73 percent of fluctuations.

According to Kose, Otrok and Prasad (2008), after mid-1980s, there has been an increase in trade and financial links between countries and also, role of EMEs in the world economy has become important. Thus, they define pre-globalization period as 1960-1984 and globalization period as 1985-2000. Based on their definition, they also examine how the international business cycles have changed in the period of globalization and they discuss the extent of risk sharing based on the cross-country co-movement of consumption. Their findings indicate that during the globalization, convergence exists for the business cycles within the group of industrialized countries and within the group of EMEs. However, they provide evidence for divergence between the groups of industrialized countries and EMEs during globalization period. This results show that group specific factors that drive business cycles have become more important than global factors. Moreover, their findings indicate that country specific factors have more important role in business cycles for EMEs in the recent period of globalization, while their role is less important for industrialized countries. According to Kose, Otrok and Prasad (2008) reasons behind the decline in the importance of global factor during globalization period are large common shocks such as oil price shocks, and some correlated shocks in the major industrialized countries such as disinflation monetary policy in the early 1980s and increase in real interest rates in pre-globalization period.

Thirdly, Kose, Otrok and Prasad (2008) analyze the robustness of their findings by considering sub-groups of countries, making changes in the importance of global and group factors, setting dummies for period of crises and defining alternative beginning points for the globalization period. Neither of these exercises

cause a significant difference in the results so it can be concluded that Kose, Otrok and Prasad's (2008) findings are robust.

Results of Kose, Otrok and Prasad (2008) can be summarized as: (i) relative importance of global factor on business cycles has been declined over time which means that there is no evidence for a global convergence of business cycles during the period of globalization, (ii) group-specific factors have become more important than the global factors;. in other words, convergence of business cycles within the groups of industrialized countries and EMEs has been increased, (iii) country-specific factors have become more important for EMEs and less important for industrialized countries[43].

Tekatli (2007) also focus on the moderation of the business cycles over the past three decades in G-7 countries similar to Stock and Watson (2005)'s study. Tekatli (2007) points out that the decline in the volatility of output growth is not specific to one country but common for most of the G-7 countries. Moreover, he also states that reduction in the volatility is not specific to the output growth but also to other macroeconomic indicators. Based these two facts, he aims to study common sources for the moderation of business cycles for G-7 countries by considering multiple domestic and international factors such as inflation, output and interest rates. According to Tekatli (2007) there are three explanations for the sources of moderation: (i) structural changes in the economy, (ii) changes in common international shocks, (iii) changes in domestic shocks.

Tekatli (2007) estimates a FSVAR model which enable to characterize each of the G-7 countries by three macroeconomic variables and to link the economies through common international shocks. The difference of this study from other studies that estimate FSVAR is that he used Bayesian approach for the estimation. In addition, Tekatli (2007) apply a dynamic structure for the VAR model similar to the ones in Ahmed, Levin and Wilson (2002) that provides the estimated structure of the economy and decompositions of the exogenous shocks into international and domestic components. He constructs the model for seven countries by considering GDP growth that represents the private sector reactions, inflation that represents

[43] This finding indicates that EME have not been able to achieve improvement in risk sharing during the globalization (Kose, Prasad and Terrones, 2003b). Moreover, successful EME depend on domestic financial investment rather than foreign capital (Gourinchas and Jeanne, 2006; Aizenman et al., 2007; Prasad et al., 2007). However, industrialized countries with high level financial integration share risk more efficiently and delink consumption and output.

price fluctuations and interest rates that represent monetary policy responses. It is assumed that there are three common international shocks: common output shock, common inflation shock and common interest rate shock, and three idiosyncratic shocks: idiosyncratic output shock, idiosyncratic inflation shock and idiosyncratic interest rate shock. These shocks are mutually independent because each country VAR is recursively identified[44].

After deriving priors and posteriors of the parameters, Tekatli (2007) makes simulations for priors and posteriors and tests the accuracy of the analytic derivations given in his study. In the next part of the study, Tekatli (2007) reports the empirical findings indicate that there is a significant change in the volatility of output growth and inflation in the post 1984 period. He estimates the changes in international and domestic spillovers and idiosyncratic components of the variance and examine if they have a role in the decline of output and inflation volatility. He also studies whether the change in these components is a result of a change in the magnitude of international shocks, domestic spillover effects and idiosyncratic shocks (impulses)[45] or a change in the structure of the economy to these shocks (propagation)[46] and analyzes which component of volatility has a leading role to understand the international business cycles. Variance decompositions are computed to identify the effects of each component on business cycles moderation such that variances in each period are decomposed into three international shocks (international components of output, inflation and interest rate) and into three domestic shocks (domestic components of output, inflation and interest rate).

Estimation results of Tekatli (2007) indicate that there is a substantial reduction in the volatility of output growth for Canada, Italy, U.K. and U.S. for pro-1984 period and decline in domestic shocks are mainly the cause of reduction in the

[44] Other assumptions that are made for the estimation of the model are: (i) a country's macro variable is not explained by other countries' macro variables. In other words, economies are linked to each other through exogenous shocks which could be common between countries or be specific to that country. (ii) monetary policy shocks are identified with the movements in the interest rates that cannot be predicted given the past values of interest rates or by current and past values of other macro variables. This assumption is made because the economy's responses to the policy actions should be separated from the exogenous macroeconomic movements. (iii) monetary policy shock at date t has no contemporaneous effect on either inflation or output growth. The motivation behind this assumption is that both purchasing and pricing decisions are made prior to realization of the shock. (iv) residuals are orthogonal after the recursive identification.

[45] Impulses are functions of the VAR shock variances and reflect the magnitude of the shocks.

[46] Propagation is function of the VAR coefficients and reflects the sensitivity of the economy to the shocks or to the effects of the shocks in the economy.

volatility. Moreover, it is concluded that the decline in the magnitudes of the shocks have the key role for the volatility reductions in output growth. For all G-7 countries excluding Italy, structural changes in the economy are not effective to the reduction in volatilities. In the case of volatility of inflation, Tekatli (2007) provides evidence for substantial reductions in the volatility of inflation for G-7 countries except Germany and similar to the reduction in output volatilities, most of these inflation volatility reductions are due to domestic shocks. And, once more decline in the inflation volatility is associated with the decline in the magnitudes of the shocks with high probabilities for most of the G-7 countries. To sum up, the key conclusion of Tekatli's (2007) study is that the change in domestic shocks accounts for a large part of the moderation of business cycles in most of the G-7 countries.

Bordo and Helbling (2011) investigate international business cycle synchronization for 16 countries over the period from 1880 to 2008[47]. They aim to determine if synchronization increased over the period and if changes in synchronization are due to changes in the nature of shocks such as variations in global shocks. Bordo and Helbling (2011) point out that there is an ambiguous relationship between business cycle synchronization and integration. One view suggests that the business cycles synchronization increase with more integration of countries, on the other hand the other view suggests that increase in trade integration leads to greater regional specialization and less output synchronization. They split the period of 1880 to 2008 to four eras such that: gold standard era from 1880 to1913, the interwar period from 1920 to 1938, fixed and adjustable exchange rate regimes from 1948 to 1972 and modern period of managed floating among the major currency areas from 1973 to 2008.

To measure the synchronization of business cycles, Bordo and Helbling (2011) firstly use correlations among output growth rates across countries. Their correlation analysis indicates that the distribution of the correlation coefficients differ from era to era. During the gold standard era, the correlation between outputs is negative for about one half of all country pairs, then the synchronization increased in the interwar period. The reversal was small for Bretton-Woods era and important increase can be observed in the later period. They also test if the correlations differ

[47] They only consider developed countries (Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, U.K., U.S.) since the data over the period 1918-2008 are only available for these countries.

significantly over time and it is concluded that the upward shift in the distribution of correlations are significant for the interwar and modern floating period.

After that, Bordo and Helbling (2011) use Canova and Dellas's (1993) procedure to analyze the role of the changes in shocks driving the economies on changes in the synchronization of cycles. They estimate two models: the center country model and the trade linkages model by both FAVAR model developed by Stock and Watson (2005) and nonparametric static approximate factor model. Their results indicate that, for the central model, the increased business cycle synchronization over four eras is due to the increased impact of global shocks. On the other hand, for the trade model, while global shocks have become important, increased transmission channels have more effect on business cycles synchronization. They also consider financial conditions to see the role of financial factors in international business cycles synchronization. Several financial conditional indices based on real money growth and on real ex-post short term interest rate and yield spreads are used. It has been concluded that the financial conditions that have been important is some business cycles downturns. Bordo and Helbling's (2011) main conclusion is there is a doubtless increase in the international business cycles synchronization in globalization period and global shocks have the main impact across all regimes and models. But, they point out that although there is a linear increase in synchronization, the level of globalization has followed an U-shaped pattern.

Artis, Chouliarakis and Harischandra (2011) examine international business cycles behavior for 25 advanced and EMEs over 125 years. They firstly measure business cycles synchronization by cross correlations across countries over four eras and then they estimate FVAR model to identify the proportion of common shocks on explaining business cycle fluctuations. Cross correlation analyses indicate that the number, size and distribution of positive and statistically significant bilateral correlation coefficients differ considerable across sub-periods. The overall picture that emerges from correlation analyses suggest that the periods of high trade and capital market integration cannot be associated with increased business cycles co-movements. On the other hand, mean of correlation coefficients for a number of country groups suggest that there are two cyclically coherent groups: A European

group and Anglo-Saxon group which supports the studies of Helbling and Bauyomi (2003) and Stock and Watson (2005)[48].

To identify the importance of global shocks and country specific shocks in explaining business cycle fluctuations Artis, Chouliarakis and Harischandra (2011) construct a FSVAR model based on Stock and Watson's (2005) approach. Based on the results FSVAR analysis, rise in trade integration since the 1960s leads to significant increase in international business cycle synchronization within the group of European countries and group of English speaking countries. On the other hand, according to Artis, Chouliarakis and Harischandra (2011), although there is a rise in business cycle synchronization in advanced economies, country specific shocks are still the leading source of cycles for the other group of countries.

[48] In the previous study of Artis (2003), he tries to identify European business cycles over the past 30 years. He conclude that there are some core European countries that move together but there are many other that are do not. In addition both U.S. and Japan seems to move together with these countries which stick together. According to findings of Artis (2003), it can be accepted that there is European business cycle, but the source of this cycle is globalization rather than Europeanization.

CHAPTER 3
SOME STYLIZED FACTS OF BUSINESS CYCLES IN EMERGING MARKET ECONOMIES

In this section, some stylized features of business cycles in emerging market economies (EMEs) and in developed countries are presented in order to understand the diversity between business cycles of these two groups of countries. One of the major research topics in business cycles studies is to understand structural diversity of business cycles in EMEs and developed countries to construct models in analyzing cycles and to develop policies based on this diversity. Thus, in this chapter, as the first step for understanding the difference, stylized facts of macroeconomic fluctuations for two groups of countries are presented. The footsteps of Aguiar and Gopinath (2007a) are followed such that volatilities of business cycles, relative volatilities of consumption, investment and net exports and contemporaneous correlations are computed. In addition, to give a basic picture of phenomenon and to understand the distribution of business cycles for both EMEs and developed countries, duration and amplitude of cycles are reported and kernel density estimation plots are presented.

In the literature, there has been bulk of evidence about the stylized fact that both business cycles and output growth volatility in EMEs are higher than in developed countries[1]. On the other hand, Bernanke (2004) characterize business cycles in the U.S. as mild during 1984-2006 since substantial decline in the volatility have been experienced which is named as the "Great Moderation" in the literature. Furthermore, many other studies conclude that the "Great Moderation" is true for other developed countries as well[2]. To have contribution to this debate volatilities are firstly reported in this chapter

Volatilities and autocorrelations of filtered log-output cycles and first differenced log-output are presented in Table 1. In this table, sample of EMEs consists of 25 countries and sample of developed countries consists of 22 countries.

[1] Neumeyer and Perri (2005), Aguiar and Gopinath (2007a), Haruka (2007), Garcia-Cicco, Pancrazi and Uribe (2010)

[2] Kim and Nelson (1999), Blanchard and Simon (2001) and Stock and Watson (2005).

The time period for each country is different and the detailed information on data is given in the data appendix[3]. All series in Table 1 are seasonally adjusted by Tramo/Seats method and cycles are derived by employing Hodrick-Prescott filter[4].

As seen in the Table 1, business cycles in EMEs are more volatile than in developed countries, a result consistent with the previous studies. Within the group of EMEs, Latvia and Argentina have the highest business cycle volatility, while for the group of developed economies Iceland and Luxemburg lead the group in terms of volatility. There are many studies in the literature that discuss the decline in the volatility of cycles, so-called the "Great Moderation", in the cycles of developed countries since mid 1980s. However, impact of the recent crises has not been covered due to data restrictions. In addition, similar to the business cycles volatility, first differenced output, namely growth, in EMEs is more volatile compared to developed countries[5]. Autocorrelation of output cycles that are given in the third column of the Table 1 are close among EMEs and developed countries. Thus, one can conclude that persistence does not differ across group of countries. Figure 1 provides a clear demonstration of the difference in volatilities of cycles across group of countries. In Figure 1, volatilities of EMEs and developed countries are represented by red and blue bars respectively. It is obvious that majority of EMEs are the ones with higher volatilities and majority of developed countries have lower volatilities with few outliers.

Volatilities and relative volatilities of seasonally adjusted and filtered consumption, investment and net exports are given in Table 2. It can be seen that consumption, investment and ratio of net exports to output volatilities are higher in EMEs both in level and in business cycle frequencies[6]. It should be noticed that both volatilities and relative volatilities of filtered consumption, investment and net exports over output are higher in EMEs. While, the difference between volatilities in levels is bigger than relative volatilities between two groups of countries.

[3] The data is obtained from International Monetary Fund's (IMF) International Financial Statistics.

[4] The smoothing parameter is 1600.

[5] There is also a bunch of studies that discuss the linkage between volatility and growth of output.

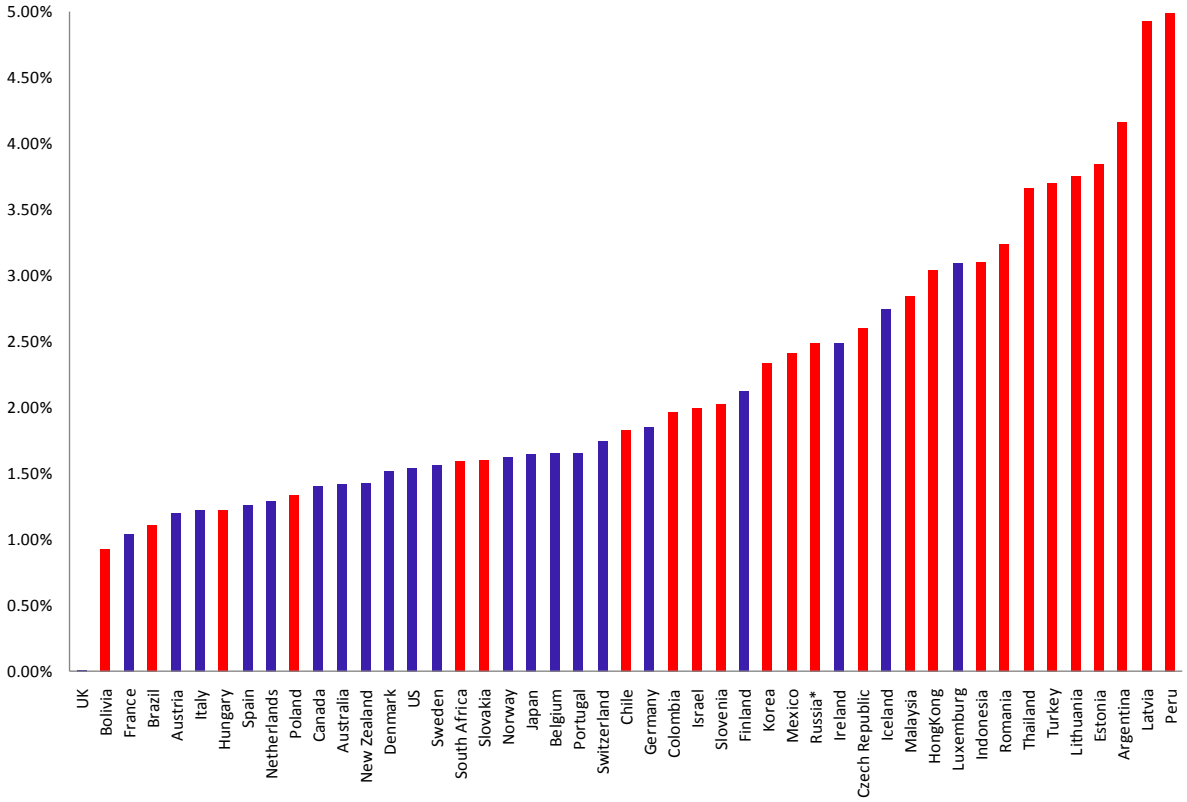
[6] The results in table 2 are slightly different than the results in Aguair and Gopinath's (2007) study such that the relative volatilities of filtered consumption, investment and next exports over GDP in their paper for EME are higher and for developed economies are lower. The reason for these differences should be due to different time period and different sample of countries.

Table 1. Volatility and Autocorrelation of Output Cycles and Output Growth

EMEs	**σ(Cyc)**	**σ(ΔY)**	**ρ(Cyc_t,Cyc_{t-1})**	**ρ(ΔY_t, ΔY_{t-1})**
Argentina	4.17%	1.92%	0.91	0.73
Bolivia	0.93%	0.69%	0.76	-0.02
Brazil	1.11%	1.24%	0.37	0.07
Chile	1.83%	1.22%	0.72	0.32
Colombia	1.96%	1.25%	0.77	0.12
Czech Republic	2.60%	1.22%	0.75	0.75
Estonia	3.84%	1.97%	0.76	0.58
HongKong	3.04%	2.08%	0.77	0.13
Hungary	1.23%	0.76%	0.62	0.67
Indonesia	3.10%	1.79%	0.84	0.72
Israel	1.99%	1.87%	0.57	-0.29
Korea	2.33%	1.62%	0.78	0.12
Latvia	4.92%	2.92%	0.66	0.58
Lithuania	3.75%	2.26%	0.67	0.34
Malaysia	2.85%	2.06%	0.76	0.22
Mexico	2.42%	1.57%	0.76	0.19
Peru	4.98%	1.90%	0.84	0.13
Poland	1.34%	1.04%	0.68	-0.01
Romania	3.23%	2.83%	0.43	0.07
Russia	2.48%	1.73%	0.79	0.35
Slovakia	1.61%	1.12%	0.80	0.13
Slovenia	2.02%	1.23%	0.68	0.36
South Africa	1.59%	1.10%	0.78	0.11
Thailand	3.66%	1.87%	0.85	0.47
Turkey	3.70%	2.96%	0.67	-0.06
Average	*2.67%*	*1.69%*	*0.72*	*0.27*
Developed Countries	**σ(Cyc)**	**σ(ΔY)**	**ρ(Cyc_t,Cyc_{t-1})**	**ρ(ΔY_t, ΔY_{t-1})**
Australia	1.42%	1.13%	0.70	-0.04
Austria	1.20%	1.03%	0.65	-0.09
Belgium	1.66%	1.76%	0.44	-0.22
Canada	1.41%	0.90%	0.80	0.31
Denmark	1.52%	1.17%	0.67	0.01
Finland	2.12%	1.09%	0.86	0.33
France	1.04%	0.62%	0.85	0.40
Germany	1.85%	1.35%	0.73	0.04
Iceland	2.75%	3.10%	0.31	-0.38
Ireland	2.49%	2.19%	0.47	-0.07
Italy	1.22%	0.78%	0.78	0.30
Japan	1.64%	1.28%	0.81	0.54
Luxemburg	3.09%	2.23%	0.71	0.07
Netherlands	1.30%	0.91%	0.73	0.04
New Zealand	1.43%	1.06%	0.74	0.01
Norway	1.63%	1.99%	0.26	-0.76
Portugal	1.66%	1.22%	0.75	-0.10
Spain	1.26%	0.86%	0.78	0.17
Sweden	1.57%	1.01%	0.74	0.11
Switzerland	1.75%	1.09%	0.78	0.11
UK	0.01%	0.01%	0.77	0.05
US	1.54%	0.87%	0.84	0.34
Average	*1.62%*	*1.26%*	*0.69*	*0.05*

Note: The output series are seasonally adjusted and logged. Cyc is for business cycle that is derived by filtering output series for each country by Hodrick-Prescott Filtering. ÄY is for output growth that is the first difference of logged seasonally adjusted output series. The standard deviations are reported in percentage term.

Furthermore, both average consumption and investment are more volatile than average business cycle volatility in both groups of countries. This result is consistent with the permanent income hypothesis that permanent increase in productivity implies higher growth of the future output. Since individuals know that their income will be higher in the future, they consume more and save less. Thus, consumption volatility would be higher than output volatility; consumption would increase more than current income, individuals would reduce savings and trade more.



Note: Red bars represent EMEs and blues represent developed countries.

Figure 1. Volatilities of Business Cycles across Countries

Table 2. Relative Volatility of Consumption, Investment and Net Exports

EMEs	**σ(C)**	**σ(I)**	**σ(C)/σ(Cyc)**	**σ(I) /σ(Cyc)**	**σ(NX/ Cyc)**
Argentina	5.56%	13.24%	1.34	3.18	2.79%
Bolivia	1.67%	9.94%	1.80	10.70	3.79%
Brazil	1.37%	4.11%	1.23	3.67	8.59%
Chile	2.55%	7.31%	1.39	4.00	2.81%
Colombia	2.44%	11.58%	1.25	5.91	1.53%
Czech	2.37%	5.84%	0.91	2.25	1.63%
Estonia	4.78%	10.25%	1.25	2.67	3.16%
HongKong	3.19%	8.16%	1.05	2.68	3.37%
Hungary	2.14%	2.59%	1.75	2.12	1.49%
Indonesia	4.96%	7.84%	1.60	2.53	2.40%
Israel	3.28%	6.66%	1.64	3.34	2.15%
Korea	3.08%	9.06%	1.32	3.89	2.91%
Latvia	5.56%	11.40%	1.13	2.31	3.54%
Lithuania	3.56%	11.38%	0.95	3.04	3.42%
Malaysia	4.48%	12.35%	1.52	4.18	4.53%
Mexico	3.47%	8.15%	1.44	3.37	2.09%
Peru	5.08%	11.09%	1.02	2.23	1.70%
Poland	1.18%	6.27%	0.88	4.69	1.15%
Romania	3.35%	6.88%	1.04	2.13	1.84%
Russia	3.24%	7.96%	1.30	3.21	4.00%
Slovak	1.78%	9.26%	1.11	5.77	4.19%
Slovenia	1.78%	6.95%	0.88	3.44	1.71%
South Africa	2.46%	6.14%	1.54	3.85	0.68%
Thailand	3.61%	12.29%	0.99	3.36	4.34%
Turkey	4.72%	10.82%	1.28	2.92	2.36%
Average	*3.27%*	*8.70%*	*1.26*	*3.66*	*2.89%*
Developed Countries	**σ(C)**	**σ(I)**	**σ(C)/σ(Cyc)**	**σ(I) /σ(Cyc)**	**σ(NX/ Cyc)**
Australia	1.02%	4.41%	0.72	3.11	1.15%
Austria	1.40%	4.12%	1.16	3.43	1.03%
Belgium	1.85%	4.41%	1.12	2.66	1.20%
Canada	1.27%	4.47%	0.90	3.17	0.90%
Denmark	1.77%	5.61%	1.16	3.68	1.02%
Finland	1.47%	7.01%	0.69	3.30	1.63%
France	1.31%	3.13%	1.26	3.02	0.72%
Germany	2.19%	4.35%	1.18	2.36	1.13%
Iceland	5.07%	14.38%	1.85	5.23	4.56%
Ireland	2.08%	8.81%	0.84	3.54	2.15%
Italy	1.27%	3.41%	1.04	2.80	0.75%
Japan	1.42%	4.09%	0.86	2.50	0.77%
Luxemburg	2.96%	9.84%	0.97	3.23	2.29%
Netherlands	1.36%	4.43%	1.05	3.41	0.98%
New Zealand	1.49%	6.05%	1.04	4.24	1.28%
Norway	2.94%	8.83%	1.81	5.43	3.24%
Portugal	3.27%	7.39%	1.97	4.46	2.21%
Spain	1.40%	4.96%	1.11	3.94	1.24%
Sweden	1.32%	5.67%	0.85	3.62	0.86%
Switzerland	1.10%	5.67%	0.63	3.24	1.10%
UK	1.61%	4.50%	1.10	3.07	0.01%
US	1.20%	4.26%	0.78	2.77	0.42%
Average	*1.85%*	*5.90%*	*1.10*	*3.46*	*1.39%*

Note: The series are seasonally adjusted, logged and filtered by Hodrick-Prescott Filtering. The standard deviations are reported in percentage term.

In order to test for the significance of the difference between business cycle volatilities of EMEs and developed countries, a simple regression is employed as an exercise which included dummies for EMEs as explanatory variable and volatilities as a dependent variable. The results are reported in the Table 3. It is concluded that business cycle volatilities, volatilities of filtered consumption, investment and ratio of net export to output differ significantly across two groups of countries at 5% significance level. However, it is also found that relative volatilities of investment do no differ significantly across group of countries and relative volatilities of consumption differ across group of countries only at 10% significance level.

Table 3. Testing Volatilities Across Group of Countries

Variables	σ(Cyc)	σ(C)	σ(I)	σ(C)/ σ(Cyc)	σ(I)/ σ(Cyc)	σ(NX/Cyc)
Constant	0.0162** (0.0020)	0.0185** (0.0025)	0.0589** (0.0057)	1.0956** (0.0675)	3.4633** (0.3005)	0.0139** (0.0029)
Dummy for EME	0.0105** (0.0027)	0.0141** (0.0034)	0.0280** (0.0078)	0.1678* (0.0926)	0.1937 (0.4119)	0.0149** (0.0039)

Notes: Standard errors are in paranthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Dummy for EMEs is equal to 1 for EMEs and to 0 for developed countries.

Table 4 reports the correlation of filtered consumption, investment and ratio of net exports to output with business cycles series. Based on the results it cannot be concluded that contemporaneous correlations between consumption, investment and ratio of net export of output differ across EMEs and developed countries. Even though, there is a slight difference between correlations of two groups of countries, both groups support the theory that both consumption and investment are procyclical while the ratio of net exports to output is countercyclical with business cycles. Moreover, net exports are more countercyclical in EMEs than in developed countries, a result consistent with those of Neumeyer and Perri (2005) and Aguiar and Gopinath (2007a)[7]. To examine if the correlations differ when some outlier countries[8] are excluded from the sample, average correlations are computed without these countries but no significant change is observed.

[7] In studies of Neumeyer and Perri (2005) and Aguiar and Gopinath (2007a), it is concluded that net exports are much more countercyclical in emerging market economies than in developed economies. Although, it is also found that net exports are more countercyclical in emerging market economies in this study, the difference is small. The reason of this difference should be different time period and sample of countries.

[8] Russia and Indonesia.

Table 4. Contemporaneous Correlation With Output

EMEs	**ρ(C,Cyc)**	**ρ(I,Cyc)**	**ρ(NX/Y,Cyc)**
Argentina	0.94	0.94	-0.83
Bolivia	0.41	0.74	-0.51
Brazil	0.54	0.78	-0.34
Chile	0.16	0.57	0.05
Colombia	0.61	0.72	-0.47
Czech Republic	0.80	0.91	-0.35
Estonia	0.87	0.80	-0.55
HongKong	0.64	0.73	-0.16
Hungary	0.49	0.37	-0.20
Indonesia	-0.07	0.71	-0.54
Israel	0.47	0.49	0.10
Korea	0.59	0.85	-0.26
Latvia	0.67	0.82	-0.68
Lithuania	0.63	0.92	-0.47
Malaysia	0.63	0.77	-0.61
Mexico	0.77	0.74	-0.52
Peru	0.79	0.76	0.05
Poland	0.57	0.74	-0.65
Romania	0.79	0.82	-0.24
Russia	-0.27	0.71	0.06
Slovakia	0.48	0.57	-0.29
Slovenia	0.64	0.89	-0.46
South Africa	0.50	0.58	-0.51
Thailand	0.90	0.91	-0.57
Turkey	0.78	0.83	-0.60
Average	*0.57*	*0.75*	*-0.38*
Developed Countries	**ρ(C,Cyc)**	**ρ(I,Cyc)**	**ρ(NX/Y,Cyc)**
Australia	0.43	0.75	-0.27
Austria	0.49	0.58	-0.20
Belgium	0.79	0.55	-0.12
Canada	0.55	0.69	0.07
Denmark	0.81	0.81	-0.41
Finland	0.63	0.82	-0.21
France	0.40	0.79	-0.29
Germany	0.83	0.85	-0.39
Iceland	0.62	0.64	-0.35
Ireland	0.70	0.77	-0.41
Italy	0.80	0.86	-0.25
Japan	0.61	0.85	-0.18
Luxemburg	0.47	0.38	0.42
Netherlands	0.69	0.71	-0.13
New Zealand	0.48	0.84	-0.18
Norway	0.32	0.22	0.05
Portugal	0.31	0.62	-0.24
Spain	0.79	0.58	-0.42
Sweden	0.53	0.79	-0.03
Switzerland	0.71	0.77	-0.46
UK	0.80	0.75	-0.37
US	0.89	0.91	-0.05
Average	*0.62*	*0.70*	*-0.20*

Note: All the series are seasonally adjusted, logged and filtered by Hodrick-Prescott filter.

Another important characteristic of business cycles in EMEs is the diversity in the duration and amplitudes of recessions and expansions. It has been argued that EMEs have experienced more frequent and deeper recessions, whereas more sizeable and longer expansions which is associated with the highly volatile output fluctuations in these countries[9]. In Table 5 and Table 6, duration and amplitudes of business cycles for EME and for developed countries are presented, respectively. As Calderon and Fuentes (2010) state there is no unique method to determine the turning points of cycles. In this study, duration and amplitudes of the expansions and recessions are determined based on the RATS program developed by Kholodilin (2000)[10]. The expansion (recession) is defined as the timespan between a cyclical trough (peak) and peak (trough). Duration refers to the timespan from peak to trough during the recessions and from trough to peak during expansions. And, amplitude is the depth of the recessions or expansions, in other words amplitude indicates how deep the impact of expansion or recession is.

It is found that average duration of recessions in EMEs is approximately 8.7 quarters and in developed countries it is approximately 11 quarters. Although, average duration time of recessions is longer for the developed countries against the expectations, the average amplitude of the recessions for EMEs is almost twice the average amplitude of recessions in developed countries. That means, it takes longer time to recover from recessions for these economies since they experience deeper contractions. On the other hand, average duration of expansions for EMEs is longer than the average duration of expansions in developed countries as expected such that convergence theory suggests that poorer countries tend to grow faster. Moreover, average amplitude of expansions in EMEs is also twice the average amplitude of expansions in developed countries.

Within the group of EMEs, Argentina has the longest duration of recessions and former eastern bloc countries have longer duration of expansions. If the period over 1990-2009 is considered, it is seen that average duration of expansions have increased noticeably and average duration of recessions have increased slightly for the sample of EMEs. This finding support the view that although EMEs had experienced several financial crises over the period 1990-2009, they have

[9] Calderon and Fuentes (2010).

[10] The program is used to determine the turning points of the cycles by taking minimum cycle duration as 4 since the data is quarterly.

implemented stronger macroeconomic policies, have become more integrated with the rest of the world and have achieved higher growth rates.

Table 5.Duration and Amplitude of Business Cycles in EMEs

EMEs	Sample	Expansions			Recessions		
		Frequency	Duration	Amplitude	Frequency	Duration	Amplitude
Argentina	1993:1-2009:2	1/16.5	10.00	0.13	1/16	16.00	0.18
Bolivia	1995:1-2008:4	1/14	11.00	0.04	1/13	22.00	0.04
Brazil	1996:1-2009:3	4/13.75	7.67	0.03	3/13.75	4.00	0.03
Chile	1996:1-2009:2	1/13.5	36.00	0.06	1/13.5	4.00	0.07
Colombia	1994:1-2009:2	2/15.5	25.00	0.07	1/15.5	5.00	0.08
Czech Republic	1994:1-2009:2	1/15.5	11.00	0.14	-	-	-
Estonia	1993:1-2009:2	1/16.5	45.00	0.11	1/16.5	11.00	0.09
HongKong	1973:3-2009:2	5/36.5	21.20	0.11	5/36.5	6.20	0.11
	1990:1-2009:2	3/19.5	24.66	0.11	2/19.5	8.00	0.10
Hungary	1995:1-2009:2	1/14.25	40.00	0.03	1/14.25	6.00	0.04
Indonesia	1997:1-2009:2	-	-	-	1/12.5	5.00	0.17
Israel	1980:1-2009:3	6/29.75	9.00	0.07	6/29.75	8.33	0.07
	1990:1-2009:2	4/19.5	9.50	0.07	4/19.5	10.25	0.08
Korea	1960:1-2009:2	5/49.5	30.40	0.10	4/49.5	7.00	0.11
	1990:1-2009:2	2/19.5	51.00	0.11	1/19.5	6.00	0.13
Latvia	1992:1-2009:2	1/17.5	51.00	0.16	1/17.5	12.00	0.25
Lithuania	1993:1-2009:2	1/16.5	52.00	0.13	1/16.5	8.00	0.12
Malaysia	1991:1-2009:2	2/18.5	31.50	0.11	1/18.5	4.00	0.16
Mexico	1981:1-2009:2	4/28.5	19.50	0.08	4/28.5	7.00	0.08
	1990:1-2009:2	2/19.5	20.50	0.09	2/19.5	7.50	0.09
Peru	1979:1-2009:2	2/30.5	17.00	0.23	2/30.5	10.00	0.23
	1990:1-2009:2	1/19.5	18.00	0.21	1/19.5	11.00	0.31
Poland	1995:1-2009:1	2/14.25	15.50	0.05	1/14.25	13.00	0.05
Romania	1998:1-2009:2	1/11.5	33.00	0.15	1/11.5	5.00	0.11
Russia	1995:1-2008:4	-	-	-	1/14	13.00	0.13
Slovakia	1993:1-2008:4	2/16	25.00	0.06	1/16	4.00	0.08
Slovenia	1995:1-2008:4	-	-	-	-	-	-
South Africa	1960:1-2009:2	7/49.5	12.43	0.06	6/49.5	9.17	0.06
	1990:1-2009:2	1/19.5	16.00	0.06	1/19.5	14.00	0.07
Thailand	1993:1-2009:3	2/16.5	25.50	0.14	1/16.5	9.00	0.17
Turkey	1987:1-2009:3	4/22.5	14.75	0.13	4/22.5	5.50	0.13
	Average		*24.40*	*0.10*		*8.65*	*0.11*
	Average Over the Period 1990-2009		*25.91*	*0.10*		*8.76*	*0.12*
	Average Over the Period 1990-2009 (Except Eastern Bloc Countries)		*21.26*	*0.10*		*8.63*	*0.12*

Since Eastern Bloc countries have data since early 1990s, thus average durations are computed without considering these countries. Without group of Eastern Bloc countries, average duration of recessions changed slightly, but average duration of expansions for EMEs have decreased remarkably.

Table 6.Duration and Amplitude of Business Cycles in Developed Countries

Developed Countries	Sample	Expansions			Recessions		
		Frequency	Duration	Amplitude	Frequency	Duration	Amplitude
Australia	1960:1-2009:2	5/49.5	22.20	0.06	5/49.5	8.60	0.06
	1990:1-2009:2	1/19.5	28.00	0.04	1/19.5	9.00	0.06
Austria	1964:1-2009:2	7/45.25	13.00	0.04	7/45.25	11.00	0.04
	1990:1-2009:2	2/19.5	15.00	0.03	2/19.5	18.00	0.03
Belgium	1980:1-2009:2	3/29.5	19.67	0.05	4/29.5	13.00	0.06
	1990:1-2009:2	2/19.5	19.50	0.05	3/19.5	12.00	0.06
Canada	1960:1-2009:2	6/49.5	18.00	0.05	6/49.5	9.00	0.05
	1990:1-2009:2	1/19.5	31.00	0.04	1/19.5	15.00	0.05
Denmark	1977:1-2009:2	7/32.5	11.00	0.05	6/32.5	7.00	0.05
	1990:1-2009:2	2/19.5	14.00	0.04	3/19.5	10.67	0.05
Finland	1970:1-2009:2	5/39.5	16.20	0.07	4/39.5	15.75	0.07
	1990:1-2009:2	2/19.5	23.50	0.06	1/19,5	11.00	0.04
France	1970:1-2009:3	6/39.75	12.83	0.03	5/39,75	14.60	0.03
	1990:1-2009:3	2/19.5	13.50	0.03	2/19,5	22.50	0.03
Germany	1978:1-2009:2	2/31	8.50	0.05	2/31	14.00	0.05
	1990:1-2009:2	1/19.5	11.00	0.04	1/19.5	17.00	0.05
Iceland	1997:1-2009:1	2/12.25	15.00	0.10	1/12,25	8.00	0.10
Ireland	1997:1-2009:1	2/12.25	9.00	0.08	1/12,25	15.00	0.06
Italy	1980:1-2009:2	3/29.5	23.67	0.04	3/29,5	12.67	0.04
	1990:1-2009:2	2/19.5	21.50	0.04	2/19,5	15.00	0.04
Japan	1960:1-2009:2	5/49.5	30.40	0.06	5/49,5	7.00	0.06
	1990:1-2009:2	2/19.5	25.00	0.05	2/19,5	10.00	0.04
Luxemburg	1995:1-2009:1	2/14.25	14.00	0.10	2/14,25	12.00	0.10
Netherlands	1977:1-2009:2	4/32.5	21.25	0.04	4/32,5	13.00	0.05
	1990:1-2009:2	2/19.5	23.00	0.04	1/19,5	11.00	0.04
New Zealand	1987:2-2009:3	3/22.5	14.33	0.05	3/22,5	10.00	0.05
Norway	1966:1-2009:2	7/43.5	15.86	0.07	6/43,5	9.50	0.07
	1990:1-2009:2	3/19.5	18.00	0.06	2/19,5	11.50	0.05

Table 6.Duration and Amplitude of Business Cycles in Developed Countries (Continue)

Developed Countries	Sample	Expansions			Recessions		
		Frequency	Duration	Amplitude	Frequency	Duration	Amplitude
Portugal	1977:1-2009:2	2/32.5	17.50	0.07	2/32,5	12.50	0.06
	1990:1-2009:2	1/19.5	27.00	0.07	1/19,5	10.00	0.05
Spain	1980:1-2009:1	6/39.35	10.33	0.04	6/39,25	14.50	0.04
	1990:1-2009:2	3/19.5	8.33	0.03	3/19,5	13.67	0.04
Sweden	1980:1-2009:2	4/29.5	18.00	0.05	4/29,5	9.75	0.05
	1990:1-2009:2	3/19.5	14.67	0.05	3/19,5	9.00	0.05
Switzerland	1970:1-2009:2	3/39.5	20.67	0.09	2/39,5	9.00	0.09
	1990:1-2009:2	-	-	-	-	-	-
UK	1960:1-2009:2	5/49.5	24.60	0.06	5/49,5	13.80	0.06
	1990:1-2009:2	1/19.5	63.00	0.05	1/19,5	14.00	0.05
US	1960:1-2009:3	6/49.75	21.17	0.06	6/49,75	10.67	0.06
	1990:1-2009:3	2/19.5	26.50	0.04	2/19,5	9.00	0.04
		Average	*22.89*	*0.05*		*11.44*	*0.06*
		Average Over the Period 1990-2009	*20.71*	*0.06*		*12.54*	*0.06*

Within the group of developed countries, Finland has the longest duration of recession over the whole period but France has the longest duration of recession over the period 1990-2009. In addition, over the period 1990-2009, average duration of recessions of develop countries increased whereas average duration of expansions have decreased. Since the developed countries data is longer compared to the data of EME, more recessions and expansions is captured and it should be noticed that some developed countries has experienced severe financial crisis before 1980s.

After, some stylized facts of business cycles are documented based on descriptive statistics, to have more clear inference on the diversity of business cycles across EMEs and developed countries Kernel density estimation is considered in this part. Kernel density estimation plot is an improvement over histogram. Unlike the histogram, kernel estimation smoothes data and does not depend on the end points of the bins, thus, it enables us to observe the distribution of the data better. In the business cycles framework, kernel density estimation plot displays the difference between the distribution of business cycles in EMEs and developed economies in a more clear way.

Since business cycles are residuals that are separated from the trend of output series by Hodrick-Prescott filtering, it is expected that they would be normally

distributed series around mean zero. Kernel estimation plot of business cycles in both EMEs and developed countries support this expectation, as they are both normally distributed around zero[11]. Figure 2 presents the difference between business cycles of two groups of countries such as while the distribution of business cycles in developed countries is more stable around 0, business cycles in EMEs are more widely spread around 0. This supports the argument that business cycles in EME are more volatile and these economies are more unstable and having recessions and booms more frequently. On the other hand, macroeconomic fluctuations in developed countries have distributed moderately and indicate a stable economic path.

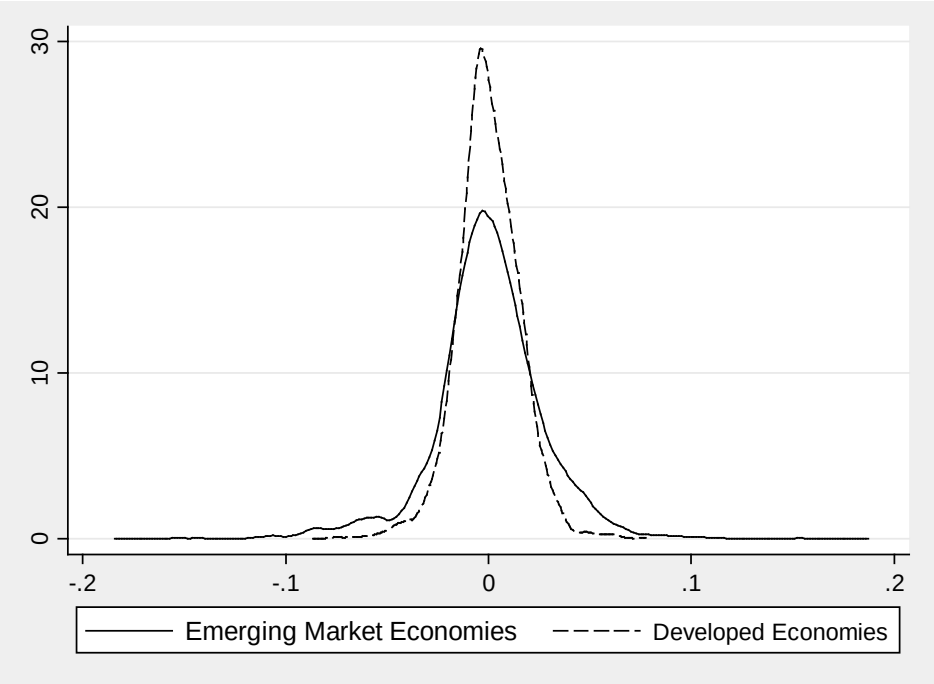


Figure 2: Kernel Density Estimation Plot for the Business Cycles in EMEs and Developed Countries.

In last two decades, the business cycles in developed countries have become more moderate until the recent global financial crisis. However, EMEs have experienced several financial crises that causeed high volatility of cycles in 1990s and in early 2000s. On the other hand, EMEs have initiated macroeconomic reforms and strengthen their domestic markets after these crises. EMEs have begun to have a considerable share in the global economy and have achieved high growth rates recently. Moreover, EMEs have become more resilient to the financial crisis in 2008

[11] Kernel density functions are estimated by using Epanechnikov kernel.

and to the growth slowdowns in developed countries over the period 2003-2008 due to their strong domestic markets and macroeconomic reforms. Under these circumstances, it has been discussed in the literature that business cycles in EME decoupled from the cycles in developed countries and have started to follow more stable path[12]. Thus, in order to see the business cycle movements in the light of this debate, kernel density graphs before and after 1995 are presented in Figure 3, Figure 4, and Figure 5.

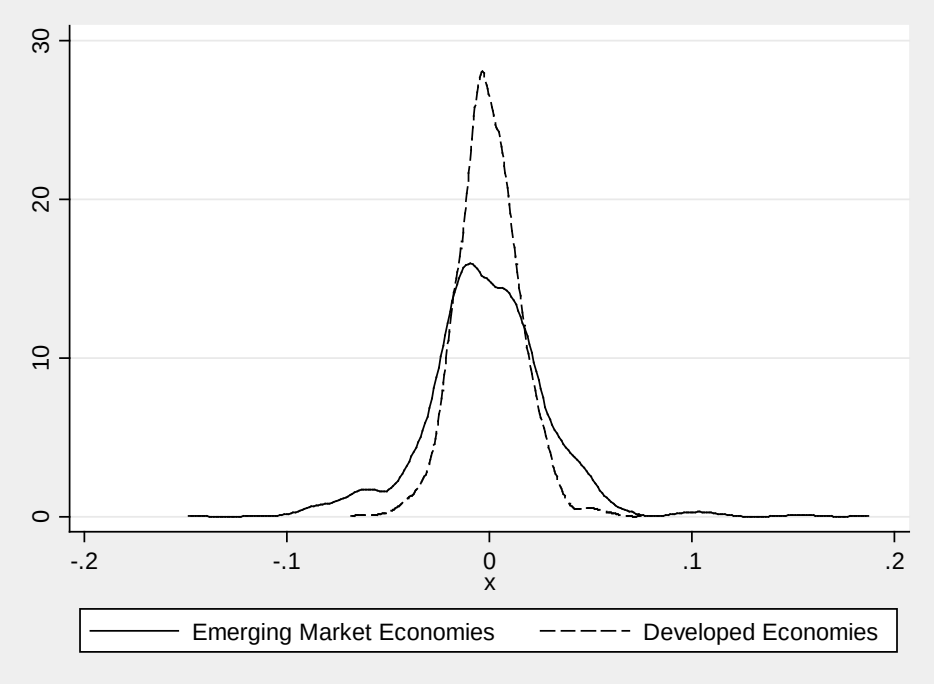


Figure 3: Kernel Density Estimation Plot for the Business Cycles in EMEs and Developed Countries over the period before 1995.

In Figure 3 and Figure 4, distribution of business cycles for both EMEs and developed countries are examined for the period before and after 1995. According to kernel distributions of cycles, even though EMEs have more noticeable recessions and booms after 1995, these economies have become more stable around zero after the year 1995. Thus, kernel density graphs support the view that economies of emerging markets have started to follow more stable path despite of the crises in the last decade. On the other hand, no significant difference can be observed in the distribution of business cycles for developed countries.

[12] Decoupling and Coupling hypotheses of cycles have been discussed in Chapter 5 in details.

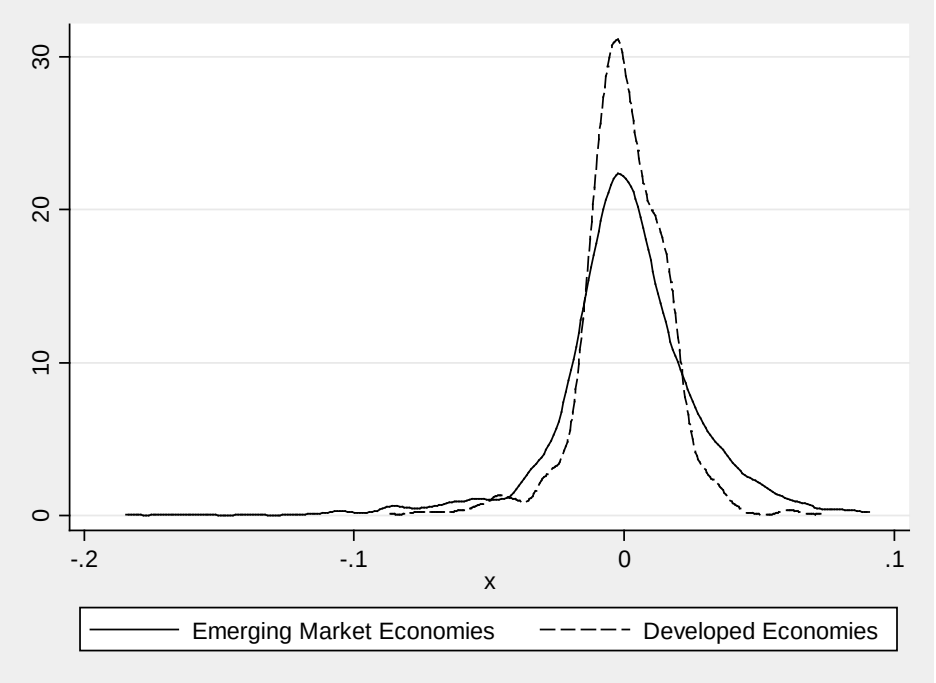


Figure 4: Kernel Density Estimation Plot for the Business Cycles in EMEs and Developed Countries over the period after 1995.

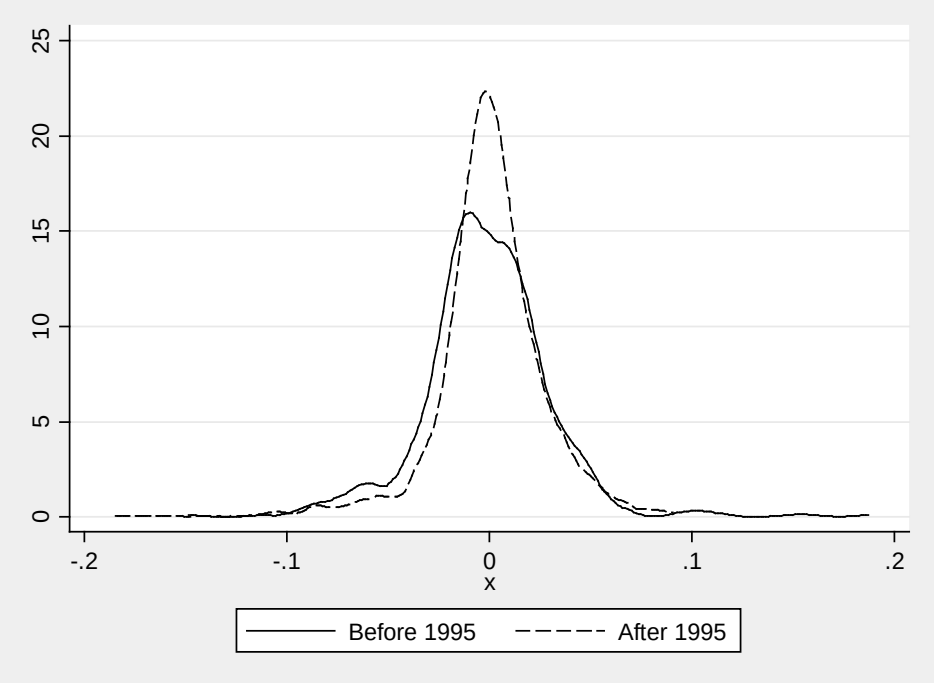


Figure 5: Kernel Density Estimation Plot for the Business Cycles in EMEs over the period before and after 1995.

Figure 5 presents the distribution of business cycles for EMEs for the period before and after 1995. This graph also supports the previous results that EMEs have become more stable after 1995. In the Figure 6, the distribution of the business cycles in developed countries is examined for the period before and after 1995. For

the developed countries, it can be concluded that the distribution of the business cycles have not been remarkably changed and have followed a modest path.

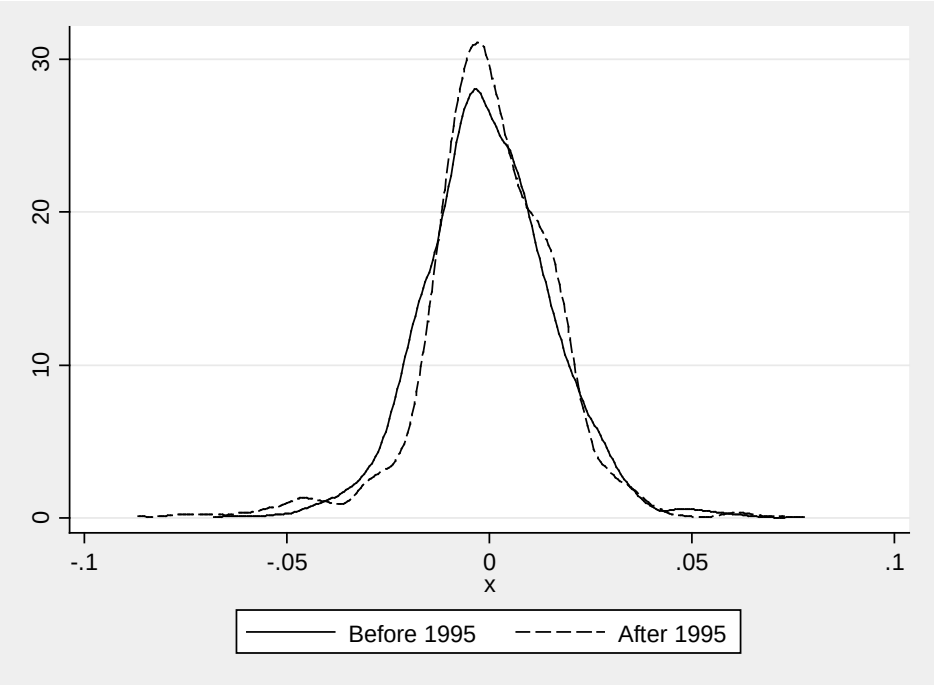


Figure 6: Kernel Density Estimation Plot for the Business Cycles in Developed Countries over the period before and after 1995.

To sum up, descriptive statistics in this chapter support the previous studies that business cycles in EMEs are more volatile for output, consumption, investment and net exports than the business cycles in developed countries. Findings also indicate that after 1995, macroeconomic fluctuations in EMEs have begun to follow more stable path despite the dramatic financial crisis over this period. Moreover, according to duration and amplitude analysis of cycles, average duration time of recessions is longer for the developed countries but the average amplitude of the recessions for EME is almost twice the average amplitude of recessions in developed countries. That means it takes longer time to recover from recessions for EME since they experience deeper contractions. On the other hand, average duration of expansions for EMEs is longer than the average duration of expansions in developed countries. According to Aguiar and Gopinath (2007a) volatile trend of the macroeconomic fluctuations in EMEs determine the behavior of the economy at business cycle frequencies. Hence, overall stylized facts of business cycles that documented in this chapter support the Aguiar and Gopinath's (2007a) view in a descriptive way.

CHAPTER 4

DETERMINANTS OF BUSINESS CYCLES

In this chapter, the main goal is to identify the main determinants of business cycle fluctuations for the whole sample, for the sample of emerging market economies (EMEs) and sample of developed countries empirically. More precisely, this chapter aims to clarify whether business cycles are caused mainly by global common shocks or domestic shocks. A general model for the determinants of business cycles can be represented as:

$$C_{it} = \alpha + \beta X_{it} + \theta Z_t + U_{it} \quad (1)$$

where C represents the business cycle series, α is the constant term, X is the vector of domestic variables and Z is the vector of external variables, β and θ are coefficient vectors and U is the disturbance term. The subscripts i and t are for country and time period, respectively.

The domestic factors that are used in the literature for investigating the factors of business cycles are mainly, real exchange rate, terms of trade[1], net foreign assets, interest rates and price level[2]. External factors that are focused on in the literature are U.S. interest rates and/or FED rates as proxy for global liquidity, industrialized countries' business cycles acting as proxy for a global economic view, the high yield spread indices, emerging market bond spreads or the Chicago Board Options Exchange Market Volatility Index (VIX) as a measure of the risk appetite of international investors in other words, price of risk[3]; and oil prices or other commodity prices acting as another proxy for taking into account the global economic condition.

Most of the recent empirical studies focus on business cycles in EMEs rather than in developed economies which is comprehensible since developed economies'

[1] Terms of trade can be considered as external factor rather than domestic factor due to the fact it is the ratio of price of exports to price of imports and since they depend on domestic conditions as well as external demand.

[2] In addition, there is a remarkable number of studies that consider consumption, investment, export and imports as domestic factors of business cycles. However, a country's output is already composed of these series, therefore considering them as a source of business cycles can be misleading.

[3] Rozada and Levy-Yeyati (2006), Sahinbeyoglu *et al.* (2009).

business cycles are stable; shocks to the cycles are transitory and do not affect the phase of the economy. Whereas, in EMEs shocks last longer as Aguiar and Gopinath (2007a) state, "the cycle is the trend" in these economies. Although most of the studies agree that external factors are important sources for business cycles in EMEs, some empirical works suggest that external factors have a limited role in the cycles and country specific factors including not only macroeconomic fundamentals but also institutional structures such as weak institutions and political instability shape the macroeconomic fluctuations[4].

In this study, the set of domestic variables consists of real exchange rate indices, change in net foreign assets ratio to GDP[5], real interest rate and terms of trade. The set of external variables consists of VIX as a measure of global financial conditions and U.S. output cycles acting as a proxy for global macroeconomic conditions that is to say common shocks.

In the model, U.S. output cycles are considered as a major external source given that output fluctuations in G-7 countries are considered as leading external source of the business cycles in EMEs.[6] Since the U.S. economy or other G-7 countries lead the global economy, it is expected that fluctuations in these economies and fluctuations in the rest of the economies would move in the same direction. A crisis in the U.S. or in other G-7 countries, which was the case in the recent crisis of 2008, has considerable effects on the global economy. On the other hand, the strong growth performance of EMEs in recent years indicates that these countries seem to have been affected less by the current global economic crisis which is another point that must be explored deeply.

Another important external factor, agreed upon in the literature, is the U.S. interest rates especially the FED fund rates due to their strong impact on economic activity such as savings and investment decisions[7]. It is claimed that a positive shock to the U.S. real interest rate, which means tighter monetary policy in the U.S. would lead to a decrease in output fluctuations in developing economies. However, it is not

[4] Ahmed (2003), Kose et al. (2003a), Boschi and Girardi's (2011).

[5] Current account can not be obtained quarterly for each country therefore change in net foreign assets ratio is taken since it reflects current account.

[6] Ahmed (2003), Izquierdo, Romero and Talvi (2008), Sosa (2008).

[7] Kim (2001), Ahmed (2003), Neumeyer and Perri (2005), Uribe and Yue (2006), Mackowiak's (2007), Hirata, Kim and Kose (2007), Franken, Le Fort and Parrado (2008).

included in the model because it is correlated with U.S. output cycles, since a slowdown in U.S. economy means lower interest rates and vice versa.

Albeit, terms of trade is a domestic variable, it is seen as an external factor rather than domestic one due to the fact that it reflects the changes in the price of oil and other commodities which are determined in global markets.[8] Terms of trade reflects the country's gains from trade. An improvement in a country's terms of trade means that country pays less for the products it imports. Hence, it is expected that improvement in terms of trade leads to a positive impact on business cycles. Thus, it has been included in the model in this study.

Emerging market spreads have not been included because of the short time period of the data and they are not available for all the EMEs in our sample. Thus, VIX entered to the model as a measure of price of risk or international financial conditions. Since VIX reflects the volatility of markets and investors' uncertainty on investment conditions, it is expected that an increase in VIX would lead a decline in economic growth and vice versa.

In this chapter, firstly long run and short run impacts of both domestic and external factors are estimated by using unbalanced panel autoregressive distributed lag (ARDL) procedure. Secondly, Pesaran's (2006) common correlated effects pooled estimator is applied to examine the driving factors of business cycles for two groups of countries to control for the cross section dependence across countries. Next, generalized method of moments (GMM) procedure for dynamic panel data models, developed by Arellano and Bond (1991) is employed to solve the potential simultaneity and thus endogeneity problem of variables. Furthermore, Chinese business cycles is also taken into consideration as a result of increasing role of Chinese economy in the global economy. And, in the last part of this chapter, determinants of business cycles are investigated over different exchange rate regimes to contribute the researches on ambiguous linkage between exchange rate regimes and economic performance.

4.1. Panel Cointegration and ECM Analysis

In order to examine the impact of domestic and external factors on business cycles empirically, firstly, a panel error correction model is constructed for three

[8] Calvo *et al.* (1993), Franken, Le Fort and Parrado (2008), Izquierdo, Romero, and Talvi. (2008), Calderon and Fuentes (2010), Hirata, Kim and Kose (2007).

samples of countries: the whole sample of countries, the sample of EMEs and the sample of developed countries. It is aimed to analyze the long run relationship with short run dynamics among the variables of interest. Long run and short run impacts of the factors are estimated by using a panel ARDL model.

Panel ARDL model is preferred since it enables to analyze empirically the long run relationship with short run dynamics among the variables of interest when it is not known with certainty whether variables of interest are stationary (I(0)) and non-stationary (I(1)) or mutually cointegrated[9]. Even though, business cycles are proxied by Hodrick-Prescott filtered GDP in this study, which is presumed to be stationary I(0). The results by Aguiar and Gopinath (2007a), on the other hand, suggest that, in the EME case "the cycle is the trend" as that EMEs are subject to substantial volatility to trend growth. Consequently, the cycles in EMEs might be more persistent. Consistent with this argument, unit root tests for individual EMEs tend to suggest non-stationarity albeit panel unit root tests for the whole sample suggest the reverse. This does not preclude the use of ARDL as the procedure allows the inclusion of both I(1) and I(0) variables. Based on panel ARDL procedure, long run and short run impacts of both domestic and external factors are estimated.

The following long-run equations are estimated as a starting point, based on equation (1), with which the driving sources of business cycles in each sample of countries will be identified. Firstly, all explanatory variables are included and, equation (2) is estimated for each sample of countries by fixed unbalanced panel data estimation. In equation (2), C represents the business cycles series by filtering the output series[10] by using the Hodrcik-Prescott filter. LReer is the logarithm of real exchange rate index, DNfar is change in the net foreign assets ratio to GDP, ToT is terms of trade, rr is real interest rate, VIX is for log of VIX and USAC is Hodrick-Prescott filtered U.S. output series[11]. Then, several combinations of significant explanatory variables are considered in the estimation to achieve the best equation that explains business cycles as a long run relationship.

$$C_{it} = \beta_0 + \beta_1 LReer_{it} + \beta_2 DNfar_{it} + \beta_3 ToT_{it} + \beta_4 rr_{it} + \beta_5 VIX_t + \beta_6 USAC_t + U_{it} \qquad (2)$$

[9] Pesaran *et al.* (2001) show that ARDL model provides consistent estimates for the long run coefficients that are asymptotically normal regardless of the order of integration of the variable of interest.

[10] Output series are based on Log of real GDP series or GDP Volume indices from IMF database. The information on data is given in the appendix.

[11] See Appendix for detailed information on the formation of series.

Secondly, it is aimed to analyze the long run relationship with short run dynamics as ARDL approach suggest. For a single cross section, the long run relationships among variables of interest are studied by Engle and Granger (1987), Johansen (1991, 1995) and Phillips (1991)[12]. In this study, Engle and Granger's (1987) residual based approach is followed and the ARDL model that is studied by Pesaran *et al.* (1999) and Pesaran's *et al.* (2001) in a panel data framework is used. Stationarity of residuals from static estimations based on equation (2) are tested by Im, Pesaran and Shin's (2003) unit root test. Besides, cointegration relationship among variables of interest is tested by panel cointegration tests that are developed by Kao (1999) and Pedroni (2004). The results of panel cointegration tests that are developed by Kao (1999) and Pedroni (2004) indicate that there is a cointegration relationship among variables of interest[13].

Following the seminal studies of Pesaran *et al.* (1999) and Pesaran *et al.* (2001) are followed and a panel version of ARDL (PARDL) model is estimated for three samples of countries which is given in equation (3).

$$C_{it} = \mu + \sum_{j=1}^{p} \lambda_j C_{i,t-j} + \sum_{j=0}^{q} \delta_j^{'} X_{i,t-j} + \sum_{j=0}^{r} \gamma_j^{'} Z_{t-j} + \varepsilon_{it} \qquad (3)$$

where C_{it} is the cycle series, X_{it} (4x1) is the vector of country-specific explanatory variables (domestic factors) and Z_t (2x1) is the vector of external explanatory variables (global factors). i=1,2,….,N where N is number of countries in the sample and t denotes period which is not need to be same for each cross section[14]. ε_{it} is the error term which are independently distributed across i and t. The explanatory variables are considered as below:

$$X_{it}^{'} = (Lreer_{it}, DNfar_{it}, ToT_{it}, rr_{it})'$$

$$Z_t^{'} = (LVIX_t, USAC_t)'$$

where Lreer, DNfar, Tot, rr, LVIX and USAC are log of real exchange rate index, change in net foreign assets, terms of trade, log of VIX and U.S. cycles, respectively. The PARDL model can be reparametrized as an error correction model (ECM) which is given in equation (4).

[12] In the literature, mainly there are two approaches for co-integration. First is Engle and Granger's (1987) study that based on two step residuals and second is Johansen's (1991,1995) study that uses reduced rank regressions. However, all of these studies assume that variables of interest should be integrated in same order other than 0.

[13] Results of Kao's (1999) and Pedroni's (2004) cointegration tests and Im, Pesaran and Shin's (2003) panel unit root test for residuals are reported in Table 1, Table 2 and Table 3.

[14] In the whole sample there are 42 countries and the longest time period is from 1960:Q1 to 2009: Q3

$$\Delta C_{it} = \mu + \phi(C_{i,t-1} - \theta_1 X_{i,t-1} - \theta_2 Z_{t-1}) + \sum_{j=1}^{p-1} \lambda_j * \Delta C_{i,t-j} + \sum_{j=0}^{q-1} \delta_j^{'} * \Delta X_{i,t-j} + \sum_{j=0}^{r-1} \gamma_j^{'} * \Delta Z_{t-j} + \varepsilon_{it} \quad (4)$$

where Δ is the first difference operator. Stationary residuals from the cointegration equation are used to calculate the equilibrium error $\phi(C_{i,t-1} - \theta_1 X_{i,t-1} - \theta_2 Z_{t-1})$ which indicates the deviation from the long-run equilibrium. Ø denotes the speed of adjustment. θ_1 and θ_2 are considered as long run coefficients and λ_j, δ_j and γ_j are short run coefficients. In this study the representation in equation (4) is used not only to examine the deviation from long-run equilibrium but also consider short-run dynamics. PARDL (2,2,2) model is estimated for all samples based on the cointegration equations described in equation (2) and based on the structure in equation (4)[15]:

$$\Delta C_{it} = \mu + \phi ec_{t-1} + \lambda_1 \Delta C_{it-1} + \delta_0 \Delta X_{i,t} + \delta_1 \Delta X_{it-1} + \gamma_0 \Delta Z_t + \gamma_1 \Delta Z_{t-1} + \varepsilon_{it} \quad (5)$$

where ec denotes the equilibrium correction term.

Even though, pre-test of variables for unit root is not required for ARDL approach as suggested by Pesaran *et al.* (2001), the results of panel unit root tests for variables of interest are reported in Table 7. In Table 7, Maddala and Wu (1999), Im, Pesaran and Shin's (2003), and Pesaran's (2003), henceforth MW, IPS and CIPS respectively, panel unit root tests are performed. MW and IPS panel unit root tests yield similar results. MW panel unit root test uses aggregated p-values from individual time series unit roots and IPS test uses averaged test statistics across individual panels. Unlike CIPS panel unit root test, both MW and IPS assume cross section independence. CIPS testing is an extention of IPS and allows for cross section dependence which is an expectable case for panel data analysis with countries as cross sections[16]. Table 7 suggest that all of the variables other than VIX and real exchange rate are integrated of order zero (I(0)) and VIX and real exchange rate are integrated of order one (I(1)). According to CIPS, ToT is also integrated of order one. Since variables of interest give mixed signals of integration order, ARDL

[15] The lag lengths of the dependent variable and the explanatory variables for PARDL are assumed to be equal. The optimal lag order is selected according to Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). In the sample of all countries, AIC suggests 5 and SIC suggests 1 for the optimal lag length. In the sample of developing countries, AIC suggests 2 and SIC suggests 4 for the optimal lag length. And, in the sample of developed countries, both AIC and SIC suggests 2 for the optimal lag length. Although information criteria gave mixed results for different samples, the parsimonious model with lag length 2 is preferred for all samples since suggested lag length in both samples of developing and developed countries is 2. AIC and SIC values for PARDL models with different lag length are given in the appendix.

[16] See Pesaran and Breitung (2005) and Barbieri (2006) for the discussion of panel unit root tests.

approach fits best to identify the long-run and short-run relationship between business cycles and domestic and external factors.

Table 7. Panel Unit Root Tests

Variables	MW-ADF	IPS	CIPS
C	354.911** [0.000] (5)	-14.934** [0.000] (5)	-8.344** [0.000] (5)
ΔC	2491.538** [0.000] (4)	-53.650** [0.000] (4)	-18.806** [0.000] (4)
LREER	69.222 [0.878] (3)	0.0271 [0.511] (3)	-0.275 [0.392] (3)
ΔLREER	1366.841** [0.000] (2)	-33.889* [0.000] (2)	-13.159** [0.000] (2)
ΔNFAR	1963.610** [0.000] (4)	-74.510* [0.000] (4)	-20.906** [0.000] (4)
Δ^2NFAR	1585.151** [0.000] (5)	-55.292* [0.000] (5)	-25.088** [0.000] (5)
TOT	223.130** [0.000] (5)	-6.793* [0.000] (5)	-0.895** [0.185] (5)
ΔTOT	2674.346** [0.000] (5)	-61.536* [0.000] (5)	-18.068** [0.000] (5)
RR	242.039** [0.000] (5)	-7.165* [0.000] (5)	-1.657** [0.049] (5)
ΔRR	1773.868** [0.000] (5)	-36.508** [0.000] (5)	-13.960** [0.000] (5)
LVIX	73.235 [0.793] (1)	-1.249 [0.106] (1)	-
ΔLVIX	3739.361** [0.000] (0)	-86.759** [0.000] (0)	-
USAC	399.821** [0.000] (2)	-30.911* [0.000] (2)	-
ΔUSAC	3295.224** [0.000] (0)	-75.724** [0.000] (0)	-

Notes: MW is for the Fisher's panel unit root test developed by Maddala and Wu (1999), IPS is for the panel unit root test developed by IM, Pesaran and Shin (2003) and P-CD is for the panel unit root test in case of cross section dependence developed by Pesaran (2007). P-values are in brackets [.] and lag lengths, chosen by SIC are in parentheses (.). (**) denotes the rejection of unit root at the 5% level.

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4.1.1. All Countries

In Table 8 estimation results of long run dynamics for the sample of all countries are given, based on equation (2). In the equation 1.1, all explanatory variables are included and it is found that only log of real exchange rate, real interest rate and U.S. cycles are statistically significant. In the second equation (equation 1.2) when DNfar and ToT are excluded from the estimation, real interest rate becomes insignificant and no improvement is achieved in the estimation. And in the third equation (equation 1.3), only log of real exchange rate as a domestic factor plus external factors VIX and U.S. cycles are included.

Table 8. Determinants of Business Cycles in the Sample of All Countries

Variables	Eqn 1.1	Eqn 1.2	Eqn 1.3
Constant	-0.1242** (0.0177)	-0.1409** (0.0172)	-0.1171 (0.0147)
LREER	0.0272** (0.0037)	0.0313** (0.0036)	0.0268** (0.0031)
DNFAR	0.0001 (0.0002)	-	-
TOT	0.0055 (0.0029)	-	-
RR	0.0217* (0.0097)	-0.0036 (0.0074)	-
LVIX	-0.0005 (0.0011)	-0.0011 (0.0011)	-0.0020* (0.0011)
USAC	0.8143** (0.0037)	0.7797** (0.0373)	0.7774** (0.0359)
N	2052	2310	2503
Number of CS	39	40	42
F-Statistic	14.9746**	13.7720**	14.1271**
R^2	0.2472	0.2072	0.2018
IPS	-11.5179^{+} [0.000]	-12.4663^{+} [0.000]	-12.8677^{+} [0.000]
ADF Fisher χ^2	295.825^{+} [0.000]	327.465^{+} [0.000]	350.012^{+} [0.000]
PP Fisher χ^2	267.261^{+} [0.000]	296.357^{+} [0.000]	313.713^{+} [0.000]
Kao	-7.2435^{+} [0.000]	-9.2999^{+} [0.000]	-9.9886^{+} [0.000]
Pedroni	-4.5341^{+} [0.000]	-6.2849^{+} [0.000]	-8.0743^{+} [0.000]
Pesaran CSD Statistic	-	36.437 (0.000)	39.585 (0.000)

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

Real exchange rate and U.S. cycles are positive and significant at 5 percent significance level and VIX is negative and significant at 10 percent significance level and all the variables have the expected signs. Since equation 1.3 explains the sources of business cycles in best way for the sample of all countries, this equation is chosen as the base equation that presents the factors affecting business cycles for the whole sample. Depending on this equation, short run dynamics is going to be estimated as suggested by PARDL approach based on equation 5. Residuals from static estimations are tested by IPS unit root test which indicates stationary residuals for all equations. Besides, results of panel cointegration tests that are developed by Kao

(1999) and Pedroni (2004) indicate that there is a cointegration relationship between variables. In Table 9, short run dynamics of PARDL estimation results are given for the whole sample using the residuals of the equation 1.3. as error correction term. In equation 1.4, log of real exchange rate index, VIX and U.S. cycles are included since it has been concluded that they are the main determinants of business cycles in the sample of all countries for the long-run. Thus, X and Z vectors are $X_{it} = (Lreer_{it})$ and $Z_t^{'} = (LVIX_t, USAC_t)'$. In equation 1.5, only lagged values of explanatory variables are included in the estimation. The findings of PARDL estimations in both equations are essentially same.

Table 9. Short Run Dynamics for the Sample of All Countries

Variables	Eqn 1.4	Eqn 1.5
Constant	-0.0002 (0.0003)	-0.0004** (0.0003)
ec_{t-1}	-0.2494** (0.0145)	-0.2532** (0.0148)
ΔC_{t-1}	0.0447** (0.0204)	0.0712** (0.0208)
$\Delta LREER_t$	0.0269** (0.0057)	-
$\Delta LREER_{t-1}$	0.0282** (0.0058)	0.0385** (0.0058)
$\Delta LVIX_t$	0.0013 (0.0012)	-
$\Delta LVIX_{t-1}$	-0.0012 (0.0011)	-0.0019* (0.0011)
$\Delta USAC_t$	0.4738** (0.0483)	-
$\Delta USAC_{t-1}$	0.4054** (0.0507)	0.4996** (0.0500)
N	2419	2419
Number of CS	42	42
R^2	0.2313	0.1915
F	14.5496*	12.2109*
DW	2.0172	2.0417

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Error correction coefficient (Φ) is negative and significant as expected which indicates the adjustment towards equilibrium. For the whole sample, considering the fact that the data is quarterly, the system reaches to the equilibrium after a shock approximately in four quarters. Both in the short-run and in the long-run real exchange rate index has positive impact on business cycles which means

depreciation deteriorates economic performance[17]. Impact of global financial conditions, represented by VIX, on business cycles is negative both in the short run and in the long run. Furthermore, U.S. output cycles are positive and significant in short run and as in long run. In ARDL setting the explanatory variables are assumed to be weakly exogenous. For external factors VIX and U.S cycles, weak exogeneity is maintained condition. However, in the dynamic macroeconomic framework the endogeneity of domestic variables is an important discussion topic. Estimating with the lagged values of domestic macroeconomic variables does not cause an endogeneity problem thus in Table 9 weak exogeneity assumption is maintained.

In all equations that are estimated for the sample of all countries, U.S. output cycles are positive and significant and emerge as the leading source of business cycles. As such, when the U.S. economy experiences growth, the world economy is affected positively, and on the contrary, a slowdown in the U.S. economy means a slowdown in other economies as well. In addition, VIX has a negative impact on business cycles, as expected. Increasing uncertainty in global markets causes downward movements in economic activity. Thus, it can be concluded that common shocks, that is to say global shocks are the main factors of macroeconomic fluctuations for the sample of all countries.

Real exchange rate also has significant positive impact on business cycles[18]. Findings for the sample of all countries indicate that currency depreciation leads to economic slowdown, whereas appreciation promotes economic growth. Theories exist that suggest both for the expansionary and contractionary impact of the real exchange rate on economic performance. According to the standard Mundell-Fleming model, real exchange rate depreciations are expansionary due to the expenditure switching effect. Since depreciation means an increase in the relative cost of foreign produced goods, domestic agents prefer to consume more domestically produced goods and hence contribute to output gain. Moreover, traditional view suggests that depreciation improves trade balance since depreciation leads to an increase in competitiveness and export of tradable goods and promotes

[17] By the construction of data, an increase in real exchange rate denotes appreciation, and a decrease in real exchange rate means depreciation.

[18] Studies on the linkage between real exchange rate and economic growth have been more popular recently by the studies of Hausmann and Rodrik (2003), Frankel (2005), Bebczuk et al. (2006),, Prasad et. al.2007, Eichengreen 2007, Rodrik (2008).

economic growth[19]. Mexican cases of 1982 and 1995 are examples of the view that depreciated currency is likely to be a stabilizing factor of financial crises.

However, after the financial crises in the 1990s, contrary to the traditional view, there have been cases of real exchange rate devaluations causing output loss. There are remarkable numbers of studies that suggest currency depreciations may have contractionary impacts[20]. The key factor behind the contractionary impact of exchange rates is seen as problematic balance sheets in the country that has experienced a currency crisis. A devaluation of the currency makes domestic assets more attractive for international investors. Before the financial crises of the 1990s, it is believed that negative impacts of devaluation are offset by positive impacts such as improvement in trade balance[21]. Nevertheless, in the case of developing countries, it has been seen that negative impacts of depreciation are stronger than positive impacts.

There are few explanations as to how depreciation causes output loss[22]. In the literature, the balance sheet effect is assumed to be the major channel through which currency depreciation causes output loss. Since domestic banks and firms have debts in terms of foreign currencies, particularly in U.S. dollars, when domestic currency depreciates, their balance sheets deteriorate and their capacity to borrow and invest is restricted. Thus, layoffs and bankruptcies take place and ultimately, the economy shrinks[23]. In addition, according to Frankel (2005), production worsens due to an increase in the cost of imported intermediate goods, financial instability, unavailability of finance and fall in imports worsen trade balances. Moreover, Calvo and Reinhart (2002) argue that exports decrease for the first eight months after devaluation. As a result, income and spending decrease, expenditure reduction is experienced instead of expenditure switching in the economy, and output loss is exerted. Another mechanism that supports contractionary impact of depreciation is

[19] See Guitian (1976), Dornbusch (1986)

[20] Diaz-Alejandro (1963), Lizondo and Montiel, (1989),Krugman and Taylor (1978), Frankel (2005) and Bebczuk et al. (2006)

[21] Edwards (1989), Kamin (1988)

[22] Kamin and Rogers (1996) discuss potential explanation of the linkage between exchange rate depreciations and economic output such as spurious correlation, causality from output to real exchange rate, rigid nominal levels, increase of nominal interest rates, balance sheet channel, national policies, acceleration of capital outflows and long run effects of sustained real devaluations. However, in the literature balance sheet effect is the key factor that is focused on.

[23] Krugman (1999), Cespedes, Chang and Velasco (2004), Frankel (2005) and Tovar (2006)

income distribution. As nominal wages do not fully adjust to new price levels, disposable income decreases as consumption of tradable goods declines and this leads to a fall in output in the end[24].

Consequently, the findings in Table 8 and in Table 9 demonstrate that global shocks are the main source of fluctuations in the sample of all countries and depreciation of currency deteriorates economic performance, as opposed to the traditional view. Nevertheless, forthcoming estimations across different groups of countries would give clearer results on the importance of global shocks and the impact of currency devaluations.

4.1.2. Emerging Market Economies

Estimation results of the general model for the sample of EMEs are given in Table 10 and short run dynamics estimation results are given in Table 11. In equation 1.6, all explanatory variables are included and it is found that log of real exchange rate, a change in the net foreign assets ratio, terms of trade and the U.S. cycle are statistically significant. When real interest rate is excluded from the estimation (equation 1.7), VIX also becomes significant. Real exchange rate, terms of trade and change in net foreign assets ratio are positively significant and VIX is negative and significant at 5 percent significance level. In equation 1.8, terms of trade is also excluded but it does not cause any improvement in the estimation. Thus, for the sample of developing economies the base equation is accepted as equation 1.7 since the best performance is achieved. According to IPS unit root test residuals from static estimations are stationary and according to Kao (1999) and Pedroni (2004) panel cointegration tests there is a cointegration relationship among variables.

Short run dynamics of PARDL (2,2,2) estimation results for the sample of EME are presented in Table 11. For error correction term residuals from the equation 1.7 are used. Based on the long run equation 1.7, log of real exchange rate index, growth in net foreign assets, terms of trade, VIX and U.S. cycles are included since it has been concluded that they are the significant determinants of business cycles in the EMEs. Thus, X and Z vectors are $X_{it}' = (Lreer_{it}, DNfar_{it}, ToT_{it}, rr_{it})'$ and $Z_t' = (LVIX_t, USAC_t)'$. In equation 1.9 only real exchange rate index and U.S. cycles have significant impact hence in equation 1.10, only real exchange rate and U.S. cycles are inclued in the model.

[24] See Diaz-Alejandro (1965), Krugman and Taylor (1978), Bebczuk et al. (2006)

Table 10. Determinants of Business Cycles in EMEs

Variables	Eqn 1.6	Eqn 1.7	Eqn 1.8
Constant	-0.1920** (0.0276)	-0.1642** (0.0226)	-0.1350** (0.0200)
LREER	0.0412** (0.0055)	0.0366** (0.0044)	0.0325** (0.0042)
DNFAR	0.0055** (0.0027)	0.0047* (0.0025)	0.0048* (0.0025)
TOT	0.0084* (0.0044)	0.0071** (0.0042)	-
RR	0.0142 (0.0142)	-	
LVIX	-0.0026 (0.0022)	-0.0041** (0.0020)	-0.0050** (0.0019)
USAC	0.7659** (0.0713)	0.7378** (0.0648)	0.7197** (0.0628)
N	892	1058	1135
Number of CS	18	20	21
F-Statistic	11.0467**	10.9852**	10.5364**
R^2	0.2264	0.2033	0.1855
IPS W-Stat	-6.9865^{+} [0.000]	-6.6405^{+} [0.000]	-6.9835^{+} [0.000]
ADF Fisher $\chi 2$	116.927^{+} [0.000]	130.235^{+} [0.000]	139.399^{+} [0.000]
PP Fisher $\chi 2$	85.5903^{+} [0.000]	102.201^{+} [0.000]	108.135^{+} [0.000]
Kao	-2.1268^{+} [0.017]	-2.7188^{+} [0.003]	-2.9653^{+} [0.002]
Pedroni	-0.6596^{+} [0.004]	-0.5561^{+} [0.001]	-1.3279^{+} [0.002]
Pesaran CSD Statistic	16.308 (0.000)	17.214 (0.000)	18.501 (0.000)

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

In both equations error correction coefficient (Φ) is negative and significant as expected. The adjustment speed towards to the equilibrium is relatively slow compared to the whole sample. Considering the fact that data is quarterly, the system reaches the equilibrium approximately in five quarters after a shock in EMEs. Both in short-run and in long-run log of real exchange rate index has positive impact on business cycles which means depreciation deteriorates economic performance. However, unlike the long-run dynamics, in the short run global financial conditions and change in net foreign assets have no significant impact. And, as similar to the previous findings, the effect of U.S. output cycles is strongly positive on the

economic performance for the EMEs. Findings for the EMEs strongly suggest that both in the short run and in the long run external factors are the foremost source of the business cycles[25].

Table 11. Short Run Dynamics for the Sample of EMEs

Variables	Eqn 1.9	Eqn 1.10
Constant	-0.0001 (0.0004)	-0.0001 (0.0004)
ec_{t-1}	-0.2152** (0.0195)	-0.2141** (0.0192)
ΔC_{t-1}	0.1455** (0.0316)	0.1416** (0.0311)
$\Delta LREER_t$	0.0350** (0.0074)	0.0338** (0.0073)
$\Delta LREER_{t-1}$	0.0178** (0.0075)	0.0195** (0.0074)
$\Delta DNFAR_t$	0.0016 (0.0011)	-
$\Delta DNFAR_{t-1}$	-0.0001 (0.0011)	-
ΔToT_t	0.0007 (0.0061)	-
ΔToT_{t-1}	-0.0008 (0.0061)	-
$\Delta LVIX_t$	0.0029 (0.0019)	-
$\Delta LVIX_{t-1}$	-0.0004 (0.0018)	-
$\Delta USAC_t$	0.5597** (0.0778)	0.5467** (0.0739)
$\Delta USAC_{t-1}$	0.3905** (0.0821)	0.4362** (0.0768)
N	1014	1028
Number of CS	20	20
R^2	0.2621	0.2628
F	11.2545*	14.3439*
DW	1.9967	1.9999

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Similar to the sample of all countries, the U.S. business cycles is also the most important driving factor of business cycles in EMEs. Secondly, it is concluded that VIX has a significant negative impact in long run, but no significant impact is detected for the short run. In parallel with expectations, an improvement in country's terms of trade contribute to economic growth since benefits from international trade

[25] In the error correction model estimation for EMEs, both current and lagged values of real exchange rate are considered. It is assumed that real exchange rate is weakly exogenous.

has been increased. Moreover, a positive change in the net foreign assets, in other words improvement in current account, promotes economic growth.

It has also been concluded that the impact of real exchange rate is strongly positive and significant for EMEs similar to the whole sample. Findings for EMEs supports the argument of contractionary effect of real depreciation on output as suggested by studies of Karmin and Rogers (1996), Frankel (2005) and Bebczuk *et al.* (2004)[26]. Most of the studies that suggest contractionary impact of real currency depreciations emphasize on the balance sheet problems[27] in developing countries. As Goldstein and Turner (2004) point out, balance sheets in developing countries are sensitive to changes in exchange rate such that borrowers in these countries have faced currency mismatches on a massive scale. According to them, investors in EME finance their foreign currency liabilities with domestic currency and since foreign currency denominated assets are limited, the net wealth of firms and households shrinks substantially in the case of depreciation and as a result, the overall economy is damaged. Furthermore, EME are not able to borrow abroad in their national currencies all the time which is another factor that cause balance sheet problems and in the end output loss[28].

Another reason for the contractionary impact of real currency depreciations for developing countries seems to be the financial vulnerability which is also related to balance sheet problems. According to Cespedes, Chang and Velasco (2004), when a country is financially vulnerable, which is typical for developing countries, depreciation raises the risk premium and causes output losses. The further results for developed countries would give better explanation of the impact of real depreciation on economic performance and the existence of any difference between developing and developed countries but so far results in this part suggest that real depreciations have contractionary impact.

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[26] Karmin and Rogers (1996) examine the impact of real depreciations on economic growth for Mexico. By controlling for reverse causation from output to the real exchange rate and, eliminating third factors such as capital account shocks and temporary contractionary effects of devaluation in their analysis, they conclude that depreciation causes contraction in the Mexican economy. Bebczuk et al. (2004) analyze the impact of currency depreciations on growth for an unbalanced panel of 57 countries with 22 developed and 35 developing countries. Their results support the traditional view that real depreciation leads to higher growth. However, they also conclude that currency depreciations have a strong negative impact on economic performance in those countries with high levels of domestic liability dollarization which suggest that the balance sheet effect channel is stronger.

[27] Hausmann et al. (2001), Calvo and Reinhart (2002), Bebczuk et al. (2004), Cespedes, Chang and Velasco (2004)

[28] Eichengreen et al.(1999).

To sum up, estimation results indicate that for EMEs, impact of global (common) shocks are stronger than the domestic ones. This result is in accordance with the results for the sample of all countries. Even though only the real exchange is positively significant among the domestic factors in our whole sample, the analysis of EME implies that more domestic shocks such as real exchange rate, net foreign assets and terms of trade have significant role in macroeconomic fluctuations for the long run[29]. Besides, as it is mentioned before, business cycles in EMEs are more volatile. Thus, it can be concluded that, business cycles in EMEs are more vulnerable to external and domestic shocks compared to the whole sample. Another important result that reflects the difference between groups of countries is the adjustment speed towards to equilibrium which is relatively small for EMEs.

4.1.3. Developed Countries

Table 12 reports the fixed panel data estimation results for sample of developed countries. In the equation 1.11, all explanatory variables are included and it is found that only real interest rate and U.S. cycles have significant effect on business cycles. As expected, real interest rate affects business cycles negatively and U.S. cycles affects positively. Although remarkable number of studies in the literature gives importance to the impact of real interest rate on business cycles, in this study real interest rate is found statistically significant only for the sample of developed countries[30]. Unlike the previous estimations, log of real exchange rate has no significant impact in equation 1.11 but its sign is negative. In the next equation (equation 1.12), terms of trade is excluded from the estimation and real exchange rate becomes negatively significant at 10 percent significance level.

To investigate the impact of real exchange rate on business cycles of developed countries, equation 1.13. is estimated by only considering log of real exchange rate as domestic variable and U.S. cycles as international variable. It is concluded that real exchange rate has negative significant impact at 10 percent significance level and U.S. cycles is strongly positive and significant. The noteworthy point in the findings of the last estimation is the expansionary impact of real currency depreciation, which is different than findings for the whole sample and

[29] In this study, different from the studies of Neumeyer and Perri (2005) and Uribe and Yue (2006), it is concluded that real interest rate has no significant impact. This is due to the fact there are different real interest rate computation which leads to different results.

[30] Neumeyer and Perri (2005), Uribe and Yue (2006).

for sample of EMEs. This finding supports the traditional view that log of real exchange rate depreciation leads to economic growth. According to traditional framework, that is to say, Mundell-Fleming framework, real exchange rate depreciation boosts economic growth through expenditure switching effect. Since relative price of foreign goods increase, domestic agents consume more domestic goods, which improves the economic performance.

Table 12. Determinants of Business Cycles in Developed Countries

Variables	Eqn 1.11	Eqn 1.12	Eqn 1.13	Eqn 1.14
Constant	0.0361 (0.0249)	0.0449* (0.0236)	0.0423* (0.0239)	-0.0094** (0.0031)
LREER	-0.0064 (0.0056)	-0.0096* (0.0050)	-0.0094* (0.0741)	-
DNFAR	0.00004 (0.0002)	0.00004 (0.0002)	-	-
TOT	-0.0061 (00041)	-	-	-
RR	-0.0999* (0.0339)	-0.0873** (0.0034)	-	-0.2420** (0.0299)
LVIX	-0.0007 (0.0010)	-0.0008 (0.0010)	-	0.0021** (0.0483)
USAC	0.8026** (0.0328)	0.8018* *(0.0327)	0.8191** (0.0345)	0.7714** (0.0340)
N	1160	1166	1271	1450
Number of CS	21	21	21	21
F-Statistic	25.9343**	26.9949**	26.0090**	26.9811**
R^2	0.3731	0.3749	0.3143	0.3032
IPS W-Stat	-8.6987^{+} [0.000]	-8.728^{+} [0.000]	-9.416^{+} [0.000]	-11.3506^{+} [0.000]
ADF Fisher χ^2	169.579^{+} [0.000]	169.531^{+} [0.000]	185.161^{+} [0.000]	216.756^{+} [0.000]
PP Fisher χ^2	189.218^{+} [0.000]	188.904^{+} [0.000]	205.818^{+} [0.000]	226.122^{+} [0.000]
Kao	-0.7969 [0.213]	-0.8369 [0.201]	-2.5337^{+} [0.006]	-3.5486^{+} [0.000]
Pedroni	-8.8057^{+} [0.000]	-8.0155^{+} [0.000]	-10.9666^{+} [0.000]	-9.6888^{+} [0.000]
Pesaran CSD Statistic	-	-	28.868 (0.000)	25.478 (0.000)

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

Secondly, in the literature savings channel or capital accumulation channel is suggested in the literature for the expansionary impact of real exchange rate

depreciation[31]. It is claimed that depreciating real exchange rate increases domestic savings and stimulates growth by increasing the rate of capital accumulation[32].

Findings for developed countries support the view that currency depreciation boosts economic growth which is different from other samples. These results that demonstrate the different impacts of real exchange rate depreciations on business cycles for different group of countries reflect the difference between EMEs and developed countries and how their macroeconomic fluctuations have different dynamics.

In equation 1.14, real interest rate, VIX and U.S. cycles are considered. As expected, real interest rate is negatively significant and U.S. cycles are positively significant at 5 percent level. However, VIX is found to be positively significant as opposed to expectations. This may due to the fact that when there is uncertainty in the world economy or in global financial markets, investors head for safer ports during highly volatile times. Thus, capital flows to developed countries from developing countries occur and this stimulates growth in developed countries.

Another notable point in the estimation for developed countries is the impact of real interest rate. In former estimation for the whole sample and for EMEs, real interest rate has no significant effect on business cycles. For developed countries, it has been seen that real interest rate is strongly significant with negative impact. Theoretically an inverse relationship between real interest rate and economic performance is expected since a decrease in interest rate would encourage investment and boost economic growth.

Thus, findings on real interest rate for developed countries are consistent with expectations but findings for EMEs are contrary to the economic theory[33]. Notwithstanding, in Neumeyer and Perri's (2005) study which is a preliminary study that investigates the linkage between real interest rate and economic fluctuations, it is concluded that real interest rate is acyclical for developed countries and

[31] Levy-Yeyati and Sturzenegger (2003) and Montiel and Serven (2008).

[32]According to Montiel and Serven (2008), China is a good example that supports capital accumulation channel such that achieved high growth rate with depreciated national currency and high domestic savings. However, Mexican crisis in 1995 is an opposite example for the capital accumulation channel. Montiel and Serven (2008) investigate the link between real exchange rate, savings and economic growth empirically and they conclude capital accumulation channel is both conceptually and empirically weak.

[33] Mendoza (1991) and Correia et al (1995) state that the relationship between real interest rate and business cycles in developing countries are either acyclical or procyclical which findings for developing countries in this study support their views.

countercyclical for developing countries. Thus, our results indicate that monetary policy matters for developed countries along with expectations, but it is not effective on business cycles for EMEs. It should be also noted that although real interest rate is strongly significant, impact of global shocks are higher than the domestic shocks as in developing countries. Since equation 1.14 gives the best performance on explaining the factors of business cycles, it is chosen as the base equation for developed countries and short run dynamics are estimated from this equation. Moreover, IPS unit root test concludes stationary residuals from static estimations and Kao (1999) and Pedroni (2004) panel cointegration tests show that there is a cointegration relationship between variables.

Table 13. Short Run Dynamics for the Sample of Developed Countries

Variables	**Eqn 1.15**	**Eqn 1.16**
Constant	-0.0003 (0.0003)	-0.0003 (0.0003)
ec_{t-1}	-0.3316** (0.0246)	-0.3298** (0.0239)
ΔC_{t-1}	-0.1021** (0.0270)	-0.1061** (0.0268)
ΔRR_t	-0.0828* (0.0450)	-0.0836* (0.0044)
ΔRR_{t-1}	-0.0153 (0.0453)	-
$\Delta LVIX_t$	0.0016 (0.0013)	0.0021* (0.0012)
$\Delta LVIX_{t-1}$	-0.0010 (0.0013)	
$\Delta USAC_t$	0.4722** (0.0558)	0.4749** (0.0549)
$\Delta USAC_{t-1}$	0.3332** (0.0597)	0.3356** (0.0586)
N	1404	1424
Number of CS	21	21
R^2	0.2526	0.2531
F	16.5944**	18.2115**
DW	1.9816	1.9664

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

For the sample of developed countries short run dynamics of PARDL (2,2,2) estimation results are reported in Table 13 by using residuals from equation 1.14 as error correction term. Real interest rate, VIX and U.S. cycles are included in equation 1.15 since it has been concluded that they are the main determinants of business

cycles in the sample of developed countries[34]. X and Z vectors are $X_{it} = (rr_{it})$ and $Z_t' = (LVIX_t, USAC_t)'$. Findings of equation 1.15 indicate that only real interest rate and U.S. output cycles have significant impact on business cycles. In equation 1.16, it is concluded that current values of real interest rate and VIX have positive impacts in short run which is essentially same in the long run equation. Moreover, similar to pervious findings, U.S. cycle is the leading factor both in the long run and in the short run.

In both equations error correction coefficient (Φ) is negative and significant. The adjustment towards equilibrium is around three quarters, which relatively fast compared to the whole sample and sample of EMEs. Both in the short-run and in the long-run real interest rate has a negative impact on business cycles. Findings support the theory such that decrease in interest rate encourages investment and boosts the economic growth. Similar to the long run results, it is also concluded that VIX has positive significant impact on business cycles. Hence, short-run results suggest that when there is uncertainty in global financial markets, investors prefer to invest in safer markets and fly to developed economies, which stimulates growth in these countries. Overall picture of the cointegration analysis for the business cycles implies that after a shock, the system reaches the equilibrium 1.5 or 2 quarters slower in EMEs than in developed countries. And, it should also be taken into account that global factors are leading sources of business cycles in all samples.

In brief, results of this section show how driving factors of business cycles differ in two groups of countries. Although global common factors are the leading source of macroeconomic fluctuations in both group of countries, impact of domestic factors differ across sample of EMEs and developed countries. The main and most remarkable result is the role of global factors on macroeconomic fluctuations. For all group of countries, it is has been noticed that U.S. cycles is the main factor of business cycles. Both EMEs and developed countries are affected from the fluctuations in the U.S economy in the same direction. However, it is also concluded that unlike the sample of EMEs, an increase in uncertainty of global financial markets could be beneficial for economic fluctuations in developed countries.

The second noteworthy point is the impact of real exchange rate on business cycles. While it has a contractionary impact on business cycles of EMEs, it has an

[34] In the estimation for developed countries, it is assumed that real interest rate is weakly exogenous.

expansionary impact on the economy of developed countries. This result proves that business cycles in EMEs and developed countries have different dynamics and a policy that helps economic growth in one group of country may harm economic growth in the other group. Another important point that one should focus on is the role of interest rate in business cycle fluctuations. It is concluded that while monetary policy is powerful in developed countries, it has no significant impact on the macroeconomic fluctuations in EMEs. Last but not the least, the adjustment towards the equilibrium differs across these two groups of countries. While business cycles in EMEs come to equilibrium in five quarters after a shock, it takes only three quarters for developed economies.

These findings support the findings in Chapter 3 such that the amplitude of business cycles is deeper in EMEs and it takes longer time for overcoming a recession compared to the developed countries. So far, main determinants of business cycles have been determined by PARDL including total of 42 countries and remarkable differences among developing and developed countries have been revealed. In the following sections, the estimation procedures are going to be improved in order to understand the dynamics of business cycles better and to perform a robustness check for results.

4.2. Common Correlated Effects Method

In this section, cross section dependence is going to be explored and robust common correlated effects pooled (CCEP) estimator, recently introduced by Pesaran (2006) is implemented. Previous analyses assume that the regressors are identically and independently distributed across the cross-sections which is not valid in practice while studying countries as cross sections. Omitted common effects, spatial spillover effects, interactions within socioeconomic networks, integrated financial and trade linkages cause cross-section dependences and this should be taken into account in modeling. Although an index for global conditions such as VIX or by U.S. business cycles as proxy for global economic performance are considered, common global shocks cannot be represented fully. Moreover, contagion effect of a crisis in a country or in a group of countries may cause cross section dependence in the data and leads to inconsistent estimates of the coefficients. Therefore, it is crucial to eliminate cross section dependence from the estimation.

Pesaran (2006) focus on the cross section dependence in panel data. In most of the panel studies, it is assumed that regressors are identically and independently distributed across individual sections and unobserved factors and the individual specific errors are allowed to be stationary. A number of studies analyze cross country dependence based on spatial lags[35] using seemingly unrelated regression (SUR) and estimating the system by generalized least squares (GLS). Pesaran (2006) argues that these methods allows for correlation in the errors for different cross sections. In addition, there are other studies that consider time varying individual effects when time (T) is fixed and number of cross sections (N) goes to infinity to eliminate the individual specific effects[36]. However, Pesaran (2006) states that in these studies regressors are identically and independently distributed across individual sections and these methods cannot be used when N and T are large and of the same order of magnitude. Therefore, Pesaran (2006) develops a new approach, CCEP method, that gives consistent and asymptotically normal parameter estimates when both T is fixed and N goes to infinity and when T and N go to infinity jointly with the presence of cross sections dependence[37]. Pesaran's (2006) method allows for individual specific errors to be serially correlated and heteroscedastic which is the case for most of the cross country analysis. He considers a multifactor residual model by filtering the individual specific regressors by means of cross section aggregates. Pesaran (2006) points out that including means of cross section aggregates in the model eliminates the effects of unobserved common factors asymptotically as $N \rightarrow \infty$[38].

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[35] Lee and Pesaran (1993), Conley and Topa (2002), Conley and Dupor (2003) and Pesaran and Smith (2006).

[36] HoltzEakin, Newey and Rosen (1988), Ahn, Lee and Schmidt (2001)

[37] Pesaran (2006) also discuss the study of Coakley *et al*. (2006) that uses one or more principal component of the estimated OLS regressors to eliminate cross section dependence. However, according to Pesaran (2006) this estimator is not consistent.

[38] The general model that Pesaran (2006) introduces as follows:

$y_{it} = \alpha\, y_{it} = \alpha_i' d_t + \beta_i' x_{it} + e_{it}$

where d_t is an nx1 vector of observed common effects, x_{it} is a kx1 vector of observed individual specific regressors on the ith cross section unit at time. Errors have the multifactor structures such as $e_{it} = \gamma_i' f_t + \varepsilon_{it}$ where f is the mx1 vector of unobserved common effects and ε_{it} are the error terms that assumed to be independently distributed of (d_t, x_{it}). And, the individual specific regressors are defined as $x_{it} = A_i' d_t + \Gamma_i' f_t + v_{it}$ where A_i and Γ_i are factor loading matrices. Γ_i and γ_i are assumed to be independently and identically distributed across i and of the specific individual errors. Moreover, Pesaran (2006) assume the individual specific regressors and the common factors to be stationary and exogenous. He showed that estimation of y_{it} on x_{it}, d_t and cross section averages by

In this context, CCEP estimation is implemented. CCEP approach suggests that estimating the regression by using cross section averages of both regressand and regressors as a proxy of the linear combination of unobserved factors. To that end, cross sectional dependence test is applied firstly that is introduced by Pesaran (2007) to test if error terms are independent across cross sections. Pesaran's (2007) cross section independence test statistics (Pesaran CSD Statistic) are reported in the Tables 8, 10, 12 for the corresponding regressions. The test results indicate that cross sections are not independent at 5% significance level. This result is expected for the studies considering countries as cross sections due to financially integrated global economy, trade linkages and socioeconomic interactions. Since cross section dependence exists in cross country analysis of business cycles, CCEP estimation is considered for controlling cross section dependence and filter out unobserved global shocks. Therefore, cross section averages are included and following model is estimated for different sample of countries based on Pesaran (2006). Linear dynamic panel data model is constructed as in the following equation (6):

$$C_{it} = \alpha + \beta X_{it} + \theta Z_t + \Psi(m\_C_{it}) + \Upsilon(m\_X_{it}) + U_{it} \quad (6)$$

where X_{it} and Z_t represent country specific factors and global factors respectively. And, m_C_{it} and m_X_{it} represent the cross sectional averages of the cycle series and country specific factors (Lreer, Dnfar, ToT and rr). U_{it} denotes independently and identically distributed error terms. The coefficients of the cross sectional averages do not need to have any economical meanings in most of the cases since they are only considered to eliminate common unobserved factors and improve coefficient estimates of explanatory variables of interest. Nevertheless, in the analysis of the determinants of business cycles, the information from cross sectional averages is also important since they are also proxy for global economic conditions such as contagion effects and socioeconomic networks that cannot be measured.

Equation 6 is estimated for three different samples of countries by PARDL (2,2,2). Firstly, all domestic (lreer, dnfar, tot, rr) and common (LVIX, USAC) factors as well as cross section averages are considered in the estimation and then the best model is determined. Estimation of equation 6 provides consistent estimators under cross section dependence.

OLS or pooled regression provide consistent estimation of the coefficients and he refer such estimation as common correlated effects estimator. CCEP estimators are the most efficient ones and robust compared to estimators in other studies such as in Coakley *et al.* (2006).

In Table 14, findings of the long run dynamics of CCEP estimations are reported for each sample of countries. In equation 1.17, for the sample of all countries it has been concluded that real exchange rate, real interest rate and cross section averages of the cycles have significant impact on business cycles. By excluding non-significant variables from the estimation, real interest rate also loses its significancy. Finally, in equation 1.18, it is concluded that only real exchange rate and cross section average of cycle series are statistically significant.

The noticeable finding in Table 14 is that in the estimation in Chapter 4.1, without filtering out the cross section dependence, U.S. cycle series is strongly significant. However, by implementing CCEP estimation, impact of U.S. cycles on business cycles becomes non-significant. Besides, VIX has no longer a significant impact as well, unlike the estimation in Table 8. On the other hand, cross section average of cycle series is came out to be strongly positive and significant. These findings point out that in CCEP estimation, cross section averages of the cycle series represent the global shocks totally.

The effect of common global shocks, including global financial conditions, global macroeconomic conditions, contagion effects and unobserved factors are appeared to be important determinants of business cycles. Log of real exchange rate has also positive impact on business cycles such that depreciation deteriorates economic performance. Thus, similar to the previous findings, this section's results are opposite to the traditional view about the impact of real exchange rate for the whole sample. However, by including cross section averages, the coefficients of real exchange rate decrease.

According to long run dynamics results of CCEP estimation for the sample of EMEs, in equation 1.19, when all explanatory variables and cross section averages are considered, real exchange rate, real interest rate and cross section average of cycles have significant impact. In estimation with only significant variables from the initial regression, only real exchange rate and cross section averages of cycle and real exchange rate come out to be significant[39]. Estimation results of equation 1.20 show that real exchange rate has a positive and significant impact on business cycles which indicates contractionary impact of real currency depreciations on output. As it is mentioned in section 4.1, contractionary impact of depreciation on output is

[39] Real interest rate turns to be insignificant in follow-up estimations with different combinations of the variables of interest.

attributed to balance sheet problems in developing countries[40]. However, the coefficient of real exchange rate decreased when the cross-section dependence is filtered out.

Unlike to the results in Table 10, where net foreign assets growth, VIX and U.S. cycles have significant impact on business cycles, these coefficients become insignificant after controlling for cross section dependence. Thus, by filtering out cross section dependence and unobserved common shocks, net foreign assets growth, VIX and U.S. cycles have no significant impact on business cycles in EMEs. However, it is observed that cross section average of cycle series came out to be strongly positive and significant similar to the results for the sample of all countries. Therefore, it can be concluded that overall impact of global factors, both financial and macroeconomic, is represented by cross section averages of the cycle series which is appeared to be the most significant determinant of business cycles.

Similar to the procedure in the other two samples, to find out the long run dynamics of CCEP estimation results for the sample of developed countries, firstly all explanatory variables and cross section averages are involved in equation 1.21. According to the findings, only cross section average of cycle series have significant impact. When the variables of interest are considered one by one, it is concluded that real interest rate and cross section average of cycle series are significant which supports the findings in Table 12. Nonetheless, in equation 1.14 without controlling for cross section dependence VIX and U.S. had also positive significant impact on business cycles in developed countries.

With controlling for cross section dependence and filtering out unobserved common effects the impact of these variables become insignificant similar to the CCEP estimation results for the whole sample and sample of EMEs. As it is discussed previously, as cross section average of cycle series captures the overall impact of global financial and macroeconomic conditions, it has a strong positive impact on business cycles for all samples. Additionally, real interest rate is negatively significant as expected for the sample of developed countries which means a decrease in interest rate encourages investment and boosts economic growth. This finding supports the results without considering cross-section dependence.

[40] Karmin and Rogers (1996), Frankel (2005) and Bebczuk et al. (2004).

Table 14. Long Run Dynamics of CCEP Estimations

Variables	All Countries		EMEs		Developed Countries	
	Eqn 1.17	**Eqn 1.18**	**Eqn 1.19**	**Eqn 1.20**	**Eqn 1.21**	**Eqn 1.22**
Constant	-0.0924 (0.1087)	-0.0007 (0.0695)	-0.0495 (0.1218)	-0.0133** (0.0942)	-0.0738 (0.0542)	0.004 (0.0004)
LREER	0.0199** (0.0034)	0.0222** (0.0029)	0.0283** (0.0054)	0.0258** (0.0038)	-0.0048 (0.0053)	-
DNFAR	0.00003 (0.0002)	-	0.0034 (0.0024)	-	0.00002 (0.0001)	-
TOT	0.0004 (0.0027)	-	0.0024 (0.0041)	-	-0.0041 (0.0036)	-
RR	0.0387** (0.0090)	-	0.0368** (0.0039)	-	-0.0225 (0.0340)	-0.0541** (0.0167)
LVIX	0.0012 (0.0011)	-	0.0024 (0.0022)	-	0.0007 (0.0011)	-
USAC	0.0145 (0.0539)	-	-0.0952 (0.0809)	-	-0.0034 (0.0489)	-
m_C	0.9973** (0.0565)	0.9978** (0.0339)	1.1073** (0.0739)	0.9879** (0.0516)	1.0207** (0.0524)	1.013** (0.0273)
m_LREER	0.00007 (0.0284)	-0.0221 (0.0154)	-0.0199 (0.0302)	-0.0229** (0.0207)	0.0279 (0.0005)	0.0660** (0.0202)
m_DNFAR	0.0002 (0.0012)	-	-0.0032 (0.0097)	-	0.0003 (0.0005)	-
m_TOT	-0.0018 (0.0256)	-	0.0033 (0.0197)	-	-0.0284 (0.0387)	-
m_RR	0.0174 (0.0139)	-	0.0223 (0.0141)	-	0.1322 (0.0760)	-
N	2052	2503	892	1232	1160	2165
Number of CS	39	42	18	21	21	21
F-Statistic	24.9006**	26.6401**	22.0546**	28.4843**	43.0759**	60.3223**
R^2	0.3787	0.3229	0.4171	0.3516	0.5421	0.3932
IPS	-11.1953^{+} [0.000]	-13.4948^{+} [0.000]	-7.4317^{+} [0.000]	-8.4780^{+} [0.000]	-10.4079^{+} [0.000]	-15.9920^{+} [0.000]
ADF Fisher χ^2	294.899^{+} [0.000]	367.053^{+} [0.000]	125.890^{+} [0.000]	153.518^{+} [0.000]	204.330^{+} [0.000]	341.201^{+} [0.000]
PP Fisher χ^2	268.971^{+} [0.000]	328.493^{+} [0.000]	94.0629^{+} [0.000]	122.356^{+} [0.000]	238.138^{+} [0.000]	370.396^{+} [0.000]
Kao	-6.5006^{+} [0.000]	-10.1591^{+} [0.000]	-3.6217^{+} [0.000]	-5.8799^{+} [0.000]	-1.3067^{++} [0.0957]	-8.3289^{+} [0.000]
Pedroni	-	-8.6332^{+} [0.000]	-	-3.5042^{+} [0.000]	-	-10.9946^{+} [0.000]

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

In Chapter 4.1., it is also concluded that real interest rate is strongly significant with negative impact for developed countries, but no significant impact occurs for other samples. It should be also noted that when cross section dependence and unobserved common shocks are considered the coefficient of real interest rate remarkably decreases. Contrary to the results in Table 12, real exchange rate has no significant effect on business cycles in CCEP estimation.

Furthermore, to analyze the short run dynamics considering long run relationship among variables of interest with controlling cross section dependence, PARDL model with CCEP estimators is estimated. Based on equation (5), the PARDL (2,2,2) model is set up including first differenced cross section averages. Error correction terms are estimated by the residuals terms from equations 1.18, 1.20 and 1.22 for the whole sample, for the sample of EMEs and for the sample of developed countries respectively. The results of short run dynamics of PARDL-CCEP estimations are reported in Table 15.

The short run dynamics of PARDL results with and without controlling for cross section dependence are essentially the same. PARDL results with common correlated effects do not produce different results from previous PARDL results, because it is seen that including U.S. cycles into the estimation eliminates cross section dependence. By considering cross country averages, impact of U.S. cycles becomes insignificant and cross country average of the cycle series becomes strongly significant.

Error correction coefficients in all short run dynamics of PARDL estimations in different sample of countries are negative and significant as expected. The longest adjustment time towards equilibrium is in the sample of EMEs and shortest adjustment time is in developed countries, this result is also similar to PARDL estimation without controlling cross section dependence. For EMEs after a shock the system reaches to its equilibrium longer than four quarters, whereas for developed countries the adjustment time is approximately three quarters. In the whole sample and in the sample of EME, both in the short-run and in the long-run, the real exchange rate index has a positive impact on business cycles which means depreciation deteriorates economic performance.

Table 15. Short Run Dynamics of Panel ARDL-CCEP Estimations

Variables	All Countries	EMEs	Developed Countries
Constant	0.0007 (0.0002)	-0.0007 (0.0004)	-0.0001 (0.0002)
ec_{t-1}	-0.2565** (0.0147)	-0.2308** (0.0018)	-0.3168** (0.0189)
ΔC_{t-1}	0.0004** (0.0207)	0.1171** (0.0295)	-0.1295** (0.0217)
$\Delta LREER_t$	0.0194** (0.0056)	0.0231** (0.0065)	-
$\Delta LREER_{t-1}$	0.0278** (0.0056)	0.0257** (0.0067)	-
Δrr_t	-	-	0.0207 (0.0276)
Δrr_{t-1}	-	-	-0.0181 (0.0276)
Δm_C_t	0.9424** (0.0582)	0.8997** (0.0799)	0.9469** (0.0432)
Δm_C_{t-1}	0.0764 (0.0607)	-0.0305 (0.0819)	0.1951 (0.0513)
Δm_LREER_t	-0.0148 (0.0321)	-0.0127 (0.0503)	-
Δm_LREER_{t-1}	-0.0448 (0.0335)	-0.0390 (0.0275)	-
Δm_rr_t	-	-	-0.0584 (0.0567)
Δm_{t-1}	-	-	0.0783 (0.0544)
N	2419	1190	2119
Number of CS	42	21	21
F-Statistic	21.2031**	21.2730**	38.2791**
R^2	0.3049	0.3391	0.3390
DW	1.9750	1.978	1.983

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Impact of global conditions, represented by cross section averages of cycle series, is strongly positive on business cycles. Therefore, cross section averages of cycle series, that captures overall global financial and macroeconomic conditions and unobserved common shocks such as socioeconomic network and contagion, is the leading determinant of business cycles in all three samples of countries. It should also be noted that short run impacts of changes in the real interest rate appears to be non-significant for developed countries, unlike the findings of PARDL without

considering cross section dependence. By this means, it can be concluded that real interest rate is not independent from cross section differences.

To sum up, the most remarkable finding of the estimation with controlling cross section dependence is the strong impact of cross section average of cycle series on business cycles for all samples. This indicates socioeconomic networks, contagion effect of crisis, trade linkages and other unobserved common shocks have important roles in business cycles. When global economy deteriorates, economic performance of a country is affected negatively; a boom in global economy boosts a country's economy as well. In previous estimates, VIX and U.S. cycles are used as proxies for global financial and macroeconomic factors. However, by CCEP estimation it has been observed that measuring common shocks with only these variables underestimates the role of common shocks. Moreover, for both estimations with or without controlling for cross section dependence it has been seen that dynamics for EMEs and developed countries differ significantly. For EMEs real exchange rate has an important role in macroeconomic fluctuations whereas for developed countries real interest rate has a significant impact, that is to say monetary policy matters for this group of countries.

4.3. GMM Analysis

In the literature, it has been an important discussion topic that domestic macroeconomic variables may be endogenous. In previous sections when running panel cointegration estimations, either lagged values of domestic variables are used or domestic variables are treated as being potentially exogenous. In this part, Generalized Method of Moments (GMM) procedure, developed for dynamic panel data models by Arellano and Bond (1991) and Arellano and Bover (1995) is applied to control for the endogeneity problem. GMM models for dynamic panels have been used widely in the literature as these models can handle multiple endogenous explanatory variables such as domestic macroeconomic variables, fixed effects and unbalanced panels. Arellano and Bond's (1991) procedure relies on first-differencing and lagged values of the endogenous variables as instruments. In addition, GMM estimator provides consistent and efficient estimates in the presence of heteroscedasticity.

In order to apply the GMM method, the following equation is considered:

$$\Delta C_{it} = \mu + \phi ec_{t-1} + \lambda_1 \Delta C_{it-1} + \delta_0 \Delta X_{i,t} + \delta_1 \Delta X_{it-1} + \gamma_0 \Delta Z_t + \gamma_1 \Delta Z_{t-1} + u_i + v_t + \eta_{it} \quad (7)$$

where C represents the business cycles series by filtering the output series, X is the vector of domestic variables, Z is the vector of common variables and *ec* denotes the equilibrium correction term. Δ is the difference operator. u_i and v_t are cross section and time specific effects respectively and η_{it} is the disturbance term.

Table 16 reports the robust two-step system GMM estimation results for the samples of all, developing and developed countries. In order to explore if endogeneity of domestic macro variables causes inaccurate results in cointegration analyses, GMM estimation is applied based on the previous PARDL estimations (equations 1.3, 1.7 and 1.14). In other words, GMM estimation tests whether the results of panel ARDL estimations are robust. The domestic variables (LREER and RR) are considered as being potentially endogenous and global variables (LVIX and USAC) are taken as strictly exogeneous. The following findings are obtained by using all the available t-2 dynamic lags and current values of USAC and LVIX as instruments.

GMM estimations provide similar findings as in fixed effect OLS estimations; however, in developed countries, real interest rate losses its significance when it is controlled for endogeneity. In addition reported Hansen tests and tests for autocorrelation give expected results. Hansen test indicates that the instruments as a group are exogenous and valid for all groups of countries. And, as expected the test for AR(1) process is rejected at 10% level for all samples and test for AR(2) process indicates that there is no autocorrelation in levels.

The major conclusion from GMM estimations is that when endogeneity problem of domestic macroeconomic variables is taken into consideration, for both whole sample and EMEs, the findings have not changed. It is concluded that real exchange rate has significant contactionary impact on business cycles, and U.S. cycles is the leading source of business cycles for these samples, as in the case of fixed PARDL results. Hence, for both sample of all countries and EME, real exchange rates, U.S. cycles and, for the whole sample, LVIX have strong and robust impact on business cycles. On the other hand, in the sample of developed countries, when endogeneity of real interest rate is controlled, only LVIX and U.S cycles seem

to have significant impact on business cycles. Thus, the issue of endogeneity arises for real interest rate and leads biased results.

Table 16. Determinants of Business Cycles: System GMM Results

Variables	All Countries	EMEs	Developed Countries
Constant	-0.0004** (0.0001)	-0.0001 (0.0001)	-0.0003** (0.0001)
ec_{t-1}	-0.2604** (0.0371)	-0.1985** (0.0377)	-0.2522** (0.0461)
$\Delta GDPVOL\_C_{t-1}$	0.0679 (0.1020)	0.2028 (0.1666)	-0.0277 (0.0798)
$\Delta LREER_t$	-	0.0349** (0.0196)	-
$\Delta LREER_{t-1}$	0.0367** (0.0103)	0.0197** (0.0270)	-
ΔRR_t	-	-	-0.0408 (0.2096)
ΔRR_{t-1}	-	-	-
$\Delta LVIX_t$	-	-	0.0036** (0.0009)
$\Delta LVIX_{t-1}$	-0.0027** (0.0013)	-	-
$\Delta USAC_t$	-	0.4824** (0.2337)	0.5792** (0.0959)
$\Delta USAC_{t-1}$	0.4837** (0.1553)	0.6629** (0.1673)	0.4856** (0.1057)
N	2419	1032	1424
Number of CS	42	20	21
Statistics	$\chi^2_{WALD}(6) = 216.59$ [0.00] Z = 599 P[Hansen] = 1.000 m1 = -3.438 [0.00] m2 = 1.86 [0.06]	$\chi^2_{WALD}(5) = 203.42$ [0.00] Z = 667 P[Hansen] = 1.000 m1 = -2.38 [0.02] m2 = 1.22 [0.22]	$\chi^2_{WALD}(6) = 100.18$ [0.00] Z = 771 P[Hansen] = 1.000 m1 = -2.33 [0.02] m2 = 1.14 [0.26]

Notes: The values in parentheses are the standard errors (d.f. adjusted) that are robust to within cross-section residual correlation and heteroscedasticity (Arellano, 1987). (**) and (*) denote the significance at the 5 % and 10 % levels, respectively. m1 and m2 are the Arellano and Bond (1991) tests for first-order and second-order serial correlation, asymptotically N(0,1). Z is the number of instruments and P[Hansen] reports the p–value of the Hansen test for instrument validity and over-identification restrictions.

4.4. Determinants of Business Cycles: Impact of Chinese Cycles

Since the beginning of 2000s Chinese economy has become an important actor in the global economy. China's economic growth rate is 10.3 % in 2010 and according to World Economic Outlook by IMF (2011) it is expected to be 9.5% for 2011. Prasad (2004) claims that China's integration into the global economy is one of the most important economic developments in the last decade. After reforms in trade and state owned enterprises, China has started to experience strong economic performance. In addition, China has a big export volume to other EMEs such that it overtook the U.S. as Brazil's biggest import market. There are studies that discuss the impact of growing Chinese economy on economic developments in other countries[41]. However, China's increasing role in global economy has not been studied widely due to quality and accuracy of data and heavy involvement of Chinese government in the markets which makes Chinese economy different relative to other countries.

In this framework, as Chinese economy has started to play a crucial role in the global economy the question of how the Chinese economy influence the economic performance of other countries has been raised. Therefore, in this part, Chinese business cycles are included in the model as another external factor[42]. Quarterly real GDP series for China are obtained from Abeysinghe and Rajaguru's (2004) study. They construct the series by rewriting quarter on quarter changes from year on year changes till 2007. For the years 2008 and 2009 Chinese output series are taken from the National Bureau of Statistics China. Chinese business cycles are obtained by filtering output series with Hodrick-Prescott filter.

Based on equations (2)-(5), PARDL (2,2,2) model is estimated by including Chinese business cycles[43]. In other words, the factors that affect business cycles are considered as $X_{it}^{'}$ = ($Lreer_{it}$, $DNfar_{it}$, ToT_{it}, rr_{it})' and $Z_t^{'}$ = ($LVIX_t$, $USAC_t$, $CHINAC_t$)'. The same process is followed in Chapter 4.1., therefore firstly the

[41] Prasad (2004), Lane and Schmukler (2007a and 2007b), Akin and Kose (2008)

[42] Curtis and Mark (2010) analyze if it is accurate to implement business cycles model for the Chinese economy. It is concluded that China is not very different for implementing business cycles modeling They examine post reform period (over the period from1978 to 2007) by using Mendoza's (1991) model. The main finding is that Chinese business cycles can be explained by business cycles models; however the model is not that successful to explain consumption and saving behaviour in China.

[43] The time period is started from 1994:1 therefore it covers the period after reforms in China.

following equation that reflects long run relationship is estimated for each sample of countries:

$$C_{it} = \beta_0 + \beta_{1L}Reer_{it} + \beta_2 DNfar_{it} + \beta_3 ToT_{it} + \beta_4 rr_{it} + \beta_5 VIX_t + \beta_6 USAC_t + \beta_6 CHINAC_t + U_{it} \quad (8)$$

where C represents the business cycles series by filtering the output series[44] with the Hodrcik-Prescott filter. LReer is the log of real exchange rate index, DNfar is change in the net foreign assets ratio to GDP, ToT is terms of trade, rr is real interest rate, VIX is for log of VIX and USAC is Hodrick-Prescott filtered U.S. output series and CHINAC is Hodrick-Prescott filtered Chinese output series. Then, several combinations of significant explanatory variables are considered and the equation that explains the business cycles as a long run relationship best is reported. Residuals from static estimations are tested by Im, Pesaran and Shin's (2003) unit root test to implement cointegration procedure. Besides, results of panel cointegration tests that are developed by Kao (1999) and Pedroni (2004) are also reported.

In Table 17, long run and in Table 18 short run dynamics of the determinants of business cycles are given for each sample[45]. Similar to the findings in Chapter 4.1, for the sample of all countries, when all explanatory variables are included, log of real exchange rate, real interest rate, U.S. cycles and additionally Chinese cycles are found to be statistically significant. In the second equation for the whole sample when DNfar and ToT are excluded from the estimation, the significancy of real interest rate is also lost, thus the long run relationship is estimated by considering real exchange rate, VIX, U.S. cycles and Chinese cycles.

Similar to the findings of equation 1.3., it is concluded that real exchange rate has positive impact on business cycles for the whole sample which supports the view that depreciations have contractionary impact on economic performance. Both U.S. cycles and Chinese cycles have also positive significant impact and VIX has a negative significant impact on cycles. Residuals from static estimations are tested by Im, Pesaran and Shin's (2003) unit root test which indicates stationary residuals for

[44] Log of real GDP series or GDP Volume indices

[45] The data set for the estimation is started from 1994:1 since real exchange rate data is available since then. So, the period that is investigated captures the period that China has begun to be an important actor in the global economy.

all equations and results of panel cointegration tests, by Kao (1999) and Pedroni (2004), indicate that there is a cointegration relationship between variables.

Table 17. Determinants of Business Cycles: Impact of Chinese Cycles

Variables	All Countries		EMEs		Developed Countries	
Constant	-0.0917** (0.0181)	-0.1039** (0.01467)	-0.1189** (0.0293)	-0.1121** (0.0197)	0.0554** (0.0251)	0.0487** (0.0248)
LREER	0.0209** (0.0037)	0.0237** (0.0031)	0.0288** (0.0057)	0.0282** (0.0041)	-0.0110* (0.0056)	-0.0111** (0.0054)
DNFAR	0.0001 (0.0002)	-	0.0047* (0.0027)	0.0042* (0.0024)	0.0001 (0.0001)	-
TOT	-0.0016 (0.0029)	-	0.0011 (0.0045)	-	-0.0046 (0.0041)	-
RR	0.0340** (0.0097)	-	0.0381** (0.0132)	-	-0.1010** (0.0336)	-0.1289** (0.0362)
LVIX	-0.0009 (0.0011)	-0.0020* (0.0011)	-0.0049** (0.0022)	-0.0063** (0.0019)	-0.0008 (0.0010)	-
USAC	0.7340** (0.0379)	0.7053** (0.0368)	0.5998** (0.0744)	0.5642** (0.0645)	0.7644** (0.0338)	0.7584** (0.0361)
CHINAC	0.3208** (0.0448)	0.3003* (0.0411)	0.6204 (0.0970)	0.5749** (0.0754)	0.1606** (0.0377)	0.1176** (0.0406)
N	2052	2503	892	1135	1160	1250
Number of CS	39	42	18	21	21	21
F-Statistic	16.146**	15.290**	12.7761**	12.9581**	26.024**	25.3523**
R^2	0.2659	0.2188	0.2613	0.2261	0.3830	0.3139
IPS	-9.4100^{+} [0.0044]	-10.1378^{+} [0.000]	-4.8387^{+} [0.000]	-5.2165^{+} [0.000]	-9.2341^{+} [0.000]	-9.9734^{+} [0.000]
ADF Fisher χ^2	247.340^{+} [0.000]	282.510^{+} [0.000]	82.523^{+} [0.000]	99.185^{+} [0.000]	180.663^{+} [0.000]	196.856^{+} [0.000]
PP Fisher χ^2	265.602^{+} [0.000]	312.195^{+} [0.000]	90.267^{+} [0.000]	113.287^{+} [0.000]	190.393^{+} [0.000]	207.318^{+} [0.000]
Kao	-6.8001^{+} [0.000]	-9.7129^{+} [0.000]	-1.8850^{+} [0.0297]	-4.1286^{+} [0.000]	-1.5249^{++} [0.0636]	-2.9764^{+} [0.001]
Pedroni	-	-6.9749^{+} [0.000]	-	-1.7179^{+} [0.042]	-	-9.5486^{+} [0.000]

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

Short run dynamics of PARDL estimation results are given in Table 18. Since the current value of VIX and lagged values of Chinese cycles are found to be not

significant, short run dynamics are estimated by excluding these variables. Error correction coefficient (Φ) is negative and significant as expected. For the whole sample, considering the fact that the data is quarterly, the system reaches to the equilibrium approximately in four quarters after a shock, which is similar to the findings without including Chinese cycles.

By considering Chinese cycles, the impact of U.S. cycles have decreased slightly both in the short run and in the long run. Yet again, real exchange rate index has a positive impact and VIX has a negative impact on business cycles in the short run and in the long run. Thus, PARDL estimation provides evidence that Chinese cycles have a positive impact on the business cycles for the sample of all countries[46]. The same procedure is followed for the sample of EMEs. It is found that log of real exchange rate change in the net foreign assets ratio, U.S. cycles, Chinese cycles have positive significant impact and VIX has a negative significant impact on businesses cycles in EMEs.

By considering Chinese cycles, terms of trade loses its significancy. Moreover, the impact of U.S. cycles has decreased noticeably such that U.S. cycles and Chinese cycles have almost the same impact on cycles in long run. According to unit root test and cointegration test, there is evidence for cointegration relationship between variables. When short run dynamics of PARDL (2,2,2) are estimated, it is concluded that change in net foreign assets and VIX have no significant impact in the short run. The error correction coefficient (Φ) is negative and significant as expected. The adjustment speed towards to the equilibrium is relatively slow such that after a shock the system reaches the equilibrium approximately in five quarters in EMEs. Both in the short-run and in the long-run real exchange rate index has a positive impact on business cycles which means depreciation deteriorates economic performance. As can be seen from the results, although Chinese cycles are also influential, U.S.cycles is the leading factor in the short run. Similar to the previous findings, findings for the EMEs suggest that both in the short run and in the long run external factors are the foremost sources of the business cycles[47].

[46] Utlaut and Roye (2010) also conclude that Chinese cycles have impact on emerging Asian countries but it is not strong as World GDP.

[47] In the error correction model estimation for EME, both current and lagged values of real exchange rate are considered. It is assumed that real exchange rate is weakly exogenous.

For the sample of developed countries, general model results indicate that log of real exchange rate, real interest rate, U.S. cycles and Chinese cycles have significant impact on business cycles. Unlike the results in Chapter 4.1, by including Chinese cycles, it is concluded that both real exchange rate and real interest rate have significant impact on cycles in the long run. Just like the previous findings, for developed countries, real currency depreciations have an expansionary impact on economic performance which supports the traditional view. And, as expected real interest rate effects business cycles negatively and U.S. cycles effects positively. In addition, global financial conditions, VIX, is found to be insignificant which is reported in Chapter 4.1 as positive and significant. Moreover, IPS unit root test concludes stationary residuals from static estimations and Kao's (1999) and Pedroni's (2004) panel cointegration tests show that there is a cointegration relationship between variables.

Short run dynamics of PARDL (2,2,2) for the developed countries indicate mixed signals. When considering Chinese cycles, real interest rate is strongly significant with negative impact both in the long run and in the short run. Similar to the results in Chapter 4.1., it is concluded that while monetary policy is effective in developed economies, but not for smoothing the macroeconomic fluctuations in EMEs. Real exchange rate supports the traditional view in the long run, but in the short run it is seen that real exchange rate deprecations harm economic growth similar to the EMEs.

Above all, the findings for developed countries indicate that Chinese cycles have stronger impact on business cycles in these countries compared to U.S in short run. On the other hand, impact of Chinese cycles is considerably low in long run. In addition, error correction coefficient (Φ) is negative and significant. The adjustment towards to equilibrium is around two and a half quarters which is relatively fast compared the other samples.

In brief, it is believed that analyzing Chinese business cycles as an external factor on business cycles for other countries is worth exploring. The major conclusion of this part is that Chinese business cycles matter for both EMEs and for developed countries. Nevertheless, by including Chinese business cycles to the model similar results are obtained as in Chapter 4.1 with slight differences. Mainly, global factors are the leading source of business cycles both in EME and developed countries. And yet, real exchange rate depreciations have contractionary impact for

business cycles in EMEs both in the long and the short run. Whereas, for developed countries it has an expansionary impact in the long run, but in the short run it becomes contractionary.

Table 18. Short Run Dynamics: Impact of Chinese Cycles

Variables	All Countries		EMEs		Developed Countries	
Constant	-0.0001 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0004)	-0.0002 (0.0004)	0.0001 (0.0003)	-0.0001 (0.0003)
ec_{t-1}	-0.2556** (0.0146)	-0.2556** (0.0146)	-0.2292** (0.0191)	-0.2279** (0.0188)	-0.4014** (0.0291)	-0.4414** (0.0275)
ΔC_{t-1}	0.0462** (0.0204)	0.0472** (0.0204)	0.1618** (0.0303)	0.1598** (0.0298)	-0.0921** (0.0293)	-0.0622** (0.0286)
$\Delta LREER_t$	0.0247** (0.0057)	0.0248** (0.0057)	0.0332** (0.0069)	0.0331** (0.0069)	-0.0105 (0.0121)	-
$\Delta LREER_{t-1}$	0.0279** (0.0058)	0.0279** (0.0058)	0.0152** (0.0071)	0.0156** (0.0070)	0.0234* (0.0127)	0.0238** (0.0126)
$\Delta DNFAR_t$	-	-	0.0015 (0.0011)	-	-	-
$\Delta DNFAR_{t-1}$	-	-	-0.0001 (0.0011)	-	-	-
Δrr_t	-	-	-	-	-0.0767 (0.0551)	-0.1256** (0.0533)
Δrr_{t-1}	-	-	-	-	-0.0091 (0.0544)	-
$\Delta LVIX_t$	-0.0001 (0.0017)	-	0.0003 (0.0018)	-	-	-
$\Delta LVIX_{t-1}$	-0.0024** (0.0012)	-0.0022** (0.0011)	-0.0018 (0.0018)	-	-	-
$\Delta USAC_t$	0.3730** (0.0543)	0.3861** (0.0502)	0.4417** (0.0846)	0.4452** (0.0766)	0.3216** (0.0650)	0.3171** (0.0651)
$\Delta USAC_{t-1}$	0.3535** (0.0542)	0.3711** (0.0504)	0.3635** (0.0837)	0.3981** (0.0752)	0.2887** (0.0686)	-
$\Delta CHINAC_t$	0.3398** (0.0794)	0.3467 ** (0.0782)	0.3167** (0.1211)	0.3332** (0.1184)	0.4491** (0.1001)	0.5124** (0.0992)
$\Delta CHINAC_{t-1}$	0.0780 (0.0803)	-	0.0159 (0.1259)	-	0.1937* (0.1002)	0.3367* (0.0939)
N	2419	2419	1089	1105	1204	1206
Number of CS	42	42	21	21	21	21
F-Statistic	14.527**	15.107**	12.232**	14.755**	16.441**	17.381**
R^2	0.2384	0.2381	0.2704	0.2700	0.2960	0.2849
DW	2.022	2.023	2.021	2.031	1.992	1.974

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

4.5. Determinants of Business Cycles: Exchange Rate Regimes

In Chapter 4.1, one of the major findings for the determinants of business cycles was how the impact of foreign currency depreciations on the business cycles differs across the sample of EMEs and developed countries. Currency depreciation deteriorates economic performance in EMEs, while it promotes economic performance in developed countries. This different impact across two groups of countries has raised the question that if determinants of business cycles change depending on the exchange rate regimes. Therefore, in this part, major factors of business cycles are analyzed in the exchange rate regimes framework, which are basically classified as floating exchange rate regimes and non-floating exchange rate regimes. Classification of exchange rate regimes based on the classification in Ilzetzki, Reinhart and Rogoff's (2009) study[48]. In their data set there are two classification codes named as "fine classification" and "coarse classification". In this study, dummy variables are constructed based on coarse classification such as classification less than 3 are accepted as non-floating regimes and greater than and equal to 3 indicates floating exchange rate regimes[49].

In the literature, it has been discussed that floating exchange rate regimes help countries to reduce foreign shocks since the exchange rate adjusts depending on the conjuncture, in other words floating exchange rates act as shock absorbers. On the other hand, the other view suggests that fixed exchange rate regimes might be preferable due to stability and certainty. After the currency and banking crises in EMEs during 1990s and in early 2000s[50], the debate over the choice of exchange rate regime for promoting economic performance have become popular[51]. As Calvo and Reinhart (2002) point out, the widely accepted suggestion to EMEs had been switching to floating exchange rate regime[52]. Many countries has chosen a blend of

[48] The dataset ends in 2007, De Facto Classification of Exchange Rate Regimes Table by IMF is used for 2008 and 2009.

[49] The detailed information on exchange rate regimes classifications in Ilzetzki, Reinhart and Rogoff (2008) are given in the appendix.

[50] Argentina in 2001, Turkey in 2001, Ecuador in 1999, Russia in 1998 and Mexico in 1994-1995.

[51] See Calvo and Mishkin (2003).

[52] There are some empirical studies that provide empirical evidence on the floating exchange rate regimes promote economic growth since floating exchange rates act as a shock absorbers (Levy-Yeyati and Sturzenner (2003), Edwards and Levy-Yeyati (2005) and Reinhart and Rogoff (2004)). On the other hand, Edwards (2011) raises questions on the limitations of these studies such as data of exchange rate are subject to survival bias. Countries that adopted a fixed exchange rate but failed to

two such that exchange rate was often stabilized by central bank and sometimes it was allowed to float, which is called soft peg regimes. However, Asian case has showed that such soft peg regimes might be responsible for the crisis in the region (Obstfeld and Rogoff (1995), Calvo and Mishkin (2003)). Therefore, according to Calvo and Mishkin (2003) countries should choose bipolar choices: either hard pegs or freely floating regimes. However, they also mention that there is no optimal regime without problems. On the whole, according to Calvo and Mishkin (2003) the key to macroeconomic success in EMEs does not depend on the choice of exchange rate regimes but on the strong macroeconomic institutions.

In this context, the determinants of business cycles are analyzed under different exchange rate regimes based on PARDL (2,2,2) estimation. The same major driving forces of business cycles are included as in Chapter 4.1. for each sample of countries.

4.5.1. Under Floating Exchange Rate Regimes

Estimation results of long run dynamics for each sample and estimation results of short run dynamics for each sample under floating exchange rate regime are given in Table 19 and in Table 20, respectively based on equation 2 and equation 5. For the sample of all countries, following the main determinants for the business cycles in Chapter 4.1, log of real exchange rate, VIX and U.S cycles are included in the model. Real interest rate is also included in the model since it is a monetary policy tool to meet policy targets under both fixed exchange rate regimes and floating exchange rate regimes. Besides, an old proposition in open economy macroeconomics states that under free capital mobility, countries cannot have fixed exchange rate regime and independent monetary policy at the same time[53]. Although it is an old proposition, Edwards (2011) points out that under recent exchange rate debates, it has started to be discussed again. Therefore, real interest rate is also considered in the estimations.

Almost same findings are achieved as in Chapter 4.1., after considering floating exchange rate regimes. Real exchange rate and U.S. cycles have significant positive impact and VIX has a negative significant impact on the cycles in the long run in line with expectations. Depending on this equation, short run dynamics is

sustain it have usually been classified as having a flexible regime. On the other hand some countries that are classified as implementing floating exchange rate regimes in fact have had de facto pegs.

[53] This proposition is known as Impossiblity of the Holy Trinity (Mundell (1961)).

estimated by PARDL approach. Residuals from static estimations are tested by IPS unit root test which indicates stationary residuals for each sample of countries. Besides, results of panel cointegration tests that are developed by Kao (1999) and Pedroni (2004) indicate that there is a cointegration relationship between variables for each sample of countries.

Table 19. Determinants of Business Cycles: Floating Exchange Rate Regimes

Variables	**All Countries**		**EMEs**		**Developed Countries**	
Constant	-0.1538** (0.0266)	-0.1497** (0.0224)	-0.1587** (0.0434)	-0.1845** (0.0197)	-0.0030 (0.0316)	-0.0017* (0.0006)
LREER	0.0350** (0.0055)	0.0341** (0.0047)	0.0381** (0.0089)	0.0432** (0.0067)	0.0023 (0.0066)	-
DNFAR	-	-	0.0255** (0.0114)	0.0219** (0.0094)	-	-
TOT	-	-	-0.0057 (0.0064)	-	-	-
RR	-0.0081 (0.0088)	-	0.0145 (0.0141)	-	-0.0634 (0.0466)	-0.0436** (0.0168)
LVIX	-0.0028 (0.0016)	-0.0026** (0.0016)	-0.0039 (0.0029)	-0.0053** (0.0026)	-0.0027* (0.0016)	-
USAC	0.7845** (0.0512)	0.8121** (0.0368)	0.7099** (0.0943)	0.6863** (0.0829)	0.8412** (0.0472)	0.6525** (0.0340)
N	1145	1248	522	641	540	896
Number of CS	35	38	13	17	20	20
F-Statistic	14.006**	15.142**	13.162**	13.610**	19.698*	20.917*
R^2	0.3249	0.3341	0.3202	0.3051	0.4675	0.3345
IPS	-1.4904^{++} [0.0064]	-3.8295^{+} [0.000]	-2.2191^{+} [0.0132]	-6.0050^{+} [0.000]	-2.3837^{+} [0.009]	-4.192^{+} [0.000]
ADF Fisher χ^2	169.334^{+} [0.000]	189.625^{+} [0.000]	54.545^{+} [0.000]	73.122^{+} [0.000]	112.920^{+} [0.000]	170.990^{+} [0.000]
PP Fisher χ^2	178.988^{+} [0.000]	209.117^{+} [0.000]	60.758^{+} [0.000]	83.451^{+} [0.000]	121.231^{+} [0.000]	179.219^{+} [0.000]
Kao	-8.2353^{+} [0.000]	-8.7515^{+} [0.000]	-1.9837^{+} [0.000]	-4.7644^{+} [0.000]	-3.0530^{+} [0.001]	-5.2990^{+} [0.000]
Pedroni	-4.5517^{+} [0.000]	-3.6546^{+} [0.000]	-1.5199^{+} [0.064]	-1.0190 [0.154]	-6.7807^{+} [0.000]	-6.2519^{+} [0.000]

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

Short run dynamics of PARDL estimation results for sample of all countries under floating exchange rate regimes indicate that, in the short run, both real exchange rate and U.S. cycles have positive significant impacts. On the other hand, it is found that VIX has no significant impact in the short run, despite it has a significant impact in the long run. Error correction coefficient (Φ) is negative and significant as expected which indicates the adjustment towards equilibrium. For the whole sample, considering the fact that the data is quarterly, after a shock the system reaches to its equilibrium approximately in three and a half quarters. Both in the short-run and in the long-run real exchange rate index has a positive impact on business cycles which means depreciation deteriorates economic performance, in the line with the previous findings. Furthermore, similar to the previous findings under the floating exchange rate regimes both in short run and in long run, U.S. cycles, the proxy for global economy, are the leading source of business cycles for the whole sample.

Under the floating exchange rate regime, for the sample of EMEs, real exchange rate, change in net foreign assets, terms of trade, real interest rate, VIX and U.S cycles are included in the model. It is concluded that real exchange rate, change in net foreign assets and U.S cycles have positive significant impacts and VIX has a negative significant impact on business cycles in EMEs. Unlike the previous findings, under the floating exchange rate regime, terms of trade has no significant impact on business cycles in EMEs. In the short run, PARDL estimation results indicate that real exchange rate, change in net foreign assets and U.S. cycles promote economic performance significantly but VIX has no significant impact in the short run on business cycles.

Error correction coefficient (Φ) is negative and significant. The adjustment speed towards to the equilibrium is relatively slow compared to the whole sample but it is relatively fast compared to the adjustment coefficient in Chapter 4.1. Considering the fact that data is quarterly, the system reaches the equilibrium approximately in four quarters after a shock in EMEs. For the sample of EMEs under floating exchange rate regime, in line with the previous findings, real exchange rate has contractionary impact both in the short run and in the long run. Moreover, U.S. cycles once again is the leading source of fluctuations both in the short run and in the long run. In the sample of developed countries, similar to the results in Chapter 4.1, it is found that real interest rate and U.S. cycles have significant impact on business

cycles. As expected real interest rate affects business cycles negatively and U.S. cycles affects positively in the long run. However, unlike the previous results, VIX has no significant impact under the floating exchange rate regime for developed countries.

Table 20. Short Run Dynamics: Floating Exchange Rate Regimes

Variables	**All Countries**		**EMEs**		**Developed Countries**	
Constant	-0.0005 (0.0004)	-0.0005 (0.0004)	-0.0002 (0.0006)	-0.0002 (0.0006)	-0.0005 (0.0004)	-0.0005 (0.0003)
ec_{t-1}	-0.3053** (0.0222)	-0.3050** (0.0220)	-0.2688** (0.0282)	-0.2692** (0.0278)	-0.3979** (0.0320)	-0.3910** (0.0319)
ΔC_{t-1}	0.0551* (0.0289)	0.0543* (0.0288)	0.1514** (0.0405)	0.1493** (0.0401)	-0.0986** (0.0333)	-0.1095** (0.0335)
$\Delta LREER_t$	0.0201** (0.0072)	0.0199** (0.0071)	0.0325** (0.0091)	0.0333** (0.0088)	-	-
$\Delta LREER_{t-1}$	0.0280** (0.0068)	0.0284** (0.0068)	0.0163* (0.0088)	0.0154* (0.0086)	-	-
$\Delta DNFAR_t$	-	-	0.0036 (0.0047)	0.0006* (0.0035)	-	-
$\Delta DNFAR_{t-1}$	-	-	-0.0040 (0.0047)	-	-	-
Δrr_t	-	-	-	-	-0.0200 (0.0434)	-0.0737* (0.0432)
Δrr_{t-1}	-	-	-	-	-0.0619 (0.0442)	-
$\Delta LVIX_t$	0.0011 (0.0017)	-	-0.0001 (0.0026)	-	-	-
$\Delta LVIX_{t-1}$	-0.0007 (0.0017)	-	-0.0006 (0.0026)	-	-	-
$\Delta USAC_t$	0.5014** (0.0725)	0.4895** (0.0692)	0.4738** (0.1097)	0.4836** (0.1045)	0.4536** (0.0569)	0.4408** (0.0571)
$\Delta USAC_{t-1}$	0.3074** (0.0755)	0.3292** (0.0711)	0.3561** (0.1143)	0.3403** (0.1073)	0.1086* (0.0590)	0.1094* (0.0596)
N	1192	1192	612	617	862	866
Number of CS	37	37	16	16	20	20
F-Statistic	11.668**	12.218**	9.804**	11.198**	15.676**	16.015**
R^2	0.3092	0.3087	0.2949	0.2932	0.3191	0.3136
DW	1.999	1.999	1.996	1.993	2.007	1.972

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Short run dynamics indicate that both real interest rate and U.S. cycles influence business cycles in the short run as well. As it is mentioned in Chapter 4.1, although remarkable number of studies provides evidence on the significant impact

of real interest rate on business cycles, real interest rate is found s a significant driving force of fluctuations only for developed countries so far. Besides, different from the other sample of countries real exchange rate has no significant effect on business cycles for developed countries, when considering the floating exchange rate regimes. Adjustment towards equilibrium takes around two and half quarters for the developed countries under floating exchange rate regimes. Under floating exchange rate regime, adjustment towards equilibrium is fast compared to the estimation results without controlling for exchange rate regimes.

Overall, findings under floating exchange rate regimes are similar to the findings without controlling for exchange rate regimes. U.S. cycles which is a proxy for global economy, is the leading source of macroeconomic fluctuations for each sample of countries. It should be also noted that different from the previous findings, it is concluded that under floating exchange rate regimes, VIX has no significant impact for any sample of countries.

4.5.2. Under Non-Floating Exchange Rate Regimes

Long run and short run estimation results of PARDL(2,2,2) under non-floating exchange rate regimes for each sample are reported in Table 21 and in Table 22 respectively based on equation 2 and equation 5.

For the sample of all countries, real exchange rate, real interest rate, VIX and U.S cycles are included in the model. In the long run, similar to the previous findings, it is concluded that real exchange rate, VIX and U.S. cycles influence business cycles positively and real interest rate has negative impact at 5% significance level. There are two findings of long run estimation that should be discussed. First it is found out that VIX has a positive significant impact. The possible reason underlying this finding might be that since, fixed exchange rate regimes reflect certainty and VIX represents investors' uncertainty, when the volatility of markets increase, investors choose to shift their investment to more safer ports. Thus, countries with fixed exchange rate regimes may provide this condition for them. Second, the remarkable finding for the sample of all countries under fixed exchange rate regimes is that real interest rate has become a significant driving factor of business cycles. Previously, significany of real interest rate have been concluded only for the sample of developed countries. Thus, estimation findings show that under fixed exchange rate regimes real interest rate contributes to business cycles

fluctuations due to the fact that under non-floating exchange rate regimes monetary authorities use interest rate actively to defend it determined peg.

Table 21. Determinants of Business Cycles: Non-Floating Exchange Rate Regimes

Variables	All Countries	EMEs		Developed Countries	
Constant	-0.11176** (0.0237)	-0.1424** (0.0368)	-0.1310** (0.0310)	0.1331** (0.0601)	0.1684** (0.0507)
LREER	0.0219** (0.0049)	0.0269** (0.0072)	0.0276** (0.0065)	-0.0311** (0.0126)	-0.0376** (0.0111)
DNFAR	-	0.0029 (0.0022)	-	-	-
TOT	-	-0.0052 (0.0057)	-	-	-
RR	-0.1527** (0.0252)	-0.1511** (0.0380)	-0.1505** (0.0331)	-0.2468 (0.0623)	-0.2421** (0.0622)
LVIX	0.0050** (0.0015)	0.0070** (0.0029)	-	0.0019 (0.0017)	-
USAC	0.7461** (0.0489)	0.9374** (0.0093)	0.7330** (0.0925)	0.6888** (0.0531)	0.6777** (0.0521)
N	1165	370	455	710	710
Number of CS	28	11	13	15	15
F-Statistic	14.091**	14.329**	12.123**	12.979*	13.668*
R^2	0.2783	0.3937	0.2929	0.2527	0.2514
IPS	-13.635^{+} [0.0064]	-4.366^{+} [0.0132]	-10.894^{+} [0.000]	-7.101^{+} [0.009]	-7.075^{+} [0.000]
ADF Fisher χ^2	184.238^{+} [0.000]	53.484^{+} [0.000]	69.660^{+} [0.000]	113.980^{+} [0.000]	113.487^{+} [0.000]
PP Fisher χ^2	196.912^{+} [0.000]	56.983^{+} [0.000]	79.070^{+} [0.000]	120.012^{+} [0.000]	119.893^{+} [0.000]
Kao	-2.1002^{+} [0.018]	1.4111^{++} [0.079]	1.4662^{++} [0.071]	2.4869^{+} [0.000]	-1.7885^{+} [0.037]
Pedroni	-3.4439^{+} [0.000]	-0.3932 [0.347]	-1.2928^{++} [0.098]	-6.0999^{+} [0.000]	-3.9449^{+} [0.000]

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively. Pedroni and Kao denote the ADF statistics of the panel cointegration tests developed by Pedroni (2004) and Kao (1999). IPS, ADF Fisher and PP Fisher give the statistics for the IM, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) panel unit root tests for the equation residuals, respectively. The values in [.] are the p-values. ($^{+}$) denotes the rejection of the null hypothesis of no cointegration at the 5% significance level.

Depending on the long run equation, short run dynamics is estimated by PARDL approach[54]. Short run dynamics support the results of long run estimation.

[54] Residuals from static estimations are tested by Im, Pesaran and Shin's (2003) unit root test which indicates stationary residuals for each sample of countries. Besides, results of panel cointegration tests

In the short run, under the non-floating exchange rate regimes, real interest rate has a negative significant impact, while VIX and U.S. cycles have positive significant impact on the business cycles. Although there is evidence on the significant contractionary impact of real exchange rate in the long run, no significant impact of real exchange rate is detected in the short run.

Thus, the results indicate that under the fixed exchange rate regime, importance of the real exchange rate vanished in the short run while effect of real interest rate on business cycles has gained importance. Another important point that should be noted is the speed of adjustment. Comparing to the results with floating exchange rate regimes, it has been seen that under non-floating exchange rate regimes; adjustment speed towards the equilibrium is slower such that the adjustment towards to the equilibrium is around four quarters.

The results under the non-floating exchange rate regimes for the sample of EMEs are also relatively different from the previous findings. In the long run, it is concluded that real exchange rate and U.S. cycles impact the fluctuations positively while real interest rate has negative significant impact on the cycles. In contrast to the previous findings, no significant impact of change in net foreign assets, terms of trade and VIX have been obtained. For the sample of EMEs real exchange rate have a contractionary impact on the cycles and real interest rate has negative impact as expected in the long run.

The short run estimation results show that only real interest rate and the U.S. cycles have significant impact on business cycles in EMEs. Similar to the findings for the whole sample, real exchange rate have contractionary impact in the long run but no significant impact is obtained for the short run. Moreover, real interest rate significantly influences the business cycles both in the short run and in the long run. Adjustment speed is relatively low compared to the one under the floating exchange rate regimes such that adjustment towards the equilibrium is around five quarters.

The picture for the sample of developed countries is remarkably different compared to the previous findings and compared to the sample of other countries. Unlike the results of other samples of countries, real interest rate has a significant impact on cycles in the long run but not in the short run. On the other hand, real

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that are developed by Kao (1999) and Pedroni (2004) indicate that there is a cointegration relationship between variables for each sample of countries.

exchange rate has a significant expansionary effect on cycles both in the long run and in the short run which supports the findings in Chapter 4.1. In addition, the impact of U.S. cycles, which has been the leading source of cycles previously, has decreased. In the short run it is found that only lagged value of U.S. cycles have significant impact.

Table 22. Short Run Dynamics: Non-Floating Exchange Rate Regimes

Variables	**All Countries**		**EMEs**		**Developed Countries**	
Constant	0.0004 (0.0003)	0.0003 (0.0003)	0.0006 (0.0005)	0.0005 (0.0005)	0.0004 (0.0004)	0.0005 (0.0004)
ec_{t-1}	-0.2570** (0.0237)	-0.2528** (0.0227)	-0.2358** (0.0298)	-0.2080** (0.0285)	-0.3251** (0.0367)	-0.3306** (0.0364)
ΔC_{t-1}	-0.0528* (0.0309)	0.0588* (0.0302)	0.1453** (0.0489)	0.1161** (0.0479)	-0.1677** (0.0388)	-0.1668** (0.0387)
$\Delta LREER_t$	-0.0174 (0.0183)	-	0.0017 (0.0232)	-	-0.0502* (0.0285)	-0.0561** (0.0278)
$\Delta LREER_{t-1}$	-0.0079 (0.0183)	-	0.0339 (0.0248)	-	-0.0668** (0.0286)	-0.0633** (0.0283)
$\Delta DNFAR_t$	-	-	-	-	-	-
$\Delta DNFAR_{t-1}$	-	-	-	-	-	-
Δrr_t	-0.0906** (0.0399)	-0.0896** (0.0379)	-0.0768* (0.0442)	-0.0807* (0.0419)	0.0954 (0.0912)	-
Δrr_{t-1}	-0.0223 (0.0320)	-	-0.0472 (0.0342)	-	0.0415 (0.0938)	-
$\Delta LVIX_t$	0.0027* (0.0015)	0.0033** (0.0014)	-	-	-	-
$\Delta LVIX_{t-1}$	-0.0014 (0.0015)	-	-	-	-	-
$\Delta USAC_t$	0.3761** (0.0689)	0.3806** (0.0672)	0.5899** (0.1056)	0.5271** (0.1020)	0.0793 (0.0854)	-
$\Delta USAC_{t-1}$	0.3774** (0.0714)	0.3971** (0.0699)	0.4852** (0.1067)	0.4866** (0.1064)	0.2229** (0.0908)	0.2119** (0.0900)
N	1107	1127	428	436	679	681
Number of CS	27	27	12	12	15	15
F-Statistic	7.649**	8.411**	8.029**	8.746**	9.710**	11.207**
R^2	0.2047	0.1975	0.2721	0.2503	0.2456	0.2436
DW	1.941	1.927	2.031	1.992	1.950	1.947

Notes: Standard errors are in parenthesis. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Adjustment speed towards the equilibrium is slower under the fixed exchange rate regime for developed countries as well. Adjustment towards the equilibrium for developed countries takes almost three quarters under the fixed exchange rate regime.

The estimation results under different exchange rate regimes provide evidence on the different structures of business cycles in EMEs and in developed countries. It is concluded under different exchange rate regimes, without controlling for them, driving sources of cycles differ across two samples of countries. Although similar results are obtained with floating exchange rate regimes as in Chapter 4.1, under fixed exchange rate regimes findings have changed dramatically. For both sample of countries, U.S. cycles is the leading source for fluctuations. However, considering the domestic shocks in the sample of EMEs, real interest rate is the significant determinant of cycles, while in the sample of developed countries real exchange rate is significant both in the short and the long run.

These findings show that various exchange rate regimes influence macroeconomic fluctuations differently, depending on the choice of the sample. Therefore, different political tools are needed to stabilize negative domestic and foreign shocks and to promote economic growth. In addition, estimated coefficients for the adjustment speed support the general consensus that floating exchange rate regimes reduce the impact of foreign shocks such that after a shock the economy under floating exchange rate regime come to equilibrium faster. On the other hand, the argument of Calvo and Mishkin (2003) should be taken into account that rather than focusing on the question whether a floating or a fixed exchange rate is preferable, the strength of economic institutions and characteristics of the economy should be considered.

In a nutshell, the findings in this chapter support the old saying that “When U.S. sneezes the rest of the world catches a cold”, although there is a debate going on that U.S. and other developed economies are slowing down while EMEs have become more important players in the world economy. Moreover, the results show the structural diversity of the business cycles of developed countries and EMEs and how diverse policies should be constructed for each sample of countries to dampen the negative foreign shocks and allow for positive spillovers.

CHAPTER 5

CO-MOVEMENTS OF BUSINESS CYCLES

Chapter 4 aimed to search out the main determinants of business cycles in both emerging market economies (EMEs) and in developed countries. The main conclusion of that chapter was that the common global shocks[1] are the leading factor that drives business cycles fluctuations in both groups of countries but domestic factors of cycles differ across two samples. The purpose of this chapter is to provide empirical evidence on whether business cycles of EMEs have converge to business cycles in developed countries as a consequence of globalization or decoupled from the business cycles in developed countries and have become independent. In the literature, it has been discussed that there are two factors that cause business cycles synchronization: common shocks such as oil price shocks, global liquidity conditions and country specific shocks that are transmitted to other countries by trade and financial linkages[2]. Findings in Chapter 4 indicate that business cycles in both groups of countries are highly affected from global factors, thus, in this chapter it is attempted to shed some light on how the impact of global factors have changed over time.

In the literature, there are two views that discuss synchronization of business cycles. First view suggests that as a result of globalization, increased financial integration EMEs have become more open to external vulnerabilities and depended on foreign sources, namely foreign capital flows, which leads to highly synchronized business cycles of EMEs and developed countries since the late 1980s. This hypothesis is known as "coupling" of business cycles. Another channel in coupling hypothesis is based on international trade linkages. According to Aruoba *et al*. (2011) an investment and consumption boom in one country may lead to an increase in demand of imports which has a positive impact on other countries' economic activity. On the supply side, a positive tradable output shock leads to lower prices, thus cheaper imported goods. These spillover effects support higher synchronization

[1] In Chapter 4, U.S. business cycles is defined as a proxy for common global shock.

[2] Frankel and Rose (1998), Baxter and Kouparitsas (2005), Bordo and Helbling (2010), Calderon *et.al.* (2010)

of business cycles fluctuations. Furthermore, they also state that as financial and trade linkages get stronger, more policy coordination becomes necessary which, in turn makes co-movement of cycles across countries increase.

On the other hand, the so-called "decoupling" hypothesis suggests that EMEs began to play an important role in the global economy[3] and have had remarkable growth performances in the last two decades. Moreover, EMEs have become more resilient to the financial crisis in 2008 and to the growth slowdowns in developed countries over the period 2003-2008 due to their strong domestic markets and macroeconomic reforms (Kose, Ortok and Prasad, 2008)[4]. In addition, Krugman (1993) points out that increased trade linkages may lead to regional specializations thus business cycle fluctuations may diverge due to industry specific shocks[5]. These three aspects supports the decoupling hypothesis that business cycles in EMEs move more and more independently from business cycles in developed countries[6].

The linkages in underlying the coupling and decoupling hypotheses are presented briefly in Chart 1. Both hypotheses base their claims on mainly three causes: financial linkages, trade linkages and strong economic performance of EMEs in the last two decades. As it is presented, there are three main channels leading to coupling of economic fluctuations: policy coordinations, demand and supply spillovers and productivity spillover effects across countries due to financial and trade linkages. On the other hand, underlying sources of decoupling hypothesis based on domestic macroeconomic and financial reforms, diversification of portfolios and regional specialization of production.

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[3] During last decade, EME have been accounted for more than half of global growth (Kose, Ortok and Prasad (2008)).

[4] Especially China and India, which have experienced rapid growth rate and hold a big share in the global trade, were affected less from the crisis in 2008. However, the recent debt crisis in 2011 initially influences developing markets sharply. To fully analyze the aggregate impact of recent crisis fully new developments should be observed.

[5] Aruoba *et al.* (2011) point out that the impact of specialization depends on the nature of specialization such as intra- vs. inter- industry specializations and the types of shocks such as common vs. country specific shocks. As they state if industry specific shocks are more important for business cycles then it is expected to experience less synchronized cycles. However, if common shocks associated with demand and supply condition are more dominant then higher synchronization of cycles would be observed.

[6] Kose, Otrok and Prasad (2008) provide evidence for decoupling of business cycles of EME and developed countries, by showing the business cycles are more closely linked within the group of EME and within the group of developed countries. Akın and Kose's (2008) findings support findings of Kose, Otrok and Prasad (2008) such that the intra group convergence between business cycles have been increased and Emerging South economies have decoupled from Northern countries.

The financial crisis in 2008 has started to signal in the mid 2007s and has initialized from financial markets of U.S. The debate on decoupling had been on the table after this crisis in such a way that growth performance of EMEs held up fairly well due to their strong domestic markets and prudent macroeconomic policies[7]. However, the latest financial crisis and credit crunch in August 2011, which has affected both EMEs and developed countries[8], led to the debate of the accuracy of decoupling hypothesis[9]. Most of the countries, both EMEs and developed countries, have implemented new policies immediately to reduce the impact of negative shocks stemming from the crisis. Although, the dataset of this study ends in 2009 and is not able to cover the impact the latest crisis in August 2011, it is believed that the analysis in this chapter would contribute to the coupling vs. decoupling hypothesis.

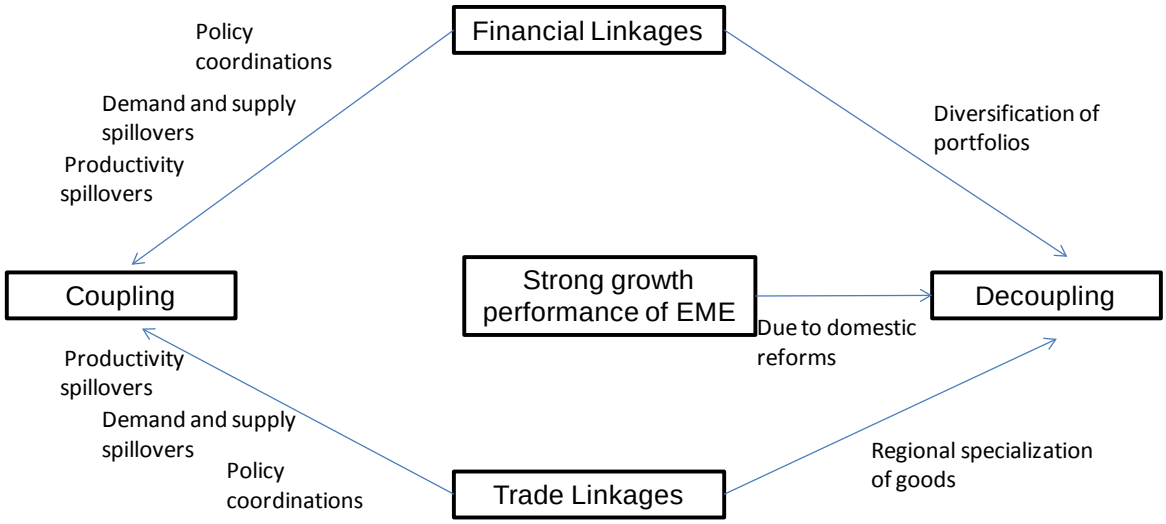

Chart 1. Coupling vs. Decoupling Hypothesis

In this chapter, firstly static factor analysis is applied to identify common business cycles factors. After that, the relationship among these factors is analyzed by using the sample of countries and two periods such that first phase of globalization (1970-1990) and second phase of globalization period (1990-2009)[10].

[7] Kose et. al (2008a and 2008b)

[8] Especially Euro area.

[9] The strong economic performance of China is accepted as the strongest evidence for decoupling hypothesis.

[10] In order to analyze more reliable data the shorter time period and less number of countries are considered in this study compare to Kose *et.al.* (2008a and 2008b).

Secondly, because the findings in Chapter 4 findings indicate that exchange rate regimes have different implications on fluctuations, the question that how synchronization alters over time depending on exchange rate regimes will be studied. In the literature, it has been discussed that financial integration and trade linkages are the key sources of synchronization of business cycles since these are important transmission channels of country-specific shocks from one country to another. Therefore, thirdly the relationship between business cycles of EMEs and developed countries are examined by controlling for financial integration levels. Finally, rolling window estimation is done to investigate if the impacts of common factors have been changed over time.

5.1. Factor Analysis

To analyze the co-movement among business cycles of different groups of countries factor analysis is preferred because it enables to identify unobserved common elements in other words inter-related variables from covariance of observable macroeconomic time series; in this case output cycles of countries. The main goal of factor analysis is to discover and to generate main unobservable sources of the variables of interest.

Factor models are also advantageous such that they can cope with many variables without causing degrees of freedom problems and they don't depend on strict assumptions[11]. Moreover, as Bernanke *et al.* (2005) point out, factor models enable to summarize the information about overall economic activity from large number of data. Another advantage of factor analysis is that after the data are collected, it can be implemented easily and rapidly by statistical packages. Thus, factor models are preferred by researchers and policy makers and once common factors are identified, they can be considered for forecasting purposes and can be used in many macroeconomic analyses for reaching to more information (Breitung and Eickmeier, 2005). In analyzing international business cycles, factor analysis helps to identify main common forces driving economic activity globally and in specific regions.

[11] See Breitung and Eickmeier (2005)

The following static r-factor model is considered which is based on Breitung and Eickmeier's (2005) study[12] :

$y_{it} = \lambda_{i1} f_{1t} + \cdots + \lambda_{ir} f_{rt} + u_{it}$ where t=1,…, T and i=1,…,N

$y_{it} = \lambda_i' f_t + u_t$

where $\lambda'_i = [\lambda_{i1}, \ldots, \lambda_{ir}]'$, $f_t = [f_{1t}, \ldots, f_{rt}]'$ and $u_t = [u_{1t}, \ldots, u_{Nt}]'$

$y_t = \lambda f_t + u_t$

$Y = F\Lambda' + U$

where $\Lambda = [\lambda_1, \ldots, \lambda_N]'$, $Y = [y_1, \ldots, y_T]'$, $F = [f_1, \ldots, f_T]'$ and $U = [u_1, \ldots, u_T]'$

For strict factor model, it is assumed that

- $E(u_t) = 0$
- $E(u_t u_t') = \Sigma = \text{diag}(\sigma_1^2 \ldots \sigma_1^3)$
- $E(f_t) = 0$
- $E(f_t f_t') = \Omega$[13]
- $E(f_t u_t') = 0$

And loading matrix, Λ, is computed by minimizing sum of squares of

$$\sum (y_t - \beta f_t)'(y_t - \beta f_t)$$

subject to constraint where $\beta'\beta = I_r$'. The $\hat{\beta}$ is called principal components estimator of factor loading matrix, Λ. The columns of $\hat{\beta}$ gives the eigenvectors of the r largest eigenvalues of the matrix $\frac{1}{T}\sum_{t=1}^{T} y_t y_t'$

In this chapter, annual data are used to cover balanced and longer time period with larger number of countries as much as possible. In the sample there are 46 countries[14] totally which involves 21 EMEs and 23 developed countries. Annual GDP series[15] are obtained from The World Bank's World Economic Indicators dataset and cycles are extracted by Hodrick-Prescott filter[16].

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[12] There are other leading studies that consider factor models such as Stock and Watson (2005), Forni *et al.* (2002).

[13] $E(y_t)$ should be equal to zero for that reason standardization of variables is needed. Since business cycles are stationary series with mean zero, this condition is satisfied so standardization is not done.

[14] Argentina, Austria, Australia, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Denmark, Egypt, Finland, France, Germany, Hong Kong, Greece, Hungary, Iceland, Indonesia India, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, U.K., U.S., Venezuela. The detailed information of data is given in appendix.

[15] Constant local currency unit GDP series are used from The World Bank World Development Indicators dataset.

Thus, the following equation is estimated by using principal component factor model:

$$c_{it} = \lambda_{i1} f_{1t} + \cdots + \lambda_{ir} f_{rt} + u_{it} \quad (9)$$

where t=1970,…, 2009 and i=1,…,N=46

$$c_{it} = \lambda_i' f_t + u_t \quad (10)$$

where $\lambda'_i = [\lambda_{i1}, \dots, \lambda_{ir}]'$, $f_t = [f_{1t}, \dots, f_{rt}]'$ and $u_t = [u_{1t}, \dots, u_{Nt}]'$

$$C = F\Lambda' + U \quad (11)$$

where $\Lambda = [\lambda_1, \dots, \lambda_N]'$, $Y = [y_1, \dots, y_T]'$, $F = [f_1, \dots, f_T]'$ and

$U = [u_1, \dots, u_T]'$

c_i represents the business cycle fluctuations of country i and C is the NxT matrix of business cycles.

Correct specification of number of factors is the key point for factor modeling. As Hair *et al.* (2009) summarized basic considerations to choose number of factors are as follows: (i) Factors with eigenvalues greater than 1. (ii) A predetermined number of factors based on research objective or prior studies. (iii) Enough factors to meet a specified percentage of variance usually %60 or higher. (iv) Factors shown by the scree test and (v) More factors when heterogeneity is present among sample subgroups. They also point out that to ensure the best structure, several considerations should be taken into account. Based on these considerations, three common factors are determined for analyzing co-movements of business cycles across group of countries[17].

As a first step, loading matrix is rotated to obtain orthogonal factors by varimax rotation because rotation improves the interpretation of factors[18]. Even

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[16] It is possible to include more countries in factor analysis as in Kose, Otrok, Prasad's (2008) or in Helbling's *et al.* (2007) studies. However, countries with higher uniqueness and shorter time period are eliminated for a more reliable factor analysis as suggested by Hair *et.al.* (2009) that depending on the variable's overall contribution to the analysis and depending on its communality index variable elimination is necessary. Moreover, Hair *et.al.* (2009) state that at least 5 observations per variable is the desired ratio for factor analysis. In this analysis, over the whole period (1970-2009) there are 40 observations per each variable, and per each countries' cycle so the desired ratio is satisfied.

[17] There are other studies that discuss on the topic of choosing the optimal number of factors. One of the leading studies is Ng and Bai's (2002) study who develop three selection criteria for the optimal number of factors when N and T $\rightarrow\infty$. However, for this study Hair's *et al.* (2009) suggestions are followed.

[18] Oblique rotation, that relaxes the assumption that the factors must be orthogonal, is also applied. The factors that derived after oblique rotation are given in the appendix. It can be seen that the derived

though more than three factors have been revealed with eigenvalues larger than 1, it has been seen that three common factors (labeled as developed countries factor, Latin American countries factor and Asian countries factor) is proper for explaining the structure under the international business cycles. 51% of the common variance of business cycles is explained by these three factors, which is reported in Table 23. Thus, the derived factors that are derived explain most of the common variation in underlying business cycles of the sample. As a result, r is determined as equal to three in equation 10.

Table 23. Factor Analysis Results after Rotation

Factor	Eigenvalue	Variance	Proportion	Cumulative
Factor 1	15.219	12.989	0.282	0.282
Factor 2	4.293	5.303	0.115	0.398
Factor 3	3.926	5.146	0.111	0.510

For labeling the factors, scatter plots for factor loadings and factor loading matrix (Λ), reported in in Figure 7 and in Table 24 respectively. Factor loadings indicate which variables are included in which factor. Loading with an absolute values greater than and equal to 0.5 is chosen as a cut-off point which is common in the literature. Thus, the corresponding country with a value of loadings greater than 0.5 has been included in that corresponding factor. The first factor is referred as developed countries common factor and second common factor and third common factor are Asian countries common factor and Latin American countries common factor, respectively, since loadings are higher than the threshold for the correspondent group of countries[19].

factors have changed slightly. Thus, it is believed findings would not change by implementing oblique rotation.

[19] There are some outliers for developed countries group such as Norway. Mexico is another outlier that it has the highest loading in factor 1, developed countries factor. The reason for this condition might be the highly dependency of Mexico to U.S. Hong Kong is an interesting case such that it has highest loadings in both groups of Latin American and Asia.

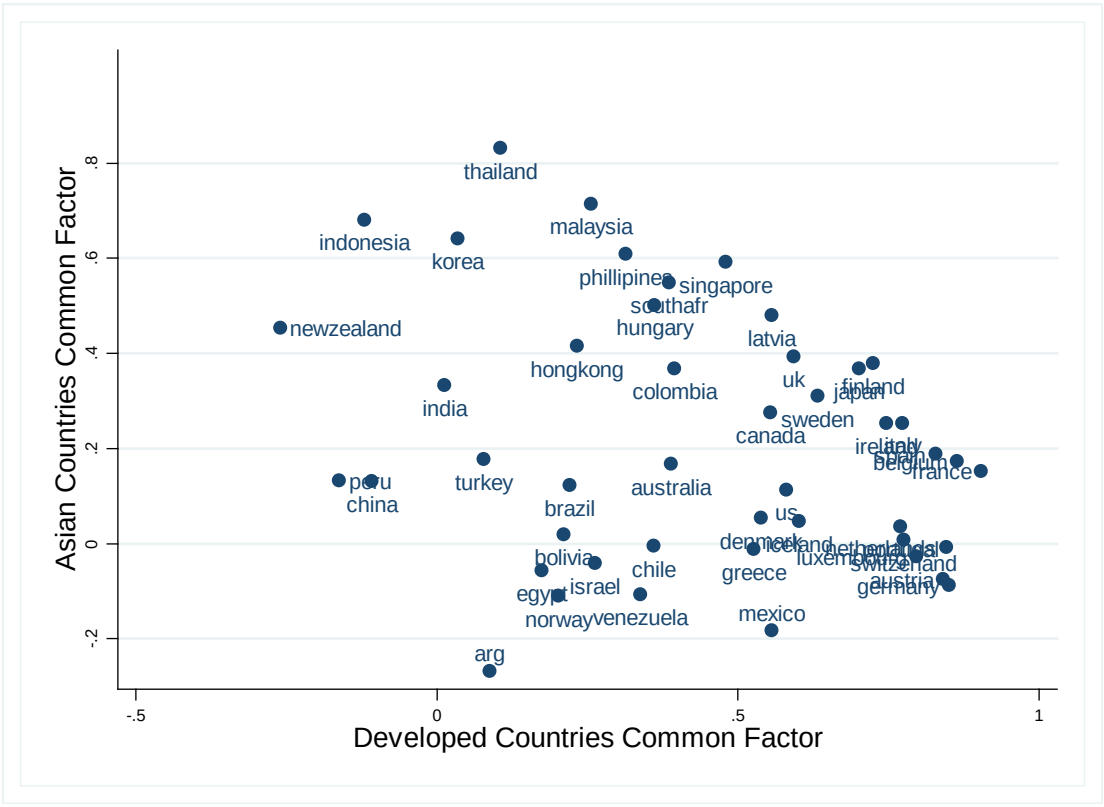
Table 24. Rotated Factor Loadings

Variable	Factor1	Factor2	Factor3
Argentina	0.0875	-0.2685	0.6073
Austria	0.8407	-0.0753	0.0225
Australia	0.3887	0.1675	0.1102
Belgium	0.8641	0.1730	0.1220
Bolivia	0.2111	0.0197	0.0123
Brazil	0.2208	0.123	0.7305
Canada	0.554	0.2756	0.3885
Chile	0.3605	-0.0052	0.5498
China	-0.108	0.1313	0.5218
Colombia	0.394	0.3675	0.5805
Denmark	0.5388	0.0535	0.4667
Egypt	0.1740	-0.0572	-0.3270
Finland	0.7239	0.3786	0.0742
France	0.9038	0.1528	-0.0460
Germany	0.8503	-0.0871	0.1519
Hong Kong	0.2323	0.4148	0.4897
Greece	0.5261	-0.0117	0.0924
Hungary	0.3612	0.5015	0.0654
Iceland	0.6017	0.0473	0.4875
Indonesia	-0.1200	0.6809	0.2096
India	0.0125	0.3323	-0.3431
Ireland	0.7461	0.2525	-0.0698
Israel	0.2624	-0.0411	0.4643
Italy	0.7726	0.2536	0.2641
Japan	0.7009	0.3678	0.0889
Korea	0.0352	0.6414	0.0666
Latvia	0.5559	0.4793	-0.0850
Luxembourg	0.7966	-0.0273	0.1611
Malaysia	0.2558	0.7145	0.0428
Mexico	0.5564	-0.1834	0.1741
Netherlands	0.8457	-0.0079	0.1502
New Zealand	-0.2600	0.4540	0.1578
Norway	0.2017	-0.1099	0.7421
Peru	-0.1624	0.1331	0.7485
Philippines	0.3133	0.6084	-0.3019
Portugal	0.7697	0.036	-0.0439
Singapore	0.4801	0.5917	0.0619
South Africa	0.3860	0.5485	0.1446
Spain	0.8279	0.1891	-0.0552
Sweden	0.6318	0.3106	0.1638
Switzerland	0.7754	0.008	0.1875
Thailand	0.1054	0.8317	-0.0158
Turkey	0.0778	0.1775	0.2126
U.K.	0.5921	0.3926	0.2528
U.S.	0.5805	0.1132	0.3772
Venezuela	0.3375	-0.1069	0.4304

Factor loadings plot uses the factor loadings which constitute the matrix Λ, in the scatter plot format. In the plot of developed countries common factor vs. Asian countries common factor, it can be seen that Asian countries are collected in the top of the plot which indicates factor 2 loadings greater than and equal to 0.5. On the other hand most of the developed countries are centered in the right part of graph which corresponds to factor 1 loadings are greater than and equal to 0.5. Besides, looking at the graph of developed countries common factor vs. Latin American countries common factor, it can be seen that Latin American countries are mainly located in the region where factor 3 loadings are greater than and equal to 0.5. And similar to the above graph, developed countries are located where developed countries loadings are greater than and equal to the value of 0.5. Therefore, factor 1 is accepted as developed countries common factor, factor 2 is accepted as Asian countries common factor and factor 3 is accepted as Latin American countries common factor.

After the identification of unobserved common factors in underlying international business cycles, factors are derived to be examined which are presented in Figure 8. In Figure 8, it can be seen that synchronizations between developed countries factor and Latin American and Asian common factors have changed over time. Particularly, it is clear that developed countries factor and Latin American and Asian factor move together closely after 1990s. The developed countries factor and Asian factor have started the move together by 1990 but there is a divergence over the period 1994-1999 which might be due to Asian crisis in 1997. On the other hand, it seems like developed countries factor and Latin American factor have moved together since 1998.

The next step is to examine if the impact of common factors, namely developed countries common factor, Asian countries common factor and Latin American countries common factor, on business cycles have changed over time or not, depending on the sample of countries.



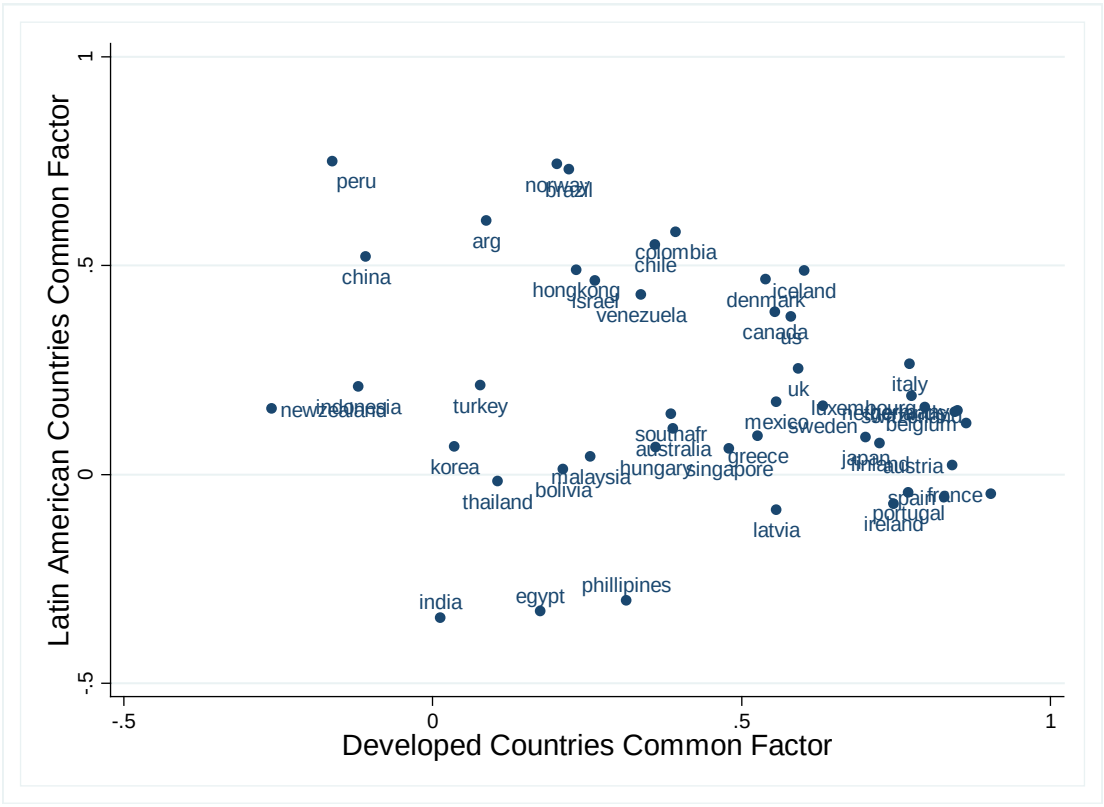


Figure 7. Factor Loadings Plots

Equation 12 has been estimated by robust fixed effect panel data estimation by involving common factors as explanatory variables as below:

$$C_{it} = \alpha + \beta_1 F_{Devt} + \beta_2 F_{Asiat} + \beta_3 F_{Lat} + \varepsilon_{it} \quad (12)$$

where C represents the business cycle series for i^{th} country at year t where t=1970, …, 2009. $F_{Dev,}$ F_{Asia} and F_{La} represent developed countries common factor, Asian countries common factor and Latin American countries common factor, respectively, and, ε is the disturbance term.

In the literature, different empirical methodologies such as correlation analysis, factor VAR estimation etc. are used to search for if decoupling or coupling hypotheses of business cycles has occurred. In this chapter, in order to investigate how synchronization of business cycles differ over time ,the change in the impact of common factors on cycles of other groups of countries is analyzed. In other words, if the impact of common factors has increased significantly over time, then it means that there is an evidence for coupling hypothesis. On the other hand, if no significant change of the impact of common factors has been concluded, it could be the evidence for decoupling of cycles.

The estimations are done first over the total period from 1970 to 2009 for different sample of countries. After that, in order to examine whether the impact of common factors have changed by time, particularly by globalization periods, the estimation is carried out for the periods before and after 1990. 1990 is chosen as a threshold for two reasons: (i) since mid-1980s, trade and financial linkages have increased rapidly. Most of the EMEs have made economic and financial liberalization reforms which leads to an increase in capital flows globally[20]. (ii) 1990 is the half way of the sample which enables us to capture almost same number of observations for both periods (1970-1989 and 1990-2009).

[20] In addition, according to Reisen (2010) the 1990s is highly volatile periods for EMEs with several financial crises, 1994 Mexican and Turkey currency crises, 1997 Asian financial crisis, 1998 Russian financial crisis etc. On the other hand, 2000s can be considered as more stable period for EME with enhanced integration.

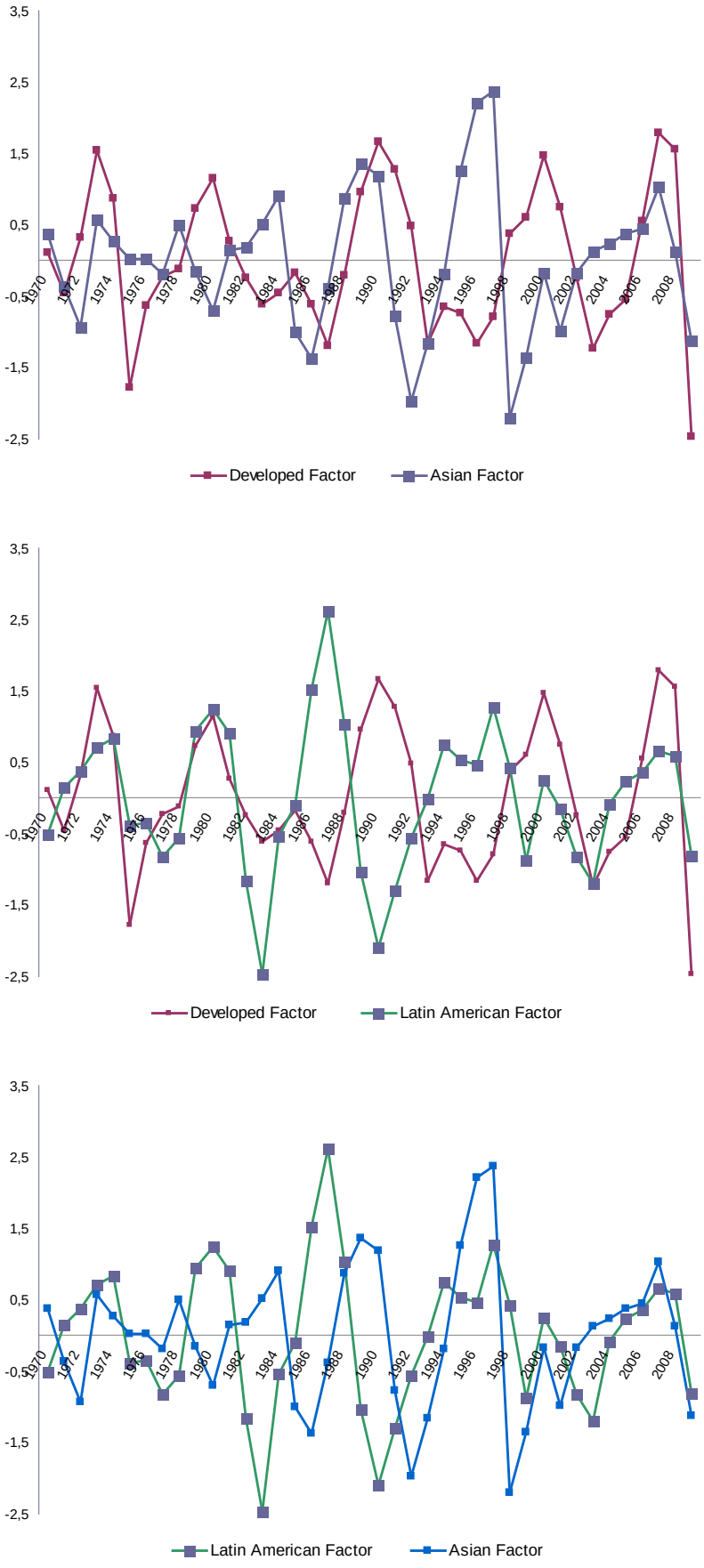


Figure 8. Common Factors

5.1.1. Business Cycles Synchronization

In Table 25, estimation results for the impact of common factors are reported depending on the sample of countries over the period 1970-2009 based on equation 12. Different from Chapter 4, five sample of countries are considered: sample of all countries, sample of developed countries, sample of EMEs, sample of Asian countries and sample of Latin American countries[21].

Fixed effect robust panel data estimations for the whole period indicate that all common factors contribute to business cycles for each sample of countries signficiantly. However, for the group of Asian countries and Latin American countries, it is seen that regional common factors have no significant impact on the other region. While developed countries factor affects both regions, Asian and Latin American countries positively; the other region common factor has no significant impact on the business cycles of the corresponding region.

Table 25. Business Cycle Synchronization over the Period 1970-2009 (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0001** [0.0001]	0.0001** [0.0001]	0.0002** [0.0001]	0.0003* [0.0001]	0.0008** [0.0001]
Developed Factor	0.0076** [0.0001]	0.0095** [0.0009]	0.0047** [0.0011]	0.0034** [0.0019]	0.0059** [0.0022]
Asian Factor	0.0044** [0.0010]	0.0022** [0.0005]	0.0061** [0.0017]	0.0125** [0.0017]	-0.0006 [0.0018]
Latin American Factor	0.0044** [0.0010]	0.0027** [0.0006]	0.0069** [0.0027]	0.0022 [0.0022]	0.0142** [0.0033]
N	1838	919	839	359	320
N of Cross Sections	46	23	21	9	8
R^2 (overall)	0.21	0.44	0.17	0.34	0.28
F-Statistic	53.56** (0.0001)	68.34** (0.0001)	28.70** (0.0001)	19.76** (0.0005)	16.15** (0.0016)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

[21] Sample of developed countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, U.K. and U.S. Sample of EME: Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Singapore, South Africa, Thailand, Turkey and Venezuela. Sample of Asian Countries: China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore and Thailand. Sample of Latin American Countries: Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

In Table 26 and Table 27, fixed effect robust panel data estimations over the period 1970-1989 and 1990-2009 are reported respectively. Over the period 1970-1989 which refers the period before trade and financial linkages gets stronger, findings indicate that developed countries factor has no significant impact on business cycles in EMEs. It is also concluded that developed countries factor has no significant impact for Latin American group but it influence Asian countries' cycles significantly. On the other hand, both Asian and Latin American factors have significant impact on EMEs' cycles. Over the period 1990-2009, when trade and financial linkages have increased dramatically, develop countries common factor has begun to effect business cycles in EMEs.

Moreover, it is also seen that the impact of Latin American common factor on EMEs' cycles has increased almost 50%. The most striking finding is that developed countries factor has became non-significant for the sample of Asian countries over the period referred as second phase of globalization as opposite to expecations. This could be due to the fact that after the Asian crisis in 1997, economies of Asian countries have maintained macroeconomic stability compared the other group of EMEs. However, Latin American countries have had volatility in the economy during this period[22]. In both periods, it is concluded that regional common factor has no significant impact on cycles of the other region.

Thus, the major conclusion of fixed effects robust panel data estimation including common factors is that, EMEs have begun to be affected significiantly from fluctuations in developed countries common factor over the period 1990-2009 because of the increased financial and trade linkages. In other words, business cycles fluctuations of EMEs have become more dependent to devleped countries common factor and this supports the coupling hypothesis over the period of stronger trade and financial linkages.

However, when the sample of Asian countries are considered, the same conclusion cannot be reached since developed countries common factor has no significant effect on the cycles of this region. Therefore, there is a little evidence in the favor of decoupling hypthesis for Asian countries such that their cycles have begun to move more independently in the second period.

[22] Edwards (2011).

Table 26. Business Cycle Synchronization over the Period 1970-1989 (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0002** [0.0002]	0.0003** [0.0001]	0.0001 [0.0001]	0.0004 [0.0003]	-0.0006 [0.0006]
Developed Factor	0.0065** [0.0013]	0.0096** [0.0013]	0.0033 [0.0025]	0.0059* [0.0022]	0.0040 [0.0056]
Asian Factor	0.0044** [0.0012]	0.0021** [0.0013]	0.0061** [0.0021]	0.0113** [0.0022]	0.0018 [0.0025]
Latin American Factor	0.0040** [0.0011]	0.0030** [0.0008]	0.0055** [0.0024]	0.0024 [0.0026]	0.0134** [0.0039]
N	920	460	420	180	160
N of Cross Sections	46	23	21	9	8
R2 (overall)	0.13	0.33	0.08	0.19	0.26
F-Statistic	21.23** (0.0001)	30.09** (0.0001)	6.25** (0.0036)	8.76** (0.0066)	18.61** (0.0010)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Table 27. Business Cycle Synchronization over the Period 1990-2009 (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0002 [0.0002]	-0.0001 [0.0001]	0.0007* [0.0003]	0.0009** [0.0003]	0.0011* [0.0005]
Developed Factor	0.0082** [0.0011]	0.0094** [0.0095]	0.0056** [0.0013]	0.0027 [0.0018]	0.0069** [0.0026]
Asian Factor	0.0042** [0.0011]	0.0024** [0.0006]	0.0052** [0.0024]	0.0116** [0.0023]	-0.0022 [0.0036]
Latin American Factor	0.0055** [0.0014]	0.0019** [0.0007]	0.0102** [0.0026]	0.0052 [0.0024]	0.0181** [0.0050]
N	918	459	419	179	160
N of Cross Sections	46	23	21	9	8
R^2 (overall)	0.28	0.58	0.29	0.51	0.34
F-Statistic	40.23** (0.0001)	42.34** (0.0001)	44.69** (0.0036)	20.40** (0.0004)	10.91** (0.0050)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

5.1.2. Business Cycles Synchronization and Exchange Rate Regimes

In this section, decoupling and coupling hypothesis are examined by controlling for different exchange rate regimes. The exchange rate regimes are classified as: floating exchange rate regimes and non-floating exchange rate regimes based on the classification of Ilzetzki, Reinhart and Rogoff (2008)[23]. Dummy variables are constructed as in the previous chapter based on coarse classification such that countries with classification less than 3 are accepted as non-floating regimes and greater than and equal to 3 indicates floating exchange rate regimes[24]. The fixed panel robust estimations are computed based on floating and non-floating exchange rate regimes over whole sample period (1970-2009) and over the first phase of globalization (1970-1989) and the second phase of globalization (1990-2009) periods based on the equation 12.

There are two reasons to analyze the co-movements of cycles under different exchange rate regimes. First, it is a robustness check of the findings in Chapter 5.1.1. Second, no consensus for the impact of exchange rate regimes on growth performance has been achieved yet. It has been discussed that floating exchange rate regimes help countries to reduce foreign shocks since the exchange rate adjust based on the conjuncture, in other words floating exchange rates act as shock absorbers. On the other hand, the other view suggests that fixed exchange rate regimes might be preferable due to stability and certainty. Thus, it is believed that analyzing the business cycle synchronization over time under different exchange rate regimes would contribute to this debate[25].

In Table 28 and Table 29, estimation results over the period from 1970 to 2009 for floating and non-floating exchange rate regimes are reported, respectively. Over the range of the whole period, it is concluded that developed countries common factor, Asian common factor and Latin American common factor have positive significant impact on the business cycles for the whole sample, sample of EMEs and sample of developed countries. However, for regional groups, namely Asian

[23] The dataset end in 2007, for 2008 and 2009 De Facto Classification of Exchange Rate Regimes table by IMF is used.

[24] The detailed information on Exchange rate regimes classifications of Ilzetzki, Reinhart and Rogoff (2008) are given in the appendix.

[25] Debate over different Exchange rate regimes and macroeconomic performances have been discussed in details in chapter 4.5.

countries and Latin American countries, under floating exchange rate regime, no significant impact of developed common factor is obtained. Only their own regional common factors influence cycles significantly under floating regimes. On the other hand, there is evidence that developed countries common factor affects cycles in Asian and in Latin American countries significantly under non-floating exchange rate regimes.

Table 28. Business Cycle Synchronization over the Period 1970-2009: Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	-0.0012** [0.0001]	0.0001 [0.0001]	-0.0015** [0.0002]	-0.0005 [0.0005]	-0.0030** [0.0002]
Developed Factor	0.0060** [0.0012]	0.0081** [0.0017]	0.0041** [0.0018]	0.0025 [0.0044]	0.0055 [0.0034]
Asian Factor	0.0043** [0.0012]	0.0026** [0.0009]	0.0054** [0.0019]	0.0147** [0.0026]	-0.0001 [0.0020]
Latin American Factor	0.0069** [0.0017]	0.0050** [0.0011]	0.0086** [0.0027]	0.0028 [0.0050]	0.0150** [0.0037]
N	794	304	462	122	199
N of Cross Sections	35	14	19	7	8
R^2 (overall)	0.19	0.47	0.17	0.36	0.30
F-Statistic	37.46** (0.0001)	22.65** (0.0001)	22.50** (0.0001)	17.97** (0.0021)	15.89** (0.0017)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Thus, findings indicate that over the period of 1970-2009, the choice of exchange rate regimes have similar impacts on developed and EMEs cycles but have different effects regionally, namely Asian and Latin American countries. This finding might be due to the phenomenon that floating exchange rate regimes make countries more resilient to foreign shocks. So, under floating exchange rate regimes foreign shocks have no significant impact when especially only regional cycles are considered.

Table 29. Business Cycle Synchronization over the Period 1970-2009: Non-Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	-0.0010** [0.0001]	0.0002** [0.0001]	0.0024** [0.0001]	0.0009** [0.0001]	0.0053** [0.0001]
Developed Factor	0.0085** [0.0009]	0.0010** [0.0008]	0.0049** [0.0012]	0.0039** [0.0015]	0.0048* [0.0017]
Asian Factor	0.0041** [0.0009]	0.0019** [0.0006]	0.0068** [0.0019]	0.0113** [0.0016]	-0.0009 [0.0023]
Latin American Factor	0.0029** [0.0009]	0.0015** [0.0007]	0.0045** [0.0021]	0.0020 [0.0024]	0.0125** [0.0037]
N	1023	615	377	237	121
N of Cross Sections	45	22	21	9	8
R^2 (overall)	0.26	0.45	0.19	0.32	0.25
F-Statistic	34.38** (0.0001)	60.57** (0.0001)	11.25** (0.0001)	17.51** (0.0007)	16.95** (0.0014)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Estimation results over 1970 to 1989 for floating and non-floating exchange rate regimes are given respectively in Table 30 and in Table 31. The findings provide mixed signals on the linkage between business cycles and common factors under different exchange rate regimes. Under floating exchange rate regimes, developed countries common factor has no significant impact on cycles other than sample of developed countries. However, it affects cycles in the whole sample, sample of developed countries and sample of EMEs significantly under non-floating regimes. And no significant impact of developed countries common factor on cycles is obtained in the sample of Asian and Latin American countries under both of the exchange rate regimes.

Table 30. Business Cycle Synchronization over the Period 1970-1989: Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0001 [0.0003]	0.0002 [0.0002]	-0.0002 [0.0005]	0.0033** [0.0004]	-0.0027* [0.0014]
Developed Factor	0.0040 [0.0025]	0.0118* [0.0026]	-0.0001 [0.0034]	0.0046 [0.0038]	0.0017 [0.0067]
Asian Factor	0.0024 [0.0020]	0.0005 [0.0021]	0.0033 [0.0030]	0.0107 [0.0054]	-0.0009 [0.0037]
Latin American Factor	0.0060** [0.0021]	0.0047** [0.0011]	0.0072** [0.0033]	-0.0006 [0.0052]	0.0133** [0.0045]
N	393	133	243	57	112
N of Cross Sections	30	12	17	5	8
R^2 (overall)	0.12	0.49	0.08	0.16	0.27
F-Statistic	6.328** (0.0020)	17.38** (0.0002)	2.22 (0.1230)	1.43 (0.3584)	4.47** (0.0472)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

The significant impact of Latin American common factor for almost all of the samples under floating exchange rate regimes must be questioned. A possible answer to this could be the share of Latin American countries in the sample under floating exchange rate regimes. However, for other samples especially for Asian countries only 4 countries are included for analyzing the relationship under floating exchange rate regimes. Besides for non-floating exchange rate regimes Asian common factor has become stronger, and this is also due to the share of Asian countries in the sample under non-floating exchange rate regimes[26].

[26] It should be discussed the different experiences of Asian countries and Latin American countries in terms of exchange rate regimes. After the 1997 crisis in East Asia, it was believed that exchange rate regime had a significant role on the deepening of the crisis. Thus, many countries in the region had chosen to apply fixed exchange rate regime and rates had been stable for a long time. Therefore, most of the countries in the sample of Asia are included in non-floating group which makes the sample size of Asian countries is small for floating group.

Table 31. Business Cycle Synchronization over the Period 1970-1989: Non-Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0001** [0.0001]	0.0003** [0.0001]	0.0003 [0.0005]	-0.0008 [0.0004]	0.0029** [0.0042]
Developed Factor	0.0077** [0.0013]	0.0087** [0.0014]	0.0059** [0.0027]	0.0062 [0.0037]	0.0028 [0.0042]
Asian Factor	0.0055** [0.0016]	0.0026 [0.0016]	0.0110** [0.0031]	0.0120** [0.0037]	0.0131* [0.0046]
Latin American Factor	0.0025** [0.0011]	0.0019** [0.0008]	0.0039 [0.0030]	0.0013 [0.0033]	0.0148 [0.0079]
N	507	327	177	123	48
N of Cross Sections	40	22	17	9	6
R^2 (overall)	0.19	0.26	0.16	0.21	0.29
F-Statistic	16.40** (0.0001)	19.47** (0.0001)	4.68** (0.0156)	6.89** (0.0131)	3.48 (0.1065)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Table 32 and Table 33 report the robust fixed panel data estimation results for the linkage between common cycles under different exchange rate regimes respectively over the period of 1990-2000. The main conclusion of the estimation is that developed countries common factor has a strongly significant impact on business cycles for all the samples in contrast to the previous period compared to the sample of Asian countries under floating exchange rate regimes. Thus it can be concluded that findings do not differ across different exchange rate regimes remarkably but differs over time. Although signals are complex to interpret over the period 1970-2009, the findings over the period 1990-2009 strongly indicate that both EMEs and developed countries have begun to be influenced by foreign shocks more, providing a support to the coupling hypothesis. On the other hand, unlike the previous findings it has been also concluded that Latin American common factor have become significant on the sample of Asian countries.

Table 32. Business Cycle Synchronization over the Period 1990-2009: Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	-0.0025** [0.0002]	-0.0001** [0.0001]	-0.0034** [0.0003]	-0.0034** [0.0008]	-0.0041** [0.0005]
Developed Factor	0.0077** [0.0012]	0.0070* [0.0017]	0.0075** [0.0017]	0.0035 [0.0038]	0.0092** [0.0035]
Asian Factor	0.0050** [0.0013]	0.0032** [0.0009]	0.0057** [0.0021]	0.0140** [0.0036]	-0.0008 [0.0032]
Latin American Factor	0.0053** [0.0018]	0.0035** [0.0015]	0.0078** [0.0027]	0.0035 [0.0050]	0.0140** [0.0040]
N	401	171	219	65	87
N of Cross Sections	31	11	19	7	7
R^2 (overall)	0.25	0.50	0.29	0.48	0.39
F-Statistic	29.91** (0.0001)	15.03** (0.0005)	24.40** (0.0001)	20.14*** (0.0016)	17.82** (0.0022)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

In general, the main finding of this chapter is that all samples have become much more vulnerable to foreign shock under any exchange rate regimes over the period 1990-2009 which support the findings in Chapter 5.1.1. In other words, exchange rate regimes don not matter for the linkage between common factors and macroeconomic fluctuations over time. Whatever the exchange rate regime is, countries have become more dependent to developed countries common factor. In Chapter 4.5, it is concluded that domestic driving sources of business cycles have varied for different sample of countries under different exchange rate regimes. However, it is also concluded that foreign shocks have strong significant impact on fluctuations which support the findings in this chapter.

Table 33. Business Cycle Synchronization over the Period 1990-2009: Non-Floating Exchange Rate Regimes (FE, Robust Estimation)

Variable	All Sample	Developed Countries	EMEs	Asian Countries	Latin American Countries
Constant	0.0021** [0.0001]	-0.0024** [0.0001]	0.0047** [0.0003]	0.0038** [0.0002]	0.0064** [0.0002]
Developed Factor	0.0090** [0.0012]	0.0108** [0.0009]	0.0045** [0.0009]	0.0031** [0.0006]	0.0057** [0.0021]
Asian Factor	0.0032** [0.0009]	0.0019** [0.0007]	0.0042* [0.0021]	0.0090** [0.0016]	-0.0019 [0.0033]
Latin American Factor	0.0048** [0.0013]	0.0013** [0.0001]	0.0091** [0.0023]	0.0061** [0.0021]	0.0138* [0.0057]
N	516	288	200	114	73
N of Cross Sections	37	18	17	8	7
R^2 (overall)	0.34	0.67	0.29	0.55	0.28
F-Statistic	21.99** (0.0001)	52.40** (0.0001)	21.65** (0.0001)	20.73** (0.0007)	7.61** (0.0181)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

5.1.3. Business Cycles Synchronization and Financial Integration

In the literature, increased financial integration since the mid 1980s is seen as one of the main causes of synchronized business cycles. With highly integrated financial markets, increased portfolio diversification across countries and spillover effects across countries economic fluctuations in one country may affect other countries' fluctuations. There are two conflicting views on the linkage between financial integration and economic growth. First, it is believed that well-functioned financial markets foster efficient resource allocation and higher long run growth rates[27]. Second there are studies that claim financial integration may be harmful to growth. In such a way that, there are models that indicate improved resource allocation and returns to savings but reduce the saving rate and if there are large externalities associated with saving and investment, the financial development hurts

[27] Frankel and Rose (1998), Kose et. al (2003b) and Imbs (2006)

growth[28]. Besides, increased financial openness make EMEs more vulnerable to external shocks which may deteriorate economic performance in these countries.

According to Aruoba *et al.* (2011), the impact of financial integration on business cycles synchronization alters due to the nature of shocks. For instance, financial linkages may contribute to higher synchronization of cycles if changes in equity prices affect dynamics of wealth. As Aruoba *et al.* (2011) point out if consumers from other countries invest in a particular stock market, then a decline in the stock market prices would decrease the demand for consumption and investment in that country simultaneously. On the other hand, financial linkages may lead to less synchronized business cycles since they stimulate specialization of production through the reallocation of capital. Aruoba *et al.* (2011) mention that countries can have more diversified portfolio such that they can insure themselves against idiosyncratic shocks thus less synchronized business cycles can be experienced. However, Aruoba *et al.* (2011) draw attention to three other channels that financial integration influences synchronization of cycles though; first, with strong financial linkages, policy coordination would also increase and this in turn supports higher synchronization. Second channel is productivity spillover. Aruoba *et al.* (2011) believe that countries that have a deeper financially integration attract relatively large foreign capital flows which generate productivity spillovers. Third advanced communication technologies enable spreading of news shocks rapidly which lead higher synchronization of cycles.

In this framework, in this section, the co-movements of business cycles are analyzed over time based on the countries' financial openness criteria to understand the linkage between financial integration and economic performance clearer.

Financial integration index is computed based on the following measure of integration which is suggested by Lane and Milesi-Ferretti (2003) and Lane and Milesi-Ferretti (2007)[29]:

$$FinInt = \frac{Total\ Liabilities + Total\ Assets}{GDP}$$

[28] Beck and Levine (2002) point out this view. And, Kalemli-Ozcan, Papaioannou and Peydro (2010) show that there is a negative correlation between financial integration and growth.

[29] Lane and Milesi-Ferretti (2007) "External Wealth of Nations Dataset".

It should be noted that there is no standard threshold to categorize countries as less financially integrated or highly financially integrated countries. Therefore, in this study time variant thresholds are computed by using quantiles. Such that, at a given year, all countries financial integration value of all countries are considered and quantlies are computed for the corresponding year. After that, value of index which is less than or equal to first quantile are accepted as "less financially integrated countries", values between first and fourth quantile are accepted as "medium financially integrated countries" and values greater than or equal to fourth quantile are accepted as "highly financially integrated countries". This computation should be done because the financial integration threshold at the year 1970 can't be same as the one at the year 1980, 1990 or so forth. Thus, financial integration degree differs over time so must the the threshold levels be. Using the computed financial integration levels, fixed effect robust panel data estimation is done for all samples of countries including common factors.

The estimation results for the linkage between common factors and business cycles over time for the sample of all countries based on financial integration levels are reported in Table 34. When the less financially integrated countries are focused on, it has been seen that developed common factors has no significant effect on cycles over the range of 1970 to 2009 and 1970 to 1989. However, the picture is different for medium financially integrated countries and high financially integrated countries. Over all periods (1970-2009, 1970-1989 and 1990-2009) the developed countries common factor have contribute significantly to the cycles of these kind of countries. Without controlling for financial integration level, in Chapter 5.1.1, it is found that developed countries common factor has a significant impact on cycles over all periods for the whole sample. Thus, by controlling for financially integration level, it has been seen that being affected from common factors is related to the financial integration level.

Besides, over the period of 1990-2009 when financial linkages have increased, less financially integrated countries' fluctuations have begun to be effected from developed cycles as well. On the other hand, regional factors have significant positive impacts over all periods and for all financially integration

levels[30]. Overall, findings for the whole sample indicate that financial integration matters for the co-movement of cycles. As financial integration level increases, without depending on the time periods, business cycles have become more vulnerable to foreign shocks. However, for any financial integration level and time period, regional common factors have significant impact on cycles for the whole sample.

The estimation results for the sample of developed countries based on financial integration levels are presented in Table 35. The findings indicate that controlling for financial integration level has not changed the results almost no. For all financial integration levels and over all periods, developed countries common factor has significant impact as expected. In addition, Latin American common factor affects the cycles significantly for any financial integration level over all periods. The only slight difference between with and without controlling for financially integration levels is the impact of Asian common factor.

Over the periods from 1970 to 2009 and from 1970 to 1989, Asian common factor has no significant impact for less financially integrated countries. It has been known that developed countries are highly financially integrated with the rest of the world compared to the other group of countries. Therefore, no significant change is expected in the results when controlling for financial integration level.

Table 36 reports the estimation results for the sample of EMEs based on financial integration levels. The findings indicate mixed signal about the linkage between financial integration levels and business cycles synchronization for EMEs. Over the whole period, developed countries common factor has significant impact only for the medium financially integrated countries. However, regional common factors namely Asian and Latin American common factors affect business cycles significantly for all levels of financial integration.

Over the period of 1970-1989, it seems that cycles are not affected from common cycles significantly other than Asian common factor for medium and highly financially integrated countries. This supports the findings in Chapter 5.1.1 more or less in such a way that over the period of 1970-1989, developed common factor has no significant impact for EMEs. Therefore, it can be concluded that, over the period

[30] Over the period 1970-1980, Asian common factor has no significant impact for the medium financially integrated countries. It could be due to the countries in this sample which should be focused on individually.

1970-2009, whatever the financial integration level of country is, macroeconomic fluctuations in EMEs have not depended on developed countries common factor. However, there is a little evidence that regional factors for that period are significantly important for the cycles in EMEs.

Over the period of 1990-2009, developed countries common factor has become significant source of fluctuations for any level of financial integration in EMEs similar to the findings in 5.1.1. Regional common factors also affect cycles significantly for all financial integration levels, other than Asian common factor which has no significant impact on the cycles for the group of medium financially integrated countries. Thus, over the period of 1990-2009, economic fluctuations in the sample of EMEs have become more dependent on the developed countries common factor, which supports the coupling hypothesis. For the sample of EMEs the main conclusion on the linkage between cycles and common factors based on level of financial integration might be that rather than the level of financial integration level, conjuncture affects the linkage over the period 1990-2009. However, it should be also noted that increased financial linkages is one of the most important sources of the conjuncture over that period.

Table 34. Business Cycle Synchronization: Whole Sample of Countries (FE, Robust Estimation)

	1970-2009			1970-1989			1990-2009		
Variable	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**
Constant	0.0018* [0.0010]	0.0001 [0.0001]	-0.0006 [0.0001]	0.0022** [0.0010]	0.0004* [0.0002]	-0.0010** [0.0002]	0.0023** [0.0005]	0.0002 [0.0002]	-0.0004** [0.0001]
Developed Factor	0.0022 [0.0015]	0.0077** [0.0013]	0.0093** [0.0012]	-0.0001 [0.0034]	0.0076** [0.0017]	0.0076** [0.0012]	0.0036** [0.0034]	0.0081** [0.0018]	0.0093** [0.0012]
Asian Factor	0.0052** [0.0013]	0.0038** [0.0013]	0.0045** [0.0013]	0.0039** [0.0012]	0.0021 [0.0019]	0.0073** [0.0022]	0.0053** [0.0015]	0.0036** [0.0015]	0.0041** [0.0010]
Latin American Factor	0.0050** [0.0018]	0.0046** [0.0014]	0.0034* [0.0020]	0.0037* [0.0020]	0.0027** [0.0014]	0.0044* [0.0018]	0.0084** [0.0020]	0.0078** [0.0025]	0.0036* [0.0013]
N	345	776	689	180	394	333	165	382	356
N of Cross Sections	24	36	40	20	32	28	19	35	33
R^2 (overall)	0.12	0.20	0.30	0.06	0.14	0.19	0.16	0.26	0.41
F-Statistic	16.60** (0.0001)	58.41** (0.0001)	95.36** (0.0001)	5.52** (0.0067)	12.83** (0.0001)	13.23** (0.0001)	15.80** (0.0001)	14.25** (0.0001)	44.32** (0.0001)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

Table 35. Business Cycle Synchronization: Sample of Developed Countries (FE, Robust Estimation)

	1970-2009			1970-1989			1990-2009	
Variable	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**
Constant	0.0035* [0.0002]	0.0001 [0.0006]	-0.0001 [0.0013]	0.0028** [0.0002]	0.0004 [0.0002]	-0.0005** [0.0001]	-0.0002 [0.0002]	-0.0001 [0.0001]
Developed Factor	0.0077** [0.0022]	0.0095** [0.0007]	0.0097** [0.0005]	0.0073** [0.0024]	0.0109** [0.0019]	0.0090** [0.0024]	0.0082** [0.0013]	0.0099** [0.0024]
Asian Factor	0.0003 [0.0017]	0.0017** [0.0006]	0.0028** [0.0008]	0.0014 [0.0014]	0.0004** [0.0019]	0.0040** [0.0018]	0.0022** [0.0010]	0.0028** [0.0008]
Latin American Factor	0.0030* [0.0018]	0.0029** [0.0006]	0.0021** [0.0006]	0.0038** [0.0012]	0.0026** [0.0009]	0.0028** [0.0008]	0.0015** [0.0018]	0.0017** [0.0009]
N	68	362	475	61	214	177	148	298
N of Cross Sections	7	16	23	7	16	14	16	23
R^2 (overall)	0.22	0.38	0.53	0.21	0.36	0.32	0.44	0.65
F-Statistic	4.54** (0.0063)	68.51** (0.0001)	170.70** (0.0001)	22.28** (0.0012)	21.93** (0.0001)	11.81** (0.0001)	15.79** (0.0001)	49.94** (0.0001)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively. Estimation for the less financially integrated developed countries over the period 1990-2009 is not done since number of cross section is 3 which wouldn't provide reliable results.

Table 36. Business Cycle Synchronization: Sample of EMEs (FE, Robust Estimation)

	1970-2009			1970-1989			1990-2009		
Variable	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**
Constant	0.0023** [0.0011]	-0.0002** [0.0001]	-0.0028 [0.0018]	0.0018** [0.0006]	0.0005 [0.0004]	-0.0017** [0.0004]	0.0032 [0.0003]	-0.0003 [0.0002]	-0.0047** [0.0002]
Developed Factor	0.0016 [0.0016]	0.0049** [0.0014]	0.0053 [0.0033]	-0.0039 [0.0046]	0.0040 [0.0028]	0.0053 [0.0043]	0.0037** [0.0015]	0.0053** [0.0018]	0.0065** [0.0030]
Asian Factor	0.0049** [0.0012]	0.0056** [0.0025]	0.0111** [0.0019]	0.0050** [0.0012]	0.0046 [0.0037]	0.0096** [0.0039]	0.0045** [0.0013]	0.0043 [0.0030]	0.0112** [0.0022]
Latin American Factor	0.0050** [0.0023]	0.0063** [0.0030]	0.0116** [0.0045]	0.0037 [0.0030]	0.0031 [0.0034]	0.0090* [0.0043]	0.0079** [0.0002]	0.0121** [0.0036]	0.0130* [0.0014]
N	273	374	178	119	174	122	154	200	56
N of Cross Sections	16	18	15	13	15	12	15	17	9
R^2 (overall)	0.12	0.16	0.31	0.07	0.06	0.18	0.24	0.28	0.52
F-Statistic	13.18** (0.0063)	21.61** (0.0001)	23.55** (0.0001)	6.55** (0.0072)	2.86* (0.0744)	4.53** (0.0267)	22.47** (0.0001)	43.58** (0.0001)	249.43** (0.0001)

Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.

In Table 37, estimation results for the sample of Asian countries are given. However, due to the lack of observations, the linkage is estimated only over the period of 1970-2009. The findings indicate that highly financially integrated countries' cycles are affected from the developed countries common factor significantly, whereas it has no significant impact on the fluctuations of the less and medium financially integrated countries. Latin American common factor has no significant impact on cycles for any level of financial integration. Finally, as expected, Asian common factor has a strong significant impact on cycles. Thus, economic fluctuations of highly financially integrated Asian countries are dependent on the developed countries common factor which implies more openness to foreign shocks. On the other hand, for less and medium financially integrated countries, economic fluctuations are determined mainly by regional and country specific factors.

Table 37. Business Cycle Synchronization: Sample of Asian Countries (FE, Robust Estimation)

	1970-2009		
Variable	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**
Constant	0.0007** [0.0001]	-0.0005** [0.0001]	0.0004 [0.0002]
Developed Factor	-0.0002 [0.0019]	0.0032 [0.0023]	0.0085** [0.0025]
Asian Factor	0.0068** [0.0019]	0.0166** [0.0021]	0.0144** [0.0017]
Latin American Factor	0.0016 [0.0034]	-0.0013 [0.0027]	0.0066 [0.0043]
N	122	135	97
N of Cross Sections	6	6	6
R^2 (overall)	0.18	0.49	0.42
F-Statistic	11.22** (0.0117)	61.68** (0.0002)	107.57** (0.0001)
Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.			

Estimation results for the sample of Latin American countries are reported in Table 38. Similar to the sample of Asian countries, due to the lack of observations the linkage is estimated only over the period of 1970-2009. The findings are different from the sample of Asian countries. It is found that the developed countries common factor has significant effect on cycles for the group of less and medium financially integrated countries. Whereas, opposite to expectations, no significant impact occurs for the highly integrated countries. Similar to the previous results, Asian countries common factor has no significant impact on cycles of Latin American countries.

Table 38. Business Cycle Synchronization: Sample of Latin American Countries (FE, Robust Estimation)

	1970-2009		
Variable	**Less Financially Integrated**	**Medium Financially Integrated**	**High Financially Integrated**
Constant	0.0038* [0.0018]	0.0009 [0.0022]	-0.0109** [0.0008]
Developed Factor	0.0044** [0.0018]	0.0055* [0.0026]	0.0047 [0.0086]
Asian Factor	0.0020 [0.0017]	-0.0016 [0.0021]	0.0040 [0.0044]
Latin American Factor	0.0131** [0.0018]	0.0137** [0.0034]	0.0167** [0.0075]
N	91	173	53
N of Cross Sections	6	8	5
R^2 (overall)	0.40	0.258	0.32
F-Statistic	18.95** (0.0001)	14.84** (0.0020)	17.17** (0.0095)
Notes: Robust standard errors are in brackets. The values in parenthesis are the p-values for F-statistics. (**) and (*) denote the significance at the 5% level and 10% level respectively.			

Overall, the findings based on financial integration levels indicate that increased financial integration level leads to increased synchronization of business cycles. However, the findings also indicate that increased financial integration is not

the strongest cause of coupling of business cycles as discussed in the literature since there are mixed signal across the group of countries.

5.2. Rolling Window Analysis

In this part, it is aimed to investigate whether the impacts of common factors that are derived in Chapter 5.1, on business cycles of sample of countries have changed over time by using rolling time series analysis. A rolling analysis of time series is been used to test the stability and predictive accuracy of the linkage among the variables of interest in most of the cases. In this case, other than stability, the main goal is to see whether macroeconomic fluctuations in one sample of countries have begun to be influenced more by developed countries common factor or regional common factors over time. If the impact of common factor has changed in a way, then evidence would be obtained in the favor of coupling or decoupling hypothesis. Besides, it provides a robustness check for the findings in Chapter 5.1.

Rolling window model is estimated by considering the following equation: for a window k<T,

$$C_{it}(k)= \alpha + \beta_1 F_{Devt}(k)+ \beta_1 F_{Asiat}(k)+ \beta_1 F_{Lat}(k)+ \varepsilon_{it}(k) \quad (13)$$

(k) represents the rolling window which is the most recent values from times t-k+1 to t where t is from 1970 to 2009. The k is chosen equal to 15. Rollin window model given in equation 13 is estimated by fixed effects panel estimation by moving windows for 15 years. Coefficient graphs for the rolling estimations are presented over time are reported below[31]. Interpreting the findings of rolling estimation by using coefficient graphs are the most widely used and helpful way as they enable to clearly track the changes in the impacts of common factors.

The coefficient graphs for the sample of all countries are presented in Figure 9. In Figure 9 no clear trend is identified for the coefficients of common factors. However, coefficients for the developed countries common factor and the Latin American common factor have begun to fluctuate upwards slightly in 1995 in other words, in the second phase of globalization.

The impact of developed countries common factor has increased by 15% over the period of 1995-2009 compared to the first phase of globalization (1980-1994).

[31] Graphs of the coefficient with Standard error bands are given in the appendix.

Besides, coefficient of developed countries common factor has increased by %31 on average, during the second half of the total period (1995-2009) compared to the period of 1970 to 1994[32]. Thus, these findings indicate little evidence for coupling hypothesis for the sample of all countries.

Rolling window estimation graphs for the sample of developed countries is given in Figure 10. It is known that macroeconomic fluctuations of developed countries is moderate and have less volatility in contrast to the fluctuations in EMEs. The coefficient graph for developed countries supports this fact in such a way that coefficients of common factor follow a stable path. One possible explanation to this phenomenon is that the impact of Latin American common factor on cycles has declined slightly in 2001. Thus, cycles in developed countries keep their strength against common shocks.

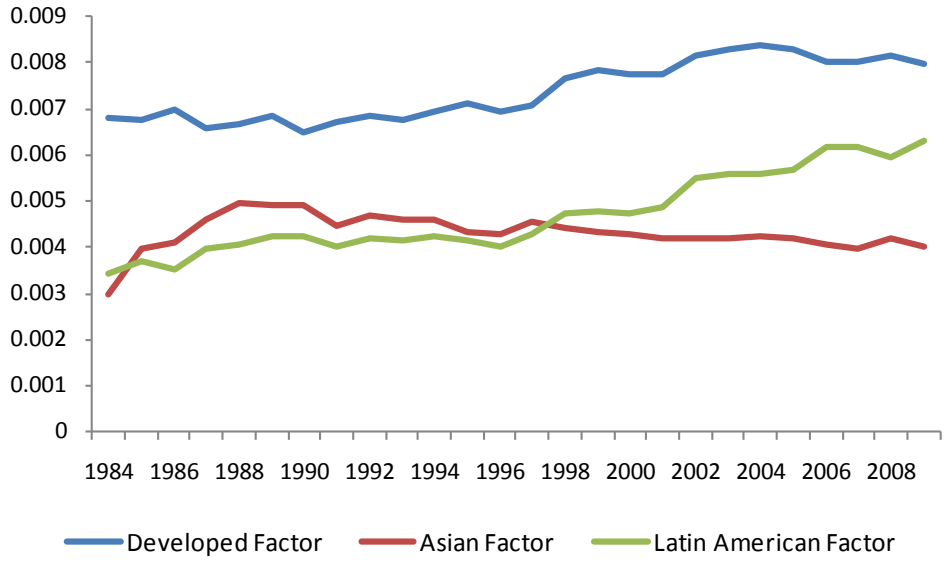


Figure 9. Rolling Window Coefficients Graph: Whole Sample of Countries

[32] Average coefficients are calculated for the first and second half of the total period in rolling windows of 15 years and the growth between two is computed.

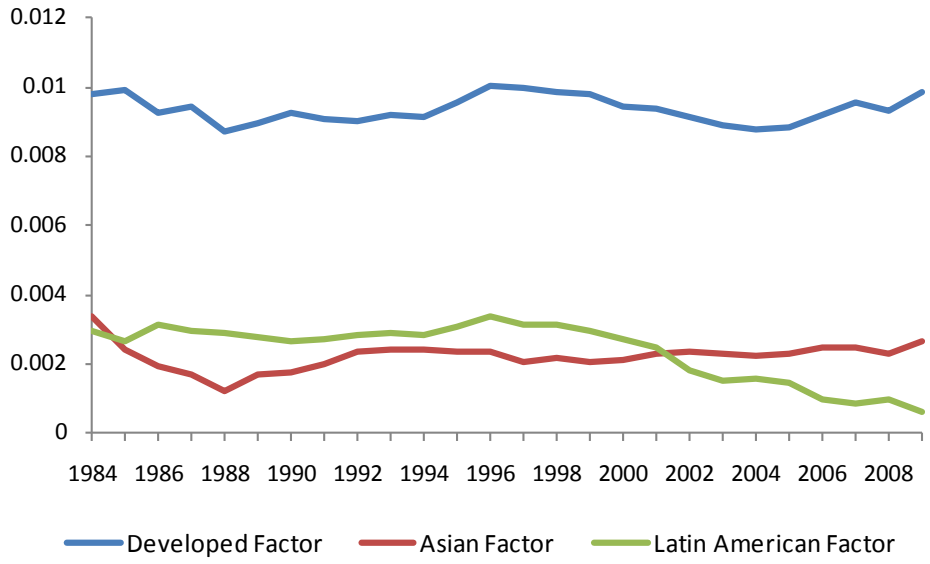


Figure 10. Rolling Window Coefficients Graph: Sample of Developed Countries

In Figure 11, rolling window estimation results are presented for the sample of EMEs. As similar to the previous findings regional common factors especially Latin American common factor is the most important source for fluctuations in EMEs. Besides, impacts of developed countries common factor and Asian countries common factor have become head to head since 2005 and the impact of Asian countries common factor has started to decline after 1990[33].

The impact of developed countries common factor on fluctuations in EMEs has increased rapidly by %79 in the second half of the total period (1995-2009) compared to the period of 1980-1994. On the other hand, on average, coefficient of developed countries common factor has increased by only %11 at the second half of the total period (1995-2009). Although there is strict upward trend on the impact of developed countries common factor since 1995, it had declined in 2003 and 2008 slightly. Similar to the results in Chapter 5.1., the rolling window estimation findings for the sample of EMEs are in the favor of coupling hypothesis that cycles in EMEs have been influenced by developed countries common factor deeply in the second phase of globalization.

[33] Averagely, the coefficient of Asian common factor has declined by around 9%. While the impact of Latin American common factor has incresed averagely by around 58%.

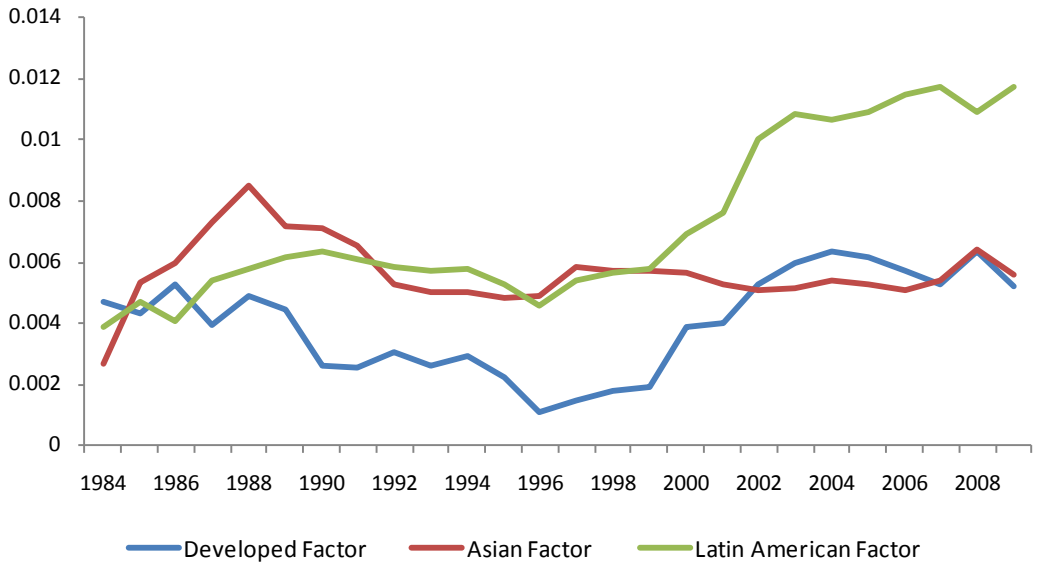


Figure 11. Rolling Window Coefficients Graph: Sample of EMEs

The rolling window estimation results for the sample of Asian countries and Latin American countries are given in Figure 12 and Figure 13 respectively. For the sample of Asian countries, while Asian common factor follows a stable path over time, both developed countries common factor and Latin American countries common factor coefficients have increased remarkable after 1998. However, it should be also noted that developed countries common factor on fluctuations of Asian countries had been strong during the period 1970-1990 but had begun to decline rapidly since the 1984.

For the sample of Latin American countries the picture is somewhat different from the Asian countries. Although the Latin American common factor had followed a stable path until 1995, its impact has increased rapidly. On the other hand, the impact of Asian countries common factor has a downward trend since 1990, which supports the findings in Chapter 5.1. Besides, the rolling coefficients for the developed countries common factor have followed a stable path. However, the fixed effects panel data estimation in Chapter 5.1. indicates that developed countries common factor has become significant in the second half of the total period (1990-2009). The results of the sample of Asian and Latin American countries point out that even though the regional factors have become more important for the

macroeconomic fluctuations in Latin American countries, for the Asian countries, the other common factors also have gained importance besides Asian common factor.

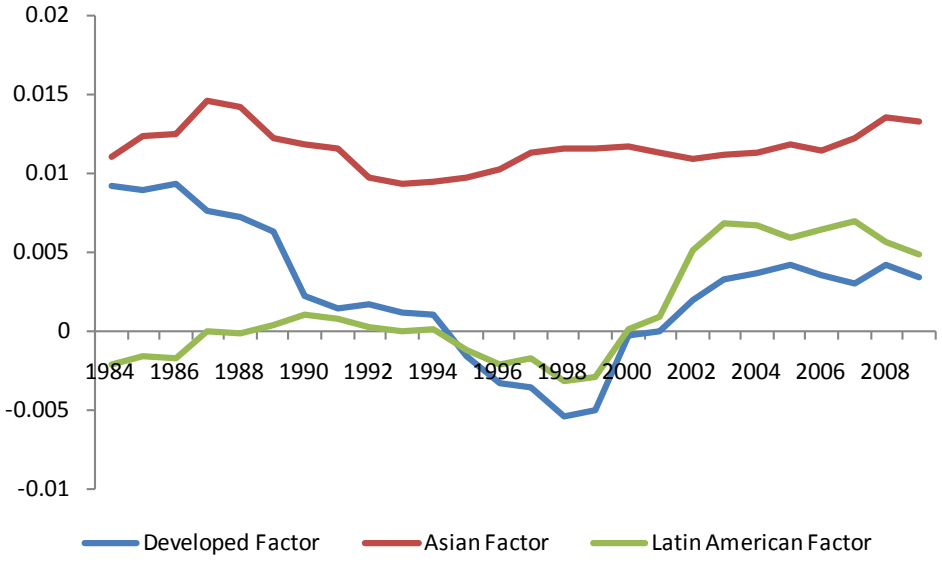


Figure 12. Rolling Window Coefficients Graph: Sample of Asian Countries

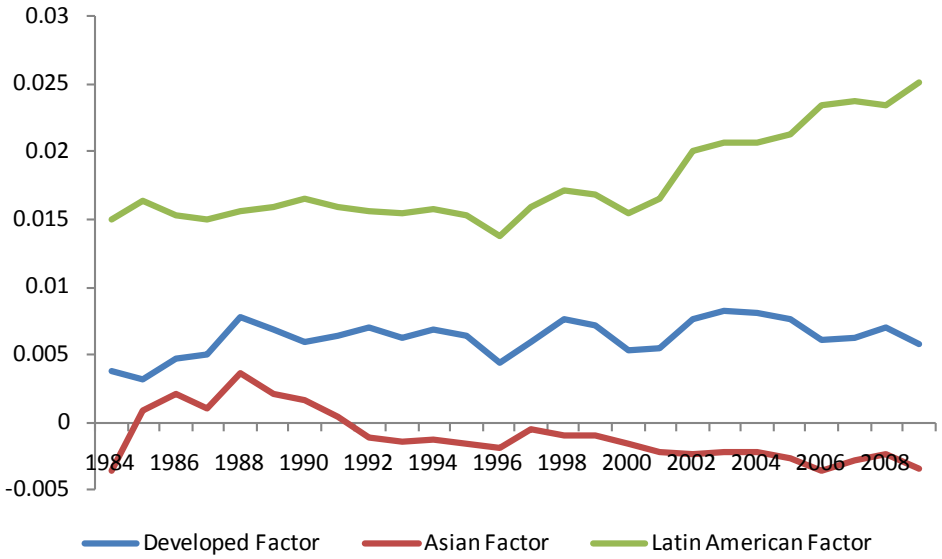


Figure 13. Rolling Window Coefficients Graph: Sample of Latin American Countries

In brief, the findings from both the fixed effects panel data estimation and rolling window fixed effects panel data estimation including common factors provide evidences in favor of coupling hypothesis. On the other hand, it has been seen that increased financial integration level helps the economic fluctuations coming closer, but it is not the leading source for coupling of macroeconomic fluctuations. Besides, different exchange rate regimes do not impact the synchronization between cycles; under any exchange rate regimes, macroeconomic fluctuations have become more dependent on the external common factors in the second phase of globalization. After the financial crisis, originated from U.S in 2008, strong economic performance of EMEs has started a debate on coupling vs. decoupling hypotheses of business cycles. However, findings in this chapter strongly support the coupling hypothesis that fluctuations in EMEs have begun to be affected more by developed countries common factor.

CHAPTER 6
CONCLUSION

This study mainly investigates domestic and external sources of business cycles in emerging market economies (EMEs), and, tries to answer the question of how these cycles differ from those in developed economies. It also examines whether cycles between in these two groups of countries converge or diverge over time. Until very recently, most developing countries have achieved higher growth rates and lower inflation rates for the last decade. It is controversial whether this good economic environment is due to domestic reforms or due to favorable external factors. On the other hand, increased trade and financial linkages make economies more vulnerable to external shocks. However, EMEs seem to have been affected less by global economic crisis in 2008 which is another point to discuss. These debates have attracted attention to the study of business cycles in EMEs and in developed countries.

After the review of literature on empirical business cycles studies is discussed, stylized facts on business cycles in EMEs and in developed countries are documented to provide different features of business cycles in these two groups of countries descriptively. Stylized facts of business cycles are examined by descriptive statistics and kernel density estimation plots. EMEs are characterized by their highly volatile macroeconomic fluctuations. It is also tested if volatilities of macroeconomic fluctuations in EMEs are significantly higher than the ones in developed countries and it is concluded that volatilities of macroeconomic fluctuations are significantly higher in these economies.

Furthermore duration and amplitudes of recessions and expansions in the EMEs and developed countries are also documented. Another important characteristic of business cycles in EMEs is the diversity in the duration and amplitudes of recessions and expansions. It has been argued that EMEs have experienced more frequent and deeper recessions, whereas more sizeable and longer expansions which is associated with the highly volatile output fluctuations in these

countries[1]. It is found that the average duration time of recessions is longer for the developed countries against the expectations, but the average amplitude of the recessions for EMEs is almost twice the average amplitude of recessions in developed countries. Thus, it is concluded that it takes longer time to recover from recessions for these countries since they experience deeper contractions. On the other hand, average duration of expansions for them is longer than the average duration of expansions in developed countries. Moreover, average amplitude of expansions in EMEs is also twice the average amplitude of expansions in developed countries.

As a next step, Kernel density function plots are presented. Kernel density estimation plots, which enable researcher to observe the distribution of data, present the difference between business cycles of two groups of countries in a clearer way. Such that, while distribution of business cycles in developed countries are more stable around 0, business cycles in EMEs are more widely spread around 0 which indicates that these economies are more unstable and having recessions and booms more frequently. The general belief is that EMEs have become important actors in the global economy since later 1990s. Thus, kernel density estimation plots business cycles for both EMEs and developed countries are examined for the period before and after 1995. Plots show that although EMEs have more noticeable recessions and booms after 1995, these economies have begun to follow more stable paths after the year 1995.

Afterwards, the role of external and domestic factors on business cycles are analyzed both with the conventional panel data estimations and also with common correlated effects panel mean group method, introduced by Pesaran (2006), which incorporates heterogeneity by allowing country-specific coefficients while accounting for the effects of common global shocks. The set of domestic variables consists of real exchange rate indices, change in net foreign assets ratio to GDP, real interest rate and terms of trade. Meanwhile,the set of external variables includes VIX as a measure of global financial conditions and U.S. output cycles acting as a proxy for global macroeconomic conditions that is to say common shocks. First, impacts of domestic and external factors are estimated by using Panel autoregressive distributed lag (ARDL) model since it enables to analyze the long run relationship with short run

[1] Calderon and Fuentes (2011)

dynamics among the variables of interest when it is not known with certainty whether variables of interest are stationary (I(0)) and non-stationary (I(1)) or mutually cointegrated[2]. Business cycles are proxied by Hodrick-Prescott filtered GDP which is presumed to be stationary I(0). Even though the output series in this study are filtered, Aguiar and Gopinath (2007a) state that EMEs are subject to substantial volatility to trend growth as they express "cycle is the trend" in EMEs. Consistent with this argument, unit root tests for individual EMEs tend to suggest non-stationarity albeit panel unit root tests for the whole sample suggest the reverse. This does not preclude the use of ARDL as the procedure allows the inclusion of both I(1) and I(0) variables. In this sense, ARDL approach is an appropriate method for analyzing the determinants of business cycles especially for EMEs.

The main conclusion of panel ARDL estimations is that the U.S. cycles, a proxy for common global shocks, is the leading driving factor of business cycles both in the long run and in the short run, and for both EMEs and developed countries. It is also concluded that unlike the sample of EMEs, increasing uncertainty in global financial markets could be beneficial for economic fluctuations in developed countries. Results of this section present how determinants of business cycles differ in these two groups of countries.

The second noticeable point is the impact of real exchange rate on business cycles as it has contractionary impact on macroeconomic fluctuations in EMEs, while having an expansionary impact on the economy of developed countries. This result proves that business cycles in EMEs and developed countries have different dynamics and a policy that helps economic growth in one group of country may harm economic growth in the other group. Another important point that should be focused on is the role of interest rate on business cycles. It is concluded that while monetary policy is forceful in developed economies, it has no significant impact on the business cycles in EMEs. Last but not least, the adjustment towards to equilibrium differs across these two groups of countries: While the business cycles of EMEs come to the equilibrium in five quarters, it takes only three quarters for developed economies.

[2] Pesaran et. al. (2001) show that ARDL model provides consistent estimates for the long run coefficients, that are asymptotically normal regardless of the order of integration of the variable of interest.

After employing panel ARDL estimations, cross section dependence is considered by implementing common correlated effects pooled (CCEP) estimator, introduced by Pesaran (2006) is implemented. Panel ARDL estimation with CCEP does not provide essentially different results from previous results because it is seen that icluding U.S. cycles into the estimation eliminate cross section dependence. The most important finding with CCEP estimation is the strong impact of cross section average of cycle series on business cycles for all samples. Thus, socioeconomic networks, contagion effects of crises, trade linkages and other unobserved common shocks have important role in business cycles for both groups of countries. When global economy deteriorates, economic performance of a country is affected negatively; a boom in global economy boosts a country's economy as well.

In addition, Generalized Method of Moments (GMM) procedure, developed for dynamic panel data models by Arellano and Bond (1991) and Arellano and Bover (1995) is applied to handle the potential simultaneity and thus endogeneity problem of the explanatory variables. The major conclusion from GMM estimations is that when endogeneity problem of domestic macroeconomic variables is taken into consideration, similar findings have been obtained for EMEs. On the other hand, for developed countries, no significance impact of real interest rate could be obtained. Thus, it is concluded that the issue of endogeneity arises for real interest rate and leads to biased results.

The role of external and domestic factors on macroeconomic fluctuations is also examined under different circumstances. First, Chinese cycles are included in the estimation as an external factor. As Chinese economy has started to play a crucial role in the global economy the question of how the Chinese economy influences the economic performance of other countries has been raised. It is concluded that Chinese business cycles matter for both EMEs and for developed countries.

Second, driving factors of business cycles are analyzed under different exchange rate regimes which are basically classified as floating exchange rate regimes and non-floating exchange rate regimes. The different impacts of real exchange rate indices across two groups of countries have raised the question whether determinants of business cycles change depending on exchange rate regimes. In the meantime, there are two conflicting views on the linkage between the choice of exchange rate regimes and economic performance in the literature such that

floating exchange rate regimes help countries to reduce foreign shocks since the exchange rate would adjust depending on the conjuncture as a shock absorber. On the other hand, opponents of this view suggest that fixed exchange rate regimes might be preferable due to stability and certainty.

Under floating exchange rate regimes similar findings are obtained such that U.S. cycles which is a proxy for global economy, is the leading source of macroeconomic fluctuations for each sample of countries. However, under non-floating exchange rate regimes findings have changed dramatically. U.S. cycles is still the leading source for fluctuations but in the sample of EMEs, real interest rate has become a significant factor of cycles in contrast to previous findings. In addition, in the sample of developed countries real exchange rate has become significant both in the short run and in the long run. These findings show that different exchange rate regimes influence macroeconomic fluctuations differently depending on the sample of countries. Therefore, different political tools are needed to stabilize domestic and foreign shocks and to promote economic growth.

Second part of the study, after searching for the main determinants of business cycles, focused on another important debate on business cycles studies: coupling and decoupling hypotheses of business cycles. According to the coupling hypothesis, the world economies have become more integrated as a result of increased trade and financial linkages in last two decades; therefore it is expected to see highly synchronized business cycles. On the other hand, “decoupling” hypothesis suggests that EMEs have begun to be important actors in the global economy and have experienced rapid growth rates and macroeconomic fluctuations have begun to follow a more independent path.

In Chapter 5, empirical evidence is provided in favor of coupling hypothesis such that business cycles of EMEs have begun to be more dependent on the business cycles in developed countries. The analysis in this chapter is based on static factor modeling. By factor analysis, the main unobservable sources of business cycles are identified such as developed countries common factor, Asian countries common factor and Latin American countries common factor. Next, it is aimed to answer the question whether the impacts of common factors on business cycles have changed over time depending on the sample of countries. The linkage between common factors and business cycles is analyzed by robust fixed effect panel data estimation

over two periods such as the first phase of globalization (1970-1990) and the second phase of globalization period (1990-2009). The main conclusion is that EMEs have started to be affected significiantly more from fluctuations in developed countries common factor over the period of 1990-2009 due to the increased financial and trade linkages. In other words, business cycles fluctuations of EMEs have become more dependent to developed countries common factor which supports coupling hypothesis over the period when trade and financial linkages get stronger.

Business cycles synchronization under different floating exchange rate regimes is also investigated. Findings indicate that macroeconomic fluctuations in all samples of countries have become much more vulnerable to foreign shocks under any exchange rate regimes over the period of 1990-2009. Thus, under any exchange rate regime, EMEs have become more dependent on developed countries fluctuations.

Moreover, since financial integration is seen as an important source of increased synchronization of business cycles, the linkage between business cycles and common factors for different financial integration levels is examined. Based on Milesi-Ferretti's (2003) and Lane and Milesi-Ferretti's (2007) studies and dataset, financial integration measures are constructed. Based on quantiles at given year, time variant thresholds are computed and countries are categorized as "less financially integrated" countries, "medium financially integrated" countries and "high financially integrated" countries. The findings indicate that increased financial integration level leads to increased synchronization of business cycles. However, findings also indicate that increased financial integration is not the strongest cause of coupling of cycles as discussed in the literature since there are mixed signals across the group of countries.

Finally, rolling window estimation is done in order to investigate whether the impacts of common factors on business cycles that are driven by factor analysis have changed over time. The findings of rolling estimation with 15 years window indicate that the impact of developed countries common factor on fluctuations in EMEs has increased rapidly by %79 in the second half of the total period (1995-2009) compared to the period of 1980-1994. On the other hand, for the sample of developed countries, it is seen that both impact of developed countries common factor and impacts of regional common factors follow a stable path. Thus, both the

fixed effects panel data estimation and rolling window fixed effects panel data estimation provide evidences in the favour of coupling hypothesis of business cycles.

The major conclusion of this study is summarized as follows: global common shocks is the leading source of macroeconomic fluctuations in EMEs and in the last two decades fluctuations in these economies have started to be more dependent on the fluctuations in developed countries. EMEs have become major contributor of the global economy in the last two decades and have stood more resilient against the negative impacts of the recent financial crises. However, according to the results, these economies are still vulnerable to external shocks. Moreover, results also show that domestic driving factors of business cycles have varied across the two groups of countries which points out the different features of business cycles in EMEs and developed countries. Thus, diverse policies should be implemented for each sample of countries to dampen the negative foreign shocks and allow for positive spillovers. It is deemed necessary that further research on business cycles in EMEs should focus on the impact of the recent crisis in August 2011 in the framework of both the determinants and synchronization of business cycles, since the recent crisis have had different impact on the dynamics of EMEs and economies of developed countries.

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APPENDICIES

APPENDIX A: DATA SOURCE

For quarterly data the main data source is International Monetary Fund (IMF), International Financial Statistics (IFS). For annual data the World Bank World Development Indicators (WDI) data set are used. For the countries whose data is not available national data sources are used. Sample of countries for quarterly series and for annual series are reported in table A1 and A2 respectively.

A. Business Cycles Series

GDP Volume Index series or Real GDP series from IFS in the quarterly basis and constant local currency units of GDP in the annual basis from WDI are used. Household consumption, gross fixed capital formation and trade data are obtained from IFS. The cycle components are derived by using Hodrick-Prescott filtering. For the quarterly data seasonality components are removed by Tramo/Seats seasonal adjustment method.

B. Real Exchange Rate Series

Effective exchange rate broad indices that are calculated from Bank for International Settlements (BIS) are used. For Bolivia, Colombia and Luxembourg effective exchange rate indices are obtained from IFS.

C. Net Foreign Assets

Net foreign assets are obtained from IFS by using Direct Investment Abroad (DIA), Portfolio Investment Assets (PIA), Other Investment Assets (OIA), Direct Investment Liabilities (DIL), Portfolio Investment Liabilities (PIL) and Other Investment Liabilities (OIL) as follows:

$NFA = DIA + P\,IA + OIA - DIL - P\,IL - OIL$

D. Terms of Trade

For terms of trade series various data sources. The data come from four sources: IFS, Eurostat, Organization for Economic Cooperation and Development (OECD) and for some countries national statistics office.

E. Real Interest Rate

Real interest rates are computed by using money market rate (mmr) or equivalent from IFS based on the Boschi and Girardi's (2008) study as following.

rr= 0.25*ln(1+mmr)-ln(CPI_{+1}/CPI) where CPI is consumer price index obtained from IFS.

F. Chinese Business Cycles

Quarterly Chinese real GDP series are obtained from Abeysinghe and Rajaguru's (2003) study. For the years 2008 and 2009 Chinese output series are taken from the National Bureau of Statistics China.

G. VIX

Chicago Board Options Exchange Market Volatility Index is obtained from Bloomberg.

H. Classification of Exchange Rate Regimes

Classification of exchange rate regimes based on the classification in Ilzetzki, Reinhart and Rogoff's (2008) study. The coarse classification for Ilzetzki, Reinhart and Rogoff's (2008) study are as following:

The course classification codes are:

1: No separate legal tender

1: Pre announced peg or currency board arrangement

1: Pre announced horizontal band that is narrower than or equal to +/-2%

1: De facto peg

2: Pre announced crawling peg

2: Pre announced crawling band that is narrower than or equal to +/-2%

2: De factor crawling peg

2: De facto crawling band that is narrower than or equal to +/-2%

3: Pre announced crawling band that is wider than or equal to +/-2%

3: De facto crawling band that is narrower than or equal to +/-5%

3: Moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time)

3: Managed floating

4: Freely floating

5: Freely falling

6: Dual market in which parallel market data is missing.

Table A1. Sample of Countries for Quarterly Series

Emerging Market Economies	Developed Countries
Argentina	Australia
Bolivia	Austria
Brazil	Belgium
Chile	Canada
Colombia	Denmark
Hong Kong	Finland
Hungary	France
Indonesia	Germany
Israel	Iceland
Korea	Ireland
Malaysia	Italy
Mexico	Japan
Peru	Luxembourg
Poland	Netherlands
Romania	New Zealand
Russia	Norway
Slovak	Portugal
Slovenia	Spain
South Africa	Sweden
Thailand	Switzerland
Turkey	U.K.
	U.S.

Table A2. Sample of Countries for Annual Series

Emerging Market Economies	Developed Countries	Asian Countries	Latin American Countries
Argentina	Australia	China	Argentina
Bolivia	Austria	Hong Kong	Bolivia
Brazil	Belgium	India	Brazil
Chile	Canada	Indonesia	Chile
China	Denmark	Korea	Colombia
Colombia	Finland	Malaysia	Mexico
Egypt	France	Philippines	Peru
Hong Kong	Germany	Singapore	Venezuela
Hungary	Iceland	Thailand	
India	Ireland		
Indonesia	Italy		
Israel	Japan		
Korea	Luxembourg		
Lativa	Netherlands		
Malaysia	New Zealand		
Mexico	Norway		
Peru	Portugal		
Philippines	Spain		
Singapore	Sweden		
South Africa	Switzerland		
Thailand	U.K.		
Turkey	U.S.		
Venezuela			

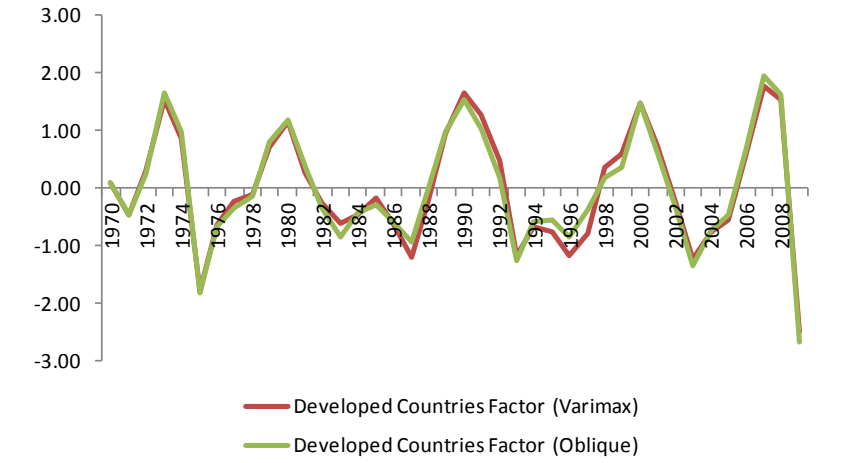
APPENDIX B: LAG SELECTION FOR PANEL ARDL ESTIMATION

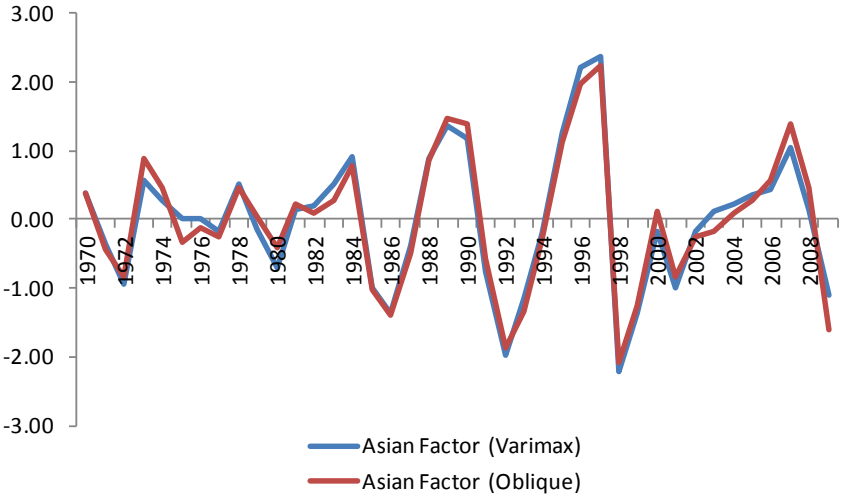
Table B1. AIC and SIC for Lag Order Selection in PARDL Models

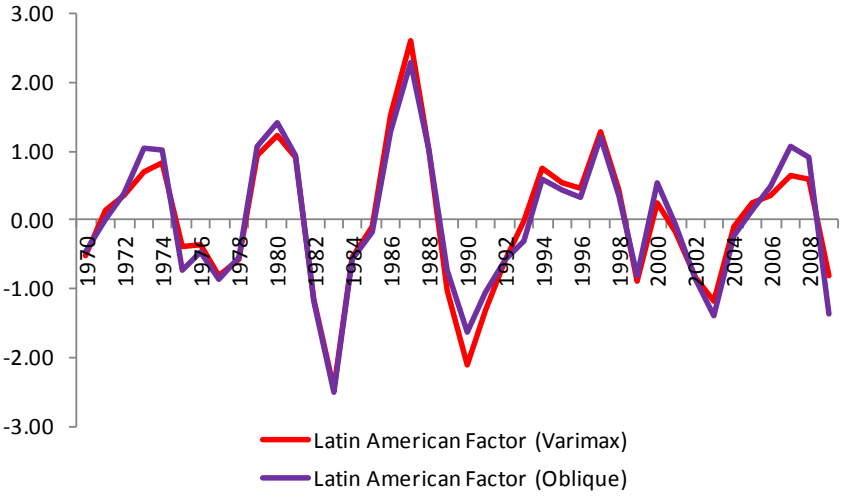
Sample of All Countries					
	PARDL (1,1,1)	**PARDL (2,2,2)**	**PARDL (3,3,3)**	**PARDL (4,4,4)**	**PARDL (5,5,5)**
AIC	-5.7844	-5.9462	-5.9479	-5.9512	-5.9527*
SIC	-5.8554*	-5.8265	-5.8197	-5.8144	-5.8072
Sample of Developing Countries					
	PARDL (1,1,1)	**PARDL (2,2,2)**	**PARDL (3,3,3)**	**PARDL (4,4,4)**	**PARDL (5,5,5)**
AIC	-5.8038	-5.8551	-5.8633	-5.8756*	-5.8705
SIC	-5.6748	-5.6998*	-5.6807	-5.6648	-5.6304
Sample of Developed Countries					
	PARDL (1,1,1)	**PARDL (2,2,2)**	**PARDL (3,3,3)**	**PARDL (4,4,4)**	**PARDL (5,5,5)**
AIC	-6.2015	-6.2144*	-6.2032	-6.2043	-6.2126
SIC	-6.1054	-6.1060*	-6.0822	-6.0822	-6.0655

APPENDIX C: OBLIQUE AND VARIMAX ROTATED COMMON FACTORS

Figure C1. OBLIQUE AND VARIMAX ROTATED COMMON FACTORS

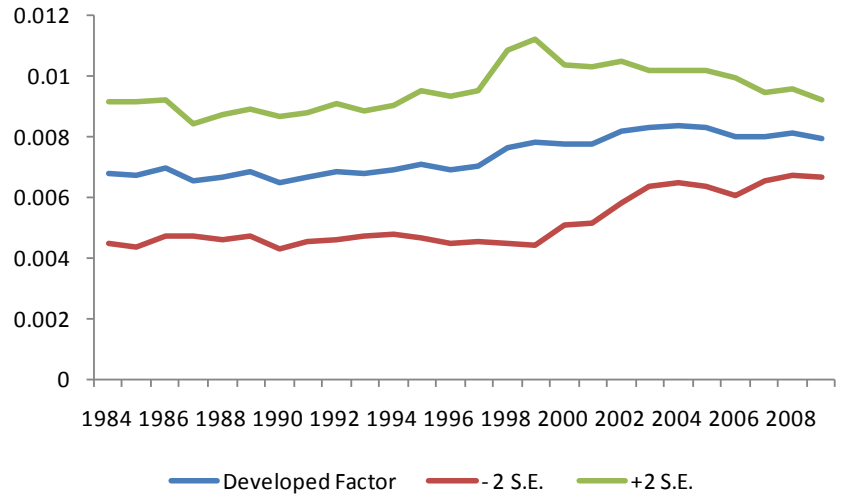


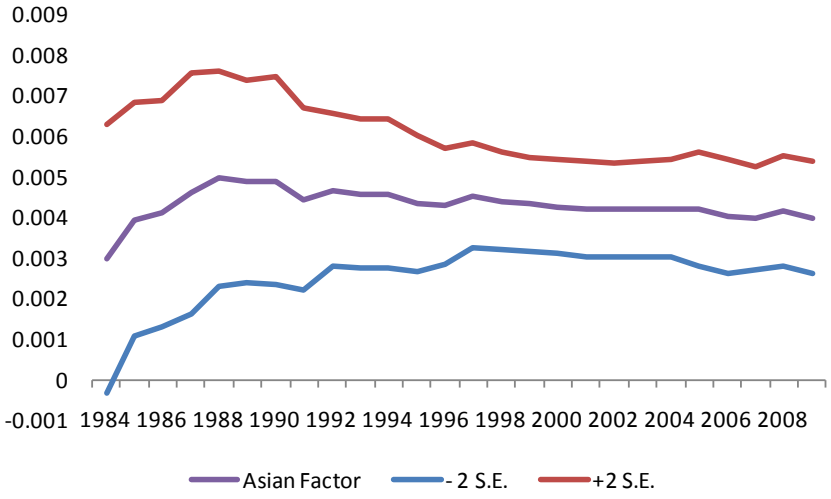




APPENDIX D: ROLLING ESTIMATIONS with STANDARD ERRORS

Figure D1. Sample of All Countries





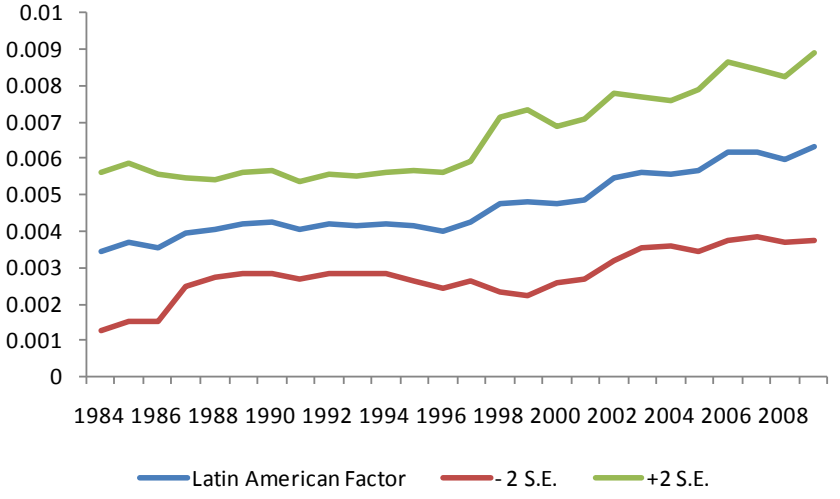
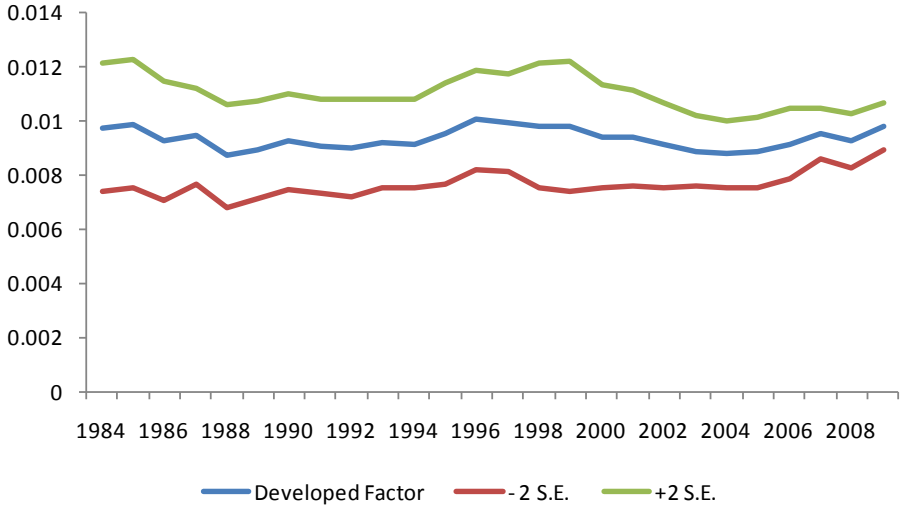
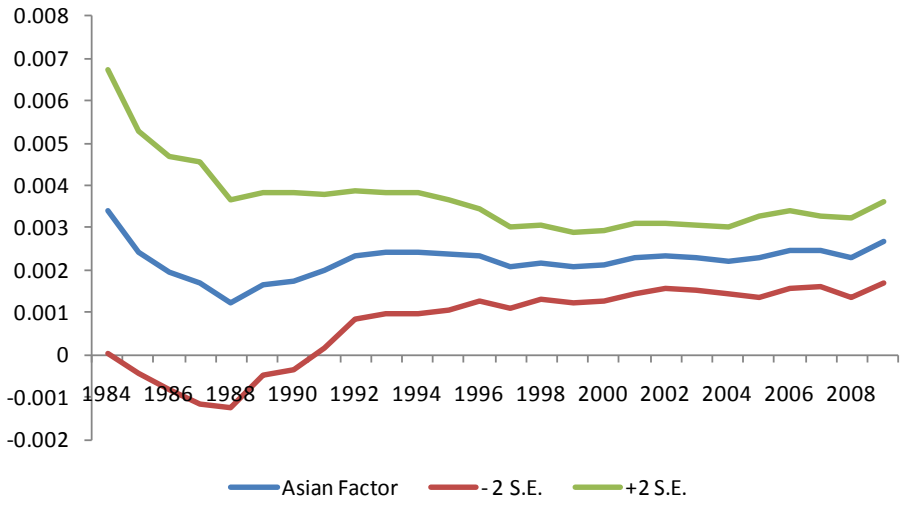


Figure D2. Sample of Developed Countries





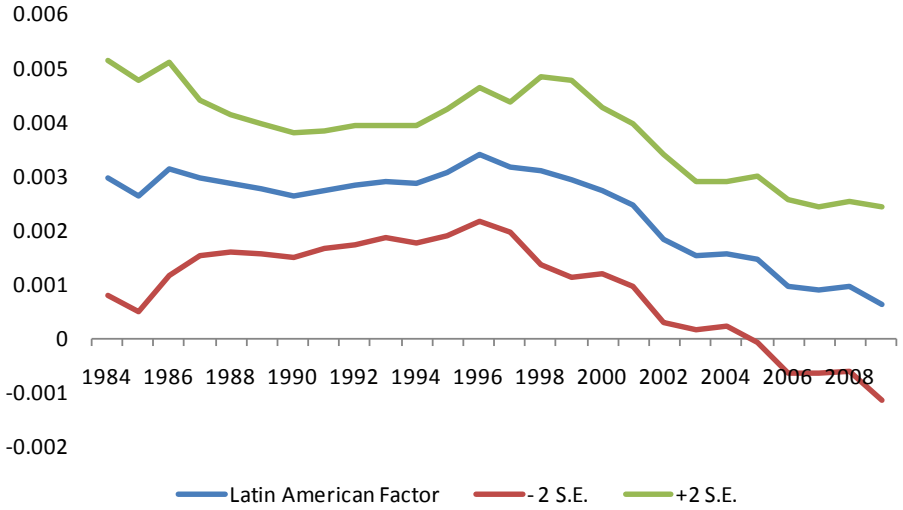
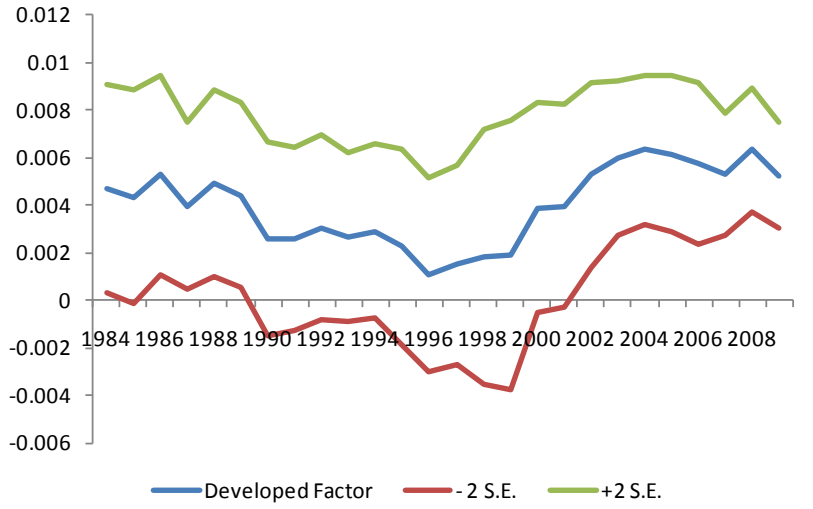
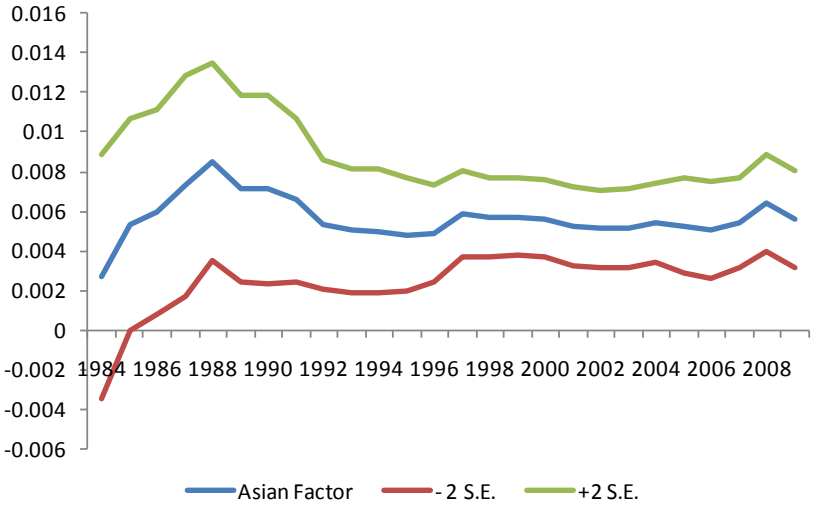
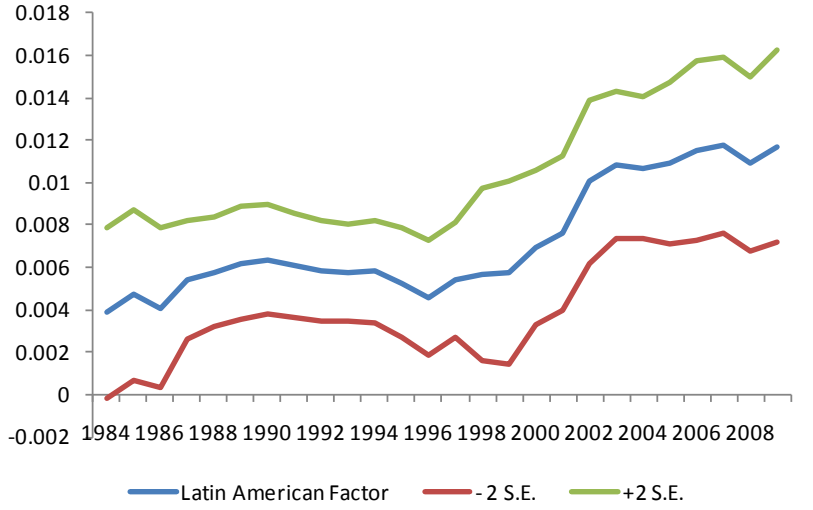


Figure D3. Sample of Emerging Market Economies







APPENDIX E

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Erdem, Fatma Pınar

Nationality: Turkish (TC)

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PUBLICATIONS

- "Reevaluating the Link Between Volatility and Growth of Output: The Robustness of the Link" *VDM Verlag*, 2009, with Stefan C. Norrbin (Book-published Master Thesis).
- "Time Series Evidence on the Linkage between the Volatility and Growth of Output", 2008, *Applied Economics Letters,* Taylor and Francis Journals, vol. 15 (1), pages 45-48, with Paul M. Beaumont and Stefan C. Norrbin.
- "Behavior of Remittances from Turkish Workers in Germany over Business Cycles in Turkey and Germany: An Econometric Analysis", 2007, *International Economics and Foreign Trade Policies,* vol. 2 (3), pages 103-130, with Serdar Sayan (in Turkish).
- "The Robustness of the Link Between Volatility and Growth of Output", July 2005, *Review of World Economics (Weltwirtschaftliches Archiv),* Springer, vol. 141 (2), pages 343-356, with Stefan C. Norrbin.

CONFERENCE PRESENTATIONS

- "Reevaluating the link between Growth and Volatility", Eastern Economic Association Conference, Washington, D.C., USA. 19–21 February 2004.

APPENDIX F

TURKISH SUMMARY

İş çevrimleri kısaca temel makroekonomik göstergelerin uzun dönem eğilimlerinin etrafındaki kısa dönemli dalgalanmalar olarak tanımlanmaktadır. İş çevrimlerinin yapısını ve etkenlerini anlamak doğru ve uygun istikrar politikalarının geliştirilmesi açısından oldukça önem taşımaktadır. Klasik iş çevrimleri çalışmaları dönüm noktalarının tanımlanması, durgunluk ve genişleme dönemlerinin belirlenmesi ve makroekonomik göstergeler ile iş çevrimleri arasındaki ilişkiyi incelemeye odaklanmıştır[1]. Öte yandan, modern iş çevrimleri araştırmaları daha çok makro-ekonometrik teknikler ile uzun dönem hareketten elde edilen çevrim bileşenlerinin analizlerde kullanılmasını içermektedir[2].

İş çevrimlerinin araştırılmasına yönelik metodolojiler gelişirken, dünya ekonomisinin daha entegre olması ile birlikte, bu konudaki çalışmalar yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimlerinin farkını ve ortak hareketlerini incelemeye odaklanmıştır[3]. Son zamanlara kadar, yükselen piyasa ekonomilerinde yüksek büyüme oranları ve göreceli daha düşük enflasyon oranları gözlenmiştir. Ancak, bu olumlu ekonomik görünümün, iç reformlara mı yoksa olumlu dışsal etkenlere mi bağlı olduğu henüz çözümlenmemiştir. Ayrıca, yükselen piyasa ekonomileri son yirmi yılda bir yandan güçlü büyüme oranlarına sahip olurken bir yandan da büyük finansal krizler yaşamışlardır. Bu nedenle, bu ülkelerdeki iş çevrimleri, gelişmiş ülke çevrimlerine kıyasla aşırı oynaklığa sahip olmalarıyla karakterize edilmektedirler. Literatürde, iki ülke grubu iş çevrimleri arasındaki farklılığı hem genel denge modelleri hem de makro ekonometrik yöntemler kullanarak anlamayı amaçlayan bir çok çalışma bulunmasına rağmen bu konuya tam bir açıklık getirmek mümkün olmamıştır.

[1] Burns ve Mitchell (1946).

[2] Hodrick ve Prescott (1997), Baxter ve King (1999) vb.

[3] Aguiar ve Gopinath (2004), Neumeyer ve Perri (2005), Izquierdo vd. (2008), Calderon ve Fuentes (2010) vd.

Literatürde yükselen piyasa ekonomileri ile gelişmiş ülke ekonomilerinin iş çevrimlerini inceleyen çalışmalar iki ana grupta toplanmıştır. İlk grup, iş çevrimlerinin itici etkenlerini inceleyerek, bu ülke grubu çevrimlerinin yapısını ortaya çıkarmayı amaçlamıştır. Olumsuz şokların etkisini azaltacak daha etkili istikrar politikaları geliştirmek için iş çevrimlerinin kaynaklarını belirlemek esas teşkil etmektedir. Yükselen piyasa ekonomilerindeki çevrimlerin ana etkeninin politik istikrarsızlık, güçsüz kurumlar ve zayıf makroekonomik temeller gibi sadece ülkeye özgü faktörler olarak kabul eden çalışmalar olduğu gibi bu konudaki son çalışmalar, dış talepte meydana gelen şoklar, küresel finansal koşulları ve emtia fiyatlarındaki değişimler gibi dışsal etkenlerin de oldukça önemli rolü olduğu sonucuna varmışlardır. Calvo, Leiderman ve Reinhart'ın (1993) öncü çalışması, dışsal etkenlerin yükselen piyasa ekonomileri üzerindeki etkisini sermaye hareketleri çerçevesinde ortaya koymuştur. Kim (2001), Lane (2003), Mackowiak (2007), Izquierdo, Romero ve Talvi'nin (2008) çalışmaları iş çevrimlerinde dışsal etkenlerin rolünü inceleyen dikkate değen diğer çalışmalar olarak göze çarpmaktadır.

Literatürde ön plana çıkan ikinci grup ise yükselen piyasa ekonomileri çevrimleri ile gelişmiş ülke çevrimleri arasındaki senkronizasyonu araştıran çalışmalardır. Bu konuda iki temel görüş bulunmaktadır. Bu konudaki ilk görüş, "birliktelik (coupling)" olarak adlandırılmaktadır. Bu görüşe göre, küreselleşme, artan finansal bütünleşme ve ticaret bağlantıları, sermaye hareketlerinin giderek liberalleşmesi ve dalgalı döviz kuru rejimleri sonucu yükselen piyasa ekonomilerinde görülen dalgalanmalar, gelişmiş ülke ekonomileri dalgalanmalarına yakınsamaktadır. Diğer taraftan, "birliktelik" görüşüne karşıt olarak ortaya çıkan "ayırım (decoupling)" hipotezi, yükselen piyasa ekonomilerindeki çevrimlerin gelişmiş ülke ekonomileri çevrimlerinden ayrıldığını ve daha bağımsız hareket etmeye başladığını savunmaktadır. Kose, Otrok ve Prasad'ın (2008) belirttiği gibi yükselen piyasa ekonomileri küresel ekonominin daha etkili oyuncuları haline gelmiş ve 2008'in Ağustos ayında yaşanan küresel krizden gelişmiş ülkeler kadar etkilenmemişlerdir. Ayrıca, artan finansal bağlantılar portföylerin çeşitlenmesine yol açarak olumsuz dışsal şokların etkilerini azaltmaktadır. Buna ek olarak, artan ticari bağlantılar sonucu üretimde ortaya çıkan bölgesel uzmanlığın neden olduğu endüstriye özel şoklar nedeniyle kısa dönem dalgalanmalarda ülke gruplarının birbirinden ayrışması beklenmektedir. Bu üç görüş, yükselen piyasa ekonomileri iş çevrimlerinin gelişmiş

ülke çevrimlerinden daha bağımsız hareket ettiği ve bu iki grup ülke çevrimlerinin birbirlerinden uzaklaştığı hipotezini desteklemektedir.

Bu çerçevede, bu çalışmanın temel amacı yükselen piyasa ekonomileri iş çevrimlerinin yapısı ve kaynaklarını araştırmak ve gelişmiş ülke iş çevrimleri ile nasıl farklılık gösterdiğini belirlemektir. Bu amaçla, ilk olarak iş çevrimlerinin temel dışsal ve içsel etkenleri çeşitli panel veri yöntemleri ile araştırılacaktır. Daha sonra küreselleşme ve finansal bütünleşme kapsamında yükselen piyasa iş çevrimlerinin gelişmekte olan çevrimlere yakınsayıp yakınsamadığı incelenecektir. Bu soruların belirginleştirilmesi, yükselen piyasa ekonomilerinin dışsal şoklara karşı kırılganlığını azaltacak ve böylece finansal krizleri önleyici önlemler almalarını sağlayacak politikalar geliştirilmesinde politika yapıcılarına yardımcı olacaktır.

Bu çalışma iş çevrimleri literatürüne çeşitli açılardan katkıda bulunmayı amaçlamaktadır. Bu amaçla iş çevrimleri üzerinde içsel ve dışsal etkenlerin rolü geleneksel panel veri tahmin yöntemlerinin yanı sıra, Pesaran (2006) tarafından geliştirilen karma ortalama grup tahmin yöntemi uygulanarak da incelenmiştir. Bu yöntem, kesitler arası bağımlılığı kontrol ederek ortak küresel şokların etkisini dikkate almaktadır. Ayrıca, iş çevrimlerinin itici faktörlerinin kısa dönem ve uzun dönem etkileri oto-regresif dağıtılmış gecikmeler modeli (ARDL) kullanılarak tahmin edilmiştir. Buna ek olarak, sonuçların sağlamlığı herhangi bir potansiyel eşzamanlılık ve buna bağlı olarak içsellik sorununu kontrol etmek amacıyla Arelleno ve Bond (1991) tarafından geliştirilen dinamik panel yöntemi ile test edilmiştir. Diğer taraftan, bu çalışmada sadece Amerika Birleşik Devletleri (ABD) çevrimlerinin yükselen piyasa ekonomileri iş çevrimleri üzerindeki etkisi değil aynı zamanda, Çin ekonomisinin dünya ekonomisinde güçlenen rolü nedeniyle, Çin çevrimlerinin etkisi de dikkate alınmıştır.

Literatürde genel olarak iş çevrimlerinin döviz kuru rejimlerine göre değişmediği savunulsa da bu çalışmada döviz kurunun çevrimler üzerindeki etkisinin ülke gruplarına göre değiştiği sonucuna varılmıştır. Bu nedenle, hem iş çevrimlerinin etkenleri hem de iki ülke grubu çevrimleri arasındaki senkronizasyonu döviz kuru rejimleri bazında incelenerek literatüre katkıda bulunulmuştur. Uluslar arası makro iktisatta döviz kuru rejiminin seçimi önemli bir araştırma konusudur. Bir görüş dalgalı döviz kuru rejimlerinin, döviz kurunun konjonktüre göre ayarlanması nedeniyle dışsal şoklara karşı tampon görevinde bulunduğunu ve böylece ekonomik büyümeye katkı sağladığını savunmaktadır. Diğer taraftan, başarılı sabit döviz kuru

rejimlerinin belirsizliği azalttığı ve böylece ekonomik görünüme katkıda bulundukları savunulmaktadır.

Çalışmanın ikinci kısmında "birliktelik (coupling)" ve "ayırım (decoupling)" hipotezleri incelenmiştir. Bu amaçla, yükselen piyasa ekonomileri iş çevrimlerinin gelişmiş ülke iş çevrimlerine yakınsaması faktör analizi yöntemi kullanılarak araştırılmıştır. 1980'lerin ortalarından bu yana artan finansal bütünleşme, iş çevrimlerinin yakınmasının ana nedeni olarak kabul görmüştür. Ancak, ülkelerin finansal bütünleşme seviyelerini dikkate alan çalışmalar oldukça yetersizdir. İyi işleyen finansal piyasaların daha etkin kaynak tahsisi sağladığı ve bu nedenle de ekonomik büyümeyi teşvik ettiği düşünülmektedir[4]. Bununla birlikte, finansal bütünleşmenin yükselen piyasa ekonomilerini daha kırılgan ve dışa bağımlı hale getirdiğini ve böylece ekonomik büyümeye zarar verdiğini savunan diğer bir görüşte bulunmaktadır[5]. Bu bağlamda, bu çalışmada diğer çalışmalardan farklı olarak yükselen piyasa ekonomileri ile gelişmiş ülke iş çevrimlerinin senkronizasyonu ülkelerin finansal bütünleşme seviyelerine göre de incelenmiştir.

Bu çalışmada iş çevrimleri verisi Hodrick-Prescott filtresi kullanılarak ülkelerin Gayri Safi Yurtiçi Hasıla (GSYİH) serisinden elde edilmiştir. İş çevrimlerinin içsel ve dışsal etkenlerinin araştırıldığı ilk bölümde üç aylık veriler, iş çevrimlerinin yakınsamasının incelendiği ikinci bölümde ise yıllık veriler kullanılmıştır. Üç aylık GSYİH, Net Yabancı Varlıklar, Dış Ticaret Hadleri ve reel faiz oranı serileri Uluslararası Para Fonu, Uluslararası Finansal veri setinden (IFS), yıllık seriler ise Dünya Bankası, Küresel Kalkınma Göstergeleri veri setinden elde edilmiştir. Reel efektif döviz kurları serileri ise Uluslararası Ödemeler Bankası (BIS) veri setinden temin edilmiştir.

Bu çalışmada ilk olarak yükselen piyasa ekonomileri ve gelişmiş ülke ekonomilerinin iş çevrimlerinin temel betimleyici istatistikleri sunulmuştur. Raporlanan betimleyici istatistikler bu iki ülke grubu çevrimlerinin temel farkını ortaya koymak için ilk adım olarak görülmektedir. Yükselen piyasa ekonomilerinin iş çevrimlerinde ve büyüme oranında görülen oynaklığın yüksek olması beklenmektedir. Bununla birlikte, ABD ve diğer gelişmiş ülkelerdeki iş çevrimlerinde gözlenen oynaklığının 1984-2006 döneminde oldukça azaldığı

[4] Frankel ve Rose (1998), Kose vd. (2003b) ve Imbs (2006)

[5] Obstfeld (2009)

görülmüş ve bu dönem "Büyük Yavaşlama (Great Moderation)" olarak adlandırılmıştır[6]. Bu beklentilere paralel olarak yükselen piyasa ekonomileri iş çevrimleri gelişmiş ülke çevrimlerine kıyasla yüksek çıkmıştır. Bununla birlikte, iş çevrimleri serisindeki devamlılık(persistence) iki ülke grubuna göre değişmemektedir. Diğer taraftan, tüketim, yatırım ve net dış ticaret verilerindeki çevrimlerinin oynaklığı da yükselen piyasa ekonomilerinde, gelişmiş ülke ekonomilerine göre daha yüksektir. İki ülke grubunda da, sürekli gelir hipotezini destekler nitelikte, tüketimdeki ve yatırımdaki oynaklığın iş çevrimlerindeki oynaklıktan yüksek olduğu sonucuna varılmıştır. İş çevrimleri serilerinin dağılımının yanı sıra, Kernel yoğunluk tahmininin grafiksel sonuçları da yükselen piyasa ekonomilerindeki iş çevrimlerinin gelişmiş ülke iş çevrimlerine göre daha oynak olduğunu göstermektedir. İş çevrimlerinin süresi ve genişliğiise Kholodilin (2000) çalışması temel alınarak hesaplanmıştır. Yükselen piyasa ekonomilerinde görülen ortalama ekonomik durgunluk süresinin gelişmiş ülke çevrimlerine göre daha kısa sürdüğü, ancak durgunluk dönemlerinin etkisinin söz konusu ekonomilerde çok daha derin olduğu sonucuna varılmıştır. Elde edilen sonuçlar göstermektedir ki yükselen piyasa ekonomilerindeki durgunluğun ortalama süresi gelişmiş ülkelere göre az olmasına rağmen, durgunluğun etkileri bu ülkelerde çok daha güçlü olmaktadır. Ayrıca, ekonomik genişlemenin ortalama süresi ve genişliği, beklentilere paralel olarak, yükselen piyasa ekonomilerinde daha uzundur.

Hem dışsal hem de iç faktörlerin yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimleri üzerindeki etkileri uzun ve kısa dönemli etkisi dengelenmemiş panel veri oto-regresif dağıtılmış gecikmeler modeli (ARDL) ile üç aylık veriler kullanılarak araştırılmıştır. Kurulan model iç değişkenler olarak reel döviz kuru, dış ticaret hadleri, net dış varlıklar ve reel faiz oranlarını içermektedir. Dışsal etken olarak ise küresel ekonomiye yön veren en güçlü ekonomi olduğu için ABD çevrimleri modele katılmıştır. ABD iş çevrimlerinin ortak küresel koşulları yansıttığı kabul edilmektedir. Ayrıca, diğer bir dış etken olarak uluslararası yatırımcıların risk iştahının, diğer bir deyişle riskin fiyatının göstergesi olan Chicago Opsiyon Borsası Oynaklık Endeksi (VIX) modele katılmıştır. Literatürdeki çoğu çalışma ABD Merkez Bankası politika faizlerini de dış etken olarak modele dahil ederek analizleri sonuçlandırmıştır. Ancak, ABD iş çevrimlerinin faiz oranları ile

[6] Bernanke (2004)

ilişkili olması nedeniyle ABD gösterge faizinin modele katılmamasının doğru olacağı düşünülmüştür.

Bu çalışmada, dış ve iç faktörlerin uzun ve kısa dönemli etkilerinin incelenmesinde panel ARDL modelinin tercih edilmesinin başlıca nedeni Pesaran vd.'nin (2001) belirttiği gibi, ARDL modellerinin ilgili değişkenlerin sıfırıncı sıradan bütünleşik ya da birinci sıradan bütünleşik dereceleri olması kısıtını getirmeden, değişkenlerin uzun dönem ilişkisinin kısa dönem ilişkisi ile birlikte tahmin edilmesine olanak sağlamasıdır. Bununla birlikte, Aguiar ve Gopinath'ın (2007) çalışmasının sonuçları, yükselen piyasa ekonomilerinin büyüme eğilimlerinin azımsanmayacak derecede çok oynaklığa sahip olduğu ve şokların etkisinin kalıcı olduğunu ortaya koymuş ve bu nedenle yükselen piyasa ekonomilerinde çevrimlerin aslında trend olduğunu belirtmiştir. Bu argüman ile tutarlı olarak, her ne kadar panel birim kök testleri, iş çevrimlerinin durağan olduğunu gösterse de yükselen piyasa ekonomileri çevrimleri ayrı ayrı incelendiğinde durağan olmayan çevrimler ile karşılaşılmaktadır. Bu bağlamda, hem iç hem de dış faktörlerin uzun dönem ve kısa dönem dalgalanmalar üzerindeki etkilerinin tahmin edilmesinde I(0) ve I(1) değişkenlerinin bir arada kullanılmasına engel teşkil etmeyen panel ARDL metodolojisi kullanılmıştır.

Dengelenmemiş sabit etki panel ARDL tahminlerinin en önemli sonucu, ABD iş çevrimleri ile temsil edilen ortak küresel etkenlerin uzun ve kısa dönemde hem yükselen piyasa ekonomileri hem de gelişmiş ülke iş çevrimlerinin ana etkeni olduğudur. Diğer taraftan, iş çevrimlerinin iç etkenleri iki ülke grubuna göre değişmektedir. Reel döviz kuru, net dış varlıklardaki değişim ve dış ticaret hadlerinin yükselen piyasa ekonomileri çevrimlerinin uzun dönemde istatistiki olarak anlamlı iç etkenleri olduğu görülmüştür. Dış etkenler olarak ABD iş çevrimleri bu ekonomilerdeki dalgalanmaları olumlu ve beklentilere uygun olarak VIX ile temsil edilen küresel finansal piyasalardaki oynaklık dalgalanmaları olumsuz etkilemektedir. Kısa dönemde ise reel döviz kuru ve ABD iş çevrimlerinin istatistiki olarak anlamlı olduğu sonucuna varılmıştır.

Bulgularda dikkati çeken önemli bir nokta ise reel döviz kurunun yükselen piyasa ekonomileri üzerinde geleneksel görüşe ters olan etkisidir. Bulgulara göre ülke parasının değer kaybetmesi ekonomik görünümü hem uzun vadede hem de kısa vadede olumsuz etkilemektedir. Döviz kuru ile ekonomik performans arasındaki ilişkiye yönelik iki türlü teori bulunmaktadır. Geleneksel teoriye, diğer bir deyişle

Mundell-Fleming modeline, göre ülke parasının değer kaybetmesi harcama kaydırtıcı ve ticaret dengesine yönelik olumlu etkileri. nedeniyle ekonomi üzerinde genişletici etkiye sahiptirler. Buna rağmen, yükselen piyasa ekonomilerinde 1990'larda yaşanan finansal krizler göstermiştir ki ülke parasının değer kaybetmesinin daraltıcı etkileri bulunmaktadır. Ülke parasının değer kaybetmesinin daraltıcı etkisinin altında yatan temel neden bu ülkelerdeki sorunlu bilançolar ve buna bağlı olarak kırılgan finansal piyasalardır. Bu nedenle, yükselen piyasa ekonomilerinde paranın değer kaybetmesinin olumsuz etkilerinin olumlu etkilerinden çok daha güçlü olduğu görülmüştür. Bu çalışmanın sonuçları da bu görüşü destekler niteliktedir.

Gelişmiş ülkelerin iş çevrimleri için de hem kısa vadede hem uzun vadede ABD'deki dalgalanmaların, diğer bir deyişle ortak küresel şokların ana etken olduğu ortaya çıkmaktadır. Diğer taraftan, yatırımcıların finansal piyasalarda yaşanan aşırı dalgalanmalarda güvenli liman olarak gördükleri gelişmiş ülkelere yatırımlarını kaydırmaları nedeniyle, VIX ile ölçülen küresel finansal piyasalarda yaşanan oynaklık, beklentilerin tersine, gelişmiş ülke ekonomilerine katkıda bulunmaktadır. İç değişkenler göz önünde bulundurulduğunda, yükselen piyasa ekonomilerinden farklı olarak reel faizlerin kısa ve uzun dönemde etkili olduğu sonucuna varılmıştır. Reel döviz kuru etkisini gelişmiş ülkeler açısından da incelemek amacıyla sadece döviz kurunun ve dış etkenlerin dahil edildiği bir model daha tahmin edilmiştir. Sonuç olarak, geleneksel görüşü destekler nitelikte gelişmiş ülke ekonomilerinde ülke parasının değer kaybetmesinin genişletici etkisi olduğu görülmüştür. Bu bulgulara ek olarak, yükselen piyasa ekonomilerinin bir şoktan sonra tekrar dengeye ulaşması yaklaşık olarak beş dönem alırken, gelişmiş ülke ekonomileri için ise dengeye ulaşma süresi yaklaşık üç dönem olarak hesaplanmıştır. Reel döviz kurunun ve reel faiz oranlarının iki ülke grubu iş çevrimleri üzerinde farklı etkilerinin bulunması ve iki ülke grubunun dengeye gelme sürelerinin farklılığı göz önünde bulundurulduğunda geliştirilmesi gereken istikrar politikalarının da farklı olması sonucu ortaya çıkmaktadır.

Önceki bulguların sağlamlılığını test etmek ve kesitlerin birbirlerine bağımlılığını kontrol almak amacıyla iş çevrimlerinin etkenlerini belirlemede ikinci olarak Pesaran (2006) tarafından geliştirilen karma ortalama grup tahmin yöntemi uygulanmıştır. Önceki panel veri tahminlerinde kesitlerin birbirlerinden bağımsız olduğu kabul edilmiştir. Ancak, bilindiği üzere ülke grupları arasında olan ihmal edilen ortak etkenler, sosyo ekonomik bağlantılar, finansal bütünleşme ve ticaret

bağlantıları nedeniyle bu varsayım ülke kesit çalışmalarında sağlanamamaktadır. Pesaran (2006) çalışmasında kesit ortalamalarının modele dahil edilerek kesitlerin bağımlılığının kontrol edileceğini ve tutarlı ve asimtotik sonuçlar elde edileceğini önermiştir. Bu nedenlerle, Pesaran'ın (2006) karma ortalama grup tahmin yöntemi kullanılmıştır. Karma ortalama grup tahmin yöntemi bulguları önceki bulgular ile örtüşmektedir. Sonuçlara göre ülke kesit değişkenlerinin ortalamaları modele dahil edildiğinde ABD iş çevrimleri ile temsil edilen küresel faktörün etkisi anlamsız hale gelmiştir. Diğer taraftan, iş çevrimlerinin ortalama değişkeninin hem yükselen piyasa ekonomileri hem de gelişmiş ülke gruplarında çok güçlü etkisi olduğu sonucuna varılmıştır. Elde edilen sonuçlar ihmal edilen ortak etkenlerin, sosyo ekonomik bağlantıların, finansal bütünleşme ve ticaret bağlantılarının iş çevrimleri üzerinde oldukça önemli rolü olduğunu ortaya koymaktadır. Böylece, karma ortalama grup tahmin yöntemi ortak şokların etkisinin hafife alındığı göstermiştir. Buna ek olarak, hem kesit bağımlılığının kontrol edildiği hem de edilmediği durumlarda iki ülke grubu iş çevrimlerinin iç dinamiklerinin farklı olduğu sonucu güçlenmiştir.

Daha sonra, potansiyel eşzamanlılık ve buna bağlı olarak içsellik sorununu kontrol etmek amacıyla Arelleno ve Bond (1991) tarafından geliştirilen dinamik panel genelleştirilmiş momentler yöntemi uygulanmıştır. Bilindiği gibi makro iktisatta değişkenlerin içsellik sorunu önemli bir tartışma konusudur. Arelleno ve Bond (1991) tarafından geliştirilen bu model değişkenlerin içsellik sorununu çözerek modeli tahmin etmeye imkan sağlamaktadır. Genelleştirilmiş momentler yöntemi sonuçları yükselen piyasa ekonomileri iş çevrimleri açısından önceki tahminlere benzer sonuçlar sunmuştur. Ancak, gelişmiş ülke iş çevrimleri için yapılan tahminlerde reel faiz oranının istatistiki olarak anlamlı etkisinin kaybolduğu görülmüştür. Böylece reel faiz oranları için içsellik sorunu bulunduğu ortaya çıkmıştır.

2000'lerin başından bu yana ticaret alanında geliştirdiği reformlar sonucunda Çin ekonomisinin küresel ekonomide önemli bir yeri olmaya başlamıştır. Bir çok araştırmacı tarafında Çin ekonomisinin bu derece güçlenmesi ekonomik açıdan son on yılın en önemli gelişmesidir. Bununla birlikte Çin ekonomisine ilişkin yeterli verinin bulunmaması nedeniyle Çin ekonomisinin önemini ampirik olarak inceleyen çalışmalar yetersizdir. Bu çerçevede, Abeysinghe ve Rajaguru'nun (2004) oluşturduğu üç aylık GSYİH serileri kullanılarak Hodrick-Prescott filtrelemesi ile iş çevrimleri serileri oluşturulmuş, diğer bir dış etken olarak modele dahil edilmiş ve

panel ARDL yöntemi ile diğer ülke iş çevrimleri üzerindeki kısa ve uzun dönemli etkisi araştırılmıştır. Bu bölümün en önemli sonucu Çin çevrimlerinin hem yükselen piyasa ekonomileri hem de gelişmiş ülke ekonomileri iş çevrimlerinin önemli bir etkeni olduğudur. Diğer taraftan, Çin çevrimlerinin modele dahil edilmesi ABD çevrimlerinin etkisini göreceli olarak azaltmakla birlikte önceki bulguları değiştirmemiştir. Sonuç olarak, küresel ortak şokların iş çevrimlerinin ana etkeni olduğu desteklenmiştir.

İş çevrimlerinin belirleyicilerinin incelendiği son bölümde etkenlerin döviz kuru rejimi seçimlerine göre farklılık gösterip göstemediği araştırılmıştır. Literatürde, ekonomik performans ve döviz kuru rejimi seçimi arasında bağlantı kesin bir sonuca ulaşılamamıştır. Bir taraftan, dalgalı döviz kur rejimlerinin şok emici rolünü üstlenerek ekonomik büyümeye katkıda bulundukları iddia edilmektedir[7]. Diğer taraftan ise sabit döviz kuru rejimlerinin yatırımcılar için politik güven sağladığı ve yatırımı destekleyerek ekonomik büyümeyi teşvik ettiği görüşü hâkimdir[8]. Bu tartışmaya katkıda bulunmak amacıyla iş çevrimlerinin belirleyicilerinin etkisinin döviz kuru rejimlerine bağlı olarak değişip değişmediği incelenmiştir. Önceden belirtildiği gibi döviz kurunun iş çevrimleri üzerindeki etkisi iki ülke grubuna göre farklılık göstermektedir. Bu nedenle, iş çevrimlerinin etkenlerinin döviz kuru rejimlerine bağlı olarak incelenmesi bu bulguya da farklı bir bakış açısı getirebileceği düşünülmüştür. Bu bağlamda, Iltzetzki, Reinhart ve Rogoff'un (2009) çalışmasında yer alan döviz kuru rejimi sınıflandırmalarına ilişkin veri seti kullanılmış; sınıflandırma derecesi 3'ün altında bulunanlar dalgalı olmayan döviz kuru rejimi, sınıflandırma derecesi 3 ve 3'ün üstüne bulunanlar ise dalgalı döviz kuru rejimi olarak kabul edilmiştir.

İç ve dış etkenlerin iş çevrimleri üzerindeki etkinlerinin döviz kuru rejimlerine göre panel ARDL yöntemi kullanılarak tahmin edilmiştir. Dalgalı döviz kuru rejimlerinin göz önünde bulundurularak elde edilen sonuçların hem yükselen piyasa ekonomileri hem de gelişmiş ülke ekonomileri açısından önceki sonuçlardan farklı olmadığı tespit edilmiştir. Dalgalı döviz kuru rejimi altındaki yükselen piyasa ekonomileri incelendiğinde önceki sonuçlara paralel olarak ülke parasının değer kaybetmesinin daraltıcı etkisi olduğu sonucuna varılmıştır. Dalgalı döviz kuru

[7] Levy-Yeyati ve Sturzenner (2003), Edwards ve Levy-Yeyati (2005) ve Reinhart ve Rogoff (2004).

[8] Ghosh vd. (1996), Artis ve Zhang (1999).

tahminlerinde ön plana çıkan bulgu bir şoktan sonra ekonominin dengeye yakınsaması süresinin önceki bulgulara göre kısaldığıdır. Böylece, dalgalı döviz kuru rejimlerinin olumsuz şokların etkisini azalttığı tespit edilmiş, diğer bir deyişle şok emici rolü oynadığı iddiası desteklenmiştir.

Dalgalı olmayan döviz kuru rejimleri alınarak iş çevrimlerinin belirleyicilerinin analizinde ise farklı bir görüntü ortaya çıkmıştır. İlk olarak dikkat çeken bulgu yükselen piyasa ekonomileri iş çevrimleri için hem uzun hem de kısa vadede reel faiz oranının istatistiki olarak anlamlı hale gelmesidir. Önceki analizlerde reel faiz oranı sadece gelişmiş ülke ekonomileri çevrimleri için anlamlı bulunmuştu. Buna ek olarak, yükselen piyasa ekonomilerinde, reel döviz kurunun daraltıcı etkisinin anlamlı olarak uzun dönemde devam ettiği kabul edilse de, önceki analizlerden farklı olarak, kısa dönem ilişkide iş çevrimleri üzerindeki anlamlı etkisi olduğu tespit edilememiştir. Yükselen piyasa ekonomilerine ilişkin sonuçlar göstermiştir ki dalgalı olmayan döviz kuru rejimlerinde para otoritelerinin döviz kuru çapasını korumak amacıyla reel faiz oranlarını etkin bir şekilde kullanmaları gerektiğinden, bu değişkenin iş çevrimleri üzerinde etkili olmaya başladığıdır. Gelişmiş ülke sonuçları incelendiğinde görülmüştür ki, önceki bulgulara ters olarak, reel faiz oranının uzun dönemde etkili olduğu ama kısa dönemde anlamlı bir etkisinin bulunmadığıdır. Buna ek olarak, döviz kurunun, dalgalı olmayan döviz kuru rejimi altındaki gelişmiş ülke iş çevrimlerinde genişletici etkisi olduğu tespit edilmiştir. Böylece, hem döviz kuru rejimlerinin kontrol edildiği hem de edilmediği durumlarda her ne kadar ortak küresel şoklar iş çevrimlerinin öncü etkeni olsa da, iki ülke grubuna göre iş çevrimleri belirleyicilerinin farklılık gösterdiği ve bu nedenle farklı uygun politikalar geliştirilmesi gerektiği sonucuna varılmıştır. Yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimlerinin hem iç hem de dış belirleyicilerinin analiz edildiği bu bölüme genel olarak baktığımızda ortak küresel şokların her iki ülke grubu çevrimleri açısından öncü etken olduğu ancak iç dinamiklerin oldukça farklı seyrettiği tespit edilmiştir.

İç ve dış faktörlerin yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimleri üzerindeki etkisi araştırıldıktan sonra, iki ülke grubu dalgalanmaları arasındaki ilişkinin zamanla değişip değişmediğinin incelenmesi amaçlanmıştır. Son üç on yılda yükselen piyasa ekonomileri ile gelişmiş ülke ekonomileri arasındaki finansal ve ticari bağlantılar oldukça güçlenmiştir. Bu yeni koşullar iş çevrimleri senkronizasyonu konusunu gündeme getirmiştir ve birçok

çalışma iş çevrimlerinin birlikteliğine ve ayrımına odaklanmıştır. Bu çalışmada, iş çevrimlerinin senkronizasyonu yıllık veri kullanılarak statik faktör analizi ile araştırılmıştır. Faktör analizi ile elde edilen ortak faktörlerin hem yükselen piyasa ekonomileri hem de gelişmiş ülke ekonomileri çevrimleri üzerindeki etkisinin küreselleşme ile değişip değişmediği analiz edilmiştir. Analizler iki zaman diliminde gerçekleştirilmiştir: küreselleşmenin birinci evresi diye adlandırılan 1970-1989 yılları ve küreselleşmenin ikinci evresi olarak kabul edilen 1990-2009 dönemi. Ayrıca, kullanılan veri seti 21 yükselen piyasa ekonomisi ve 23 gelişmiş ülke ekonomisini içermektedir.

Yükselen piyasa ekonomileri ile gelişmiş ülke ekonomileri iş çevrimlerinin ortak hareketini araştırmak için faktör analizinin tercih edilmesinin birkaç nedeni bulunmaktadır. İlk olarak, faktör modelleri gözlemlenemeyen ortak bileşenlerin gözlemlenen makro-ekonomik zaman serilerinin kovaryansından tanımlanmasını sağlamaktadır. Buna ek olarak, faktör modelleri serbestlik derecesi sorunlarına sebep olmadan çok fazla değişken ile kolayca tahmin edilebilmekte ve yorumlanabilmektedir. Diğer taraftan, Bernanke vd.'nin (2005) çalışmalarında belirttiği gibi faktör modelleri, genel ekonomik görünümün özetini sunmaktadır.

Statik faktör modeli, Hodrick-Prescott filtresi ile yıllık GSYİH serilerinden elde edilen çevrim bileşenleri ile tahmin edilmiştir. Faktör analizinin ilk adımı ortak faktör sayısını belirlemektir. Faktör sayısını belirlemek için literatürde önerilen bir çok yöntem bulunmaktadır. Faktörlerin yükleme matrisi (loading matrix) varimax yöntemi ile ortogonal hale getirilmiş, daha sonra da öz değeri birden büyük ve en büyük değere sahip olan ve toplam değişimin yüzde 51'ini açıkladığı tespit edilen ilk üç faktör iş çevrimlerini en iyi açıklayan ortak faktörler olarak alınmıştır. Daha sonraki adım, seçilen ortak faktörleri etiketlemek daha başka bir deyişle bu ortak faktörlerin neyi temsil ettiğini yorumlamaktır. Faktörleri yorumlamak amacıyla yükleme matrisindeki ülke iş çevrimlerinin katsayıları incelenmiştir. Buna göre, toplam varyansın yüzde 28'ini açıklayan ilk faktörün gelişmiş ülke ortak faktörü olduğu kabul edilmiştir. Ayrıca, sırasıyla ikinci ortak faktör Asya ülkeleri ortak faktörü, üçüncü ortak faktör ise Latin Amerika ortak faktörü olarak adlandırılmıştır. Buna ek olarak, faktör yüklemeleri grafikleri de bu yorumlamaları desteklemektedir.

İş çevrimlerinin ortak faktörlerinin tanımlanmasından sonra sabit etki dengelenmiş panel veri yöntemi ile bu faktörlerin yükselen piyasa ekonomileri, gelişmiş ülke ekonomileri, Asya ülkeleri ve Latin Amerika ülkeleri iş çevrimleri

üzerindeki etkisinin zamanla değişip değişmediği araştırılmıştır. Özellikle bu çalışmada odaklanılan nokta yükselen piyasa ekonomileri iş çevrimlerinin gelişmiş ülke ortak faktöründen etkilenme derecesinin küreselleşmenin birinci dönemi ve ikinci döneminde anlamlı bir şekilde değişip değişmediğidir.

Bulgulara göre, ticaret ve finansal bağlantıların güçlü olmadığı küreselleşmenin ilk döneminde (1970-1989) gelişmiş ülke ortak faktörünün yükselen piyasa ekonomileri iş çevrimleri üzerinde istatistiki olarak etkisi olmadığı tespit edilmiştir. Buna ek olarak, sözkonusu dönemde gelişmiş ülke ortak faktörünün Latin Amerika ülkeleri iş çevrimleri üzerinde de etkili olmadığı ancak Asya ülkeleri iş çevrimleri açısından anlamlı etkisinin bulunduğu sonucuna varılmıştır. Finansal ve ticari bağlantıların güçlendiği 1990 ve 2009 yılları arasında ise gelişmiş ülke faktörü, yükselen piyasa ekonomileri ve Latin Amerika ülkeleri iş çevrimlerini pozitif ve anlamlı etkilemeye başlamıştır. Diğer taraftan, beklentilerin tersine gelişmiş ülke ortak faktörü bu dönemde Asya ülkeleri iş çevrimleri üzerindeki anlamlı etkisini kaybetmiştir. Bu bulgunun altında yatan neden, 1997 yılında Asya krizinden sonra bu ülkelerin diğer yükselen piyasa ekonomilerine kıyasla daha fazla ekonomik istikrar sağlamaları olabilir. Bu bulgulara ek olarak her iki dönemde de bölgesel ortak faktörlerin, Asya ve Latin Amerika ülkeleri ortak faktörü, diğer bölge iş çevrimleri üzerinde anlamlı etkisi bulunamamıştır. Kısaca özetlemek gerekirse, küreselleşmenin ikinci döneminde yükselen piyasa ekonomilerinin gelişmiş ülke ortak faktörüne karşı daha bağımlı hale geldiği sonucuna ulaşılmıştır. Böylece bulguların, iki ülke grubu iş çevrimleri ilişkisinde birliktelik (coupling) hipotezini desteklediği görülmektedir.

Farklı döviz kuru rejimleri göz önüne alınarak yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimleri arasındaki senkronizasyon araştırılarak literatüre bu konuda da katkı sağlanması amaçlanmıştır. İş çevrimlerinin belirleyicilerinin döviz kuru rejimlerine göre araştırıldığı bölüme benzer olarak Iltzetzki, Reinhart ve Rogoff'un (2009) çalışmasında yer alan döviz kuru rejimi sınıflandırmaları dikkate alınmış; sınıflandırma derecesi 3'ün altında bulunanlar dalgalı olmayan döviz kuru rejimi, sınıflandırma derecesi 3 ve 3'ün üstüne bulunanlar ise dalgalı döviz kuru rejimi olarak kabul edilmiştir. Ortak faktörlerin iş çevrimleri üzerindeki etkisi küreselleşmenin birinci (1970-1989) ve küreselleşmenin ikinci dönemlerinde (1990-2009) dalgalı ve dalgalı olmayan döviz kuru rejimleri dikkate alınarak sabit etki panel veri yöntemi ile tahmin edilmiştir.

Farklı döviz kuru rejimleri altında iş çevrimlerinin ortak hareketlerinin analiz etmemizin iki nedeni bulunmaktadır. İlk olarak, iş çevrimlerinin senkronizasyonu bulgularının sağlamlığını test etmektir. İkinci olarak da, iş çevrimleri arasındaki bağlantının alt nedenlerine açıklık getirmektir. Buna ek olarak, döviz kuru rejimleri ile ekonomik performans arasındaki ilişkiye yönelik tartışmalar literatürde bir sonuca bağlanamamıştır. Dalgalı kur rejimlerinin olumsuz şokların etkisinin azalttığı bu nedenle de ekonomik büyümeyi desteklediğini belirten görüşün yanı sıra, sabit döviz kuru rejimlerinin ekonomideki belirsizliği azalttığı ve böylece yatırımı artırarak ekonomik büyümeye katkı sağladığını iddia eden görüş de mevcuttur.

Tüm zaman dilimi (1970-2009) için yapılan analiz bulguları hem dalgalı döviz kuru hem de dalgalı olmayan döviz kuru rejimleri altında ortak faktörlerin yükselen piyasa ekonomileri iş çevrimleri üzerindeki etkisinin benzer olduğunu göstermiştir. Küreselleşmenin birinci dönemi olarak adlandırılan 1970-1989 yılları arasında ise ortak faktörler ile iş çevrimleri arasındaki bağlantıya ilişkin sonuçlar karışık sinyaller vermektedir. Söz konusu dönemde dalgalı döviz kuru rejimleri altında gelişmiş ülke ortak faktörünün yükselen piyasa ekonomileri, Asya ülkeleri ve Latin Amerika ülkeleri iş çevrimleri üzerinde etkisinin bulunmadığı sonucuna varılmıştır. Diğer taraftan, dalgalı olmayan döviz kuru rejimleri altında ise gelişmiş ülke ortak faktörünün yükselen piyasa ekonomileri iş çevrimlerini olumlu etkilediği tespit edilmiştir.

Finansal bütünleşmenin ve ticari bağlantıların arttığı 1990-2009 yılları arası dönem dikkate alındığında tahmin sonuçları gelişmiş ülke ortak faktörünün, her ülke grubu iş çevrimleri için güçlü bir etken olmaya başladığını göstermektedir. 1970-1989 dönemi için sonuçlar net bir yorum yapmaya olanak tanımazken, 1990-2009 yıllarında gelişmiş ülke ortak faktörünün yükselen piyasa ekonomileri iş çevrimlerini her döviz kuru rejimi altında güçlü bir şekilde etkilemesi, söz konusu ülke iş çevrimlerinin, döviz kuru rejimi seçiminden bağımsız olarak gelişmiş ülke ekonomilerine daha bağımlı hale geldiğini göstermekte ve birliktelik hipotezi lehine delil sunmaktadır. Sonuç olarak, yükselen piyasa ekonomileri küreselleşmenin ikinci döneminde hangi döviz kuru rejimini kullanırsa kullansın gelişmiş ülkelere daha bağımlı hale gelmiştir.

Yükselen piyasa ekonomileri ve gelişmiş ülke ekonomileri iş çevrimleri arasındaki ortak hareket ülkelerin finansal bütünleşme değerlerine göre de araştırılmıştır. Bilindiği gibi, 1980'lerin ortalarından bu yana ülkeler arası finansal

bağlantıların artması iş çevrimlerinin birbirine yakınsaması ya da ayrışmasının altında yatan temel nedenlerden biri olarak kabul edilmektedir. Entegre olmuş finansal piyasaların ekonomik büyümeye katkısı yönünde literatürde iki karşıt görüş hâkimdir. İlk olarak, iyi işleyen finansal piyasaların ekonomiye etnik kaynak sağladığı ve bunun sonucu olarak büyümenin desteklendiğine inanılmaktadır[9]. İkinci olarak bazı çalışmalar ise artan finansal bağlantıların ülke ekonomisini daha çok dışarıya bağımlı hale getireceğini ve olumsuz dışsal şoklardan daha fazla etkilenerek ekonomiyi olumsuz etkileyeceğini belirtmişlerdir. Buna ek olarak, finansal piyasaların gelişmesi kaynak aktarımını arttırarak tasarruf oranını azaltabilmekte bu da yatırımı olumsuz etkileyerek ekonomiye zarar verebilmektedir. Bu bağlamda, ortak faktörlerin iş çevrimleri üzerindeki etkisinin finansal bütünleşme seviyesine ve zamana göre değişip değişmediği incelenmiştir.

Finansal bütünleşme ölçütünün hesaplanmasında Lane ve Milesi-Feretti'nin (2003) ve Lane ve Milesi-Feretti'nin (2007) çalışmaları ve veri seti temel alınmıştır. Ülkelerin finansal bütünleşme seviyesini kategorize etmek için sabit bir eşik belirlemek, eşiğin de zamanla değişmesi gerektiğinden, mümkün değildir. Bu nedenle, her yıl için ülkeler bazında çeyrek dilimlikler hesaplanmıştır. Buna göre, ilk çeyrek dilimden küçük finansal bütünleşme değerine sahip olan ülkeler az finansal bütünleşik, birinci ve dördünce çeyrek arasında ölçüte sahip olan ülkeler orta derece finansal bütünleşik ve dördüncü çeyrekten büyük ölçütü bulunanlar yüksek derecede finansal bütünleşik ülkeler olarak sınıflandırılmıştır. Tasarlanan finansal bütünleşik kategorilerine göre ortak etkenler iş çevrimleri üzerindeki etkisi 1970-1989 ve 1990-2009 dönemleri arasında analiz edilmiştir.

Az derece finansal bütünleşik ülkeler dikkate alındığında küreselleşmenin birinci dönemi olarak kabul edilen 1970-1989 döneminde gelişmiş ülkeler ortak faktörünün bu ülkelerin iş çevrimleri üzerinde etkisi bulunmadığı tespit edilmiştir. Orta ve yüksek derecede finansal bütünleşik ülkeler incelendiğinde ise gelişmiş ülke ortak faktörünün bu ülkelerin iş çevrimlerini hem 1970-1989 hem de 1990-2009 dönemlerinde pozitif ve anlamlı etkilediği sonucuna varılmıştır. Diğer taraftan, küreselleşmenin ikinci yarısı olan 1990-2009 döneminde az derece finansal bütünleşik ülke iş çevrimleri de gelişmiş ülke ortak faktöründen pozitif ve anlamlı

[9] Frankel ve Rose (1998), Kose vd. (2003b) ve Imbs (2006)

olarak etkilenmeye başlamıştır. Netice olarak, finansal bütünleşik derecesinin yükselmesi iş çevrimlerinin ortak faktörlerden etkilenme derecesini de arttırmaktadır.

Yükselen piyasa ekonomilerinin finansal bütünleşik dereceleri göz önünde bulundurulduğunda bulguların karışık sinyaller verdiği görülmüştür. Finansal ve ticari bağlantıların arttığı 1990-2009 döneminde gelişmiş ülke ekonomileri ortak faktörünün finansal bütünleşme derecesine bağlı olmadan tüm yükselen piyasa ekonomileri iş çevrimlerini pozitif ve anlamlı etkilediği tespit edilmiştir. 1970- 1989 dönemi dikkate alındığında ise herhangi bir finansal bütünleşme derecesine sahip yükselen piyasa ekonomileri iş çevrimlerinin gelişmiş ülke ortak faktöründen etkilenmediği tespit edilmiştir. 1990-2009 döneminde gelişmiş ülke ortak faktörünün herhangi bir finansal bütünleşme derecesine sahip olan ülkelerin makroekonomik dalgalanmaları için anlamlı hale gelmesi, finansal bütünleşme derecesine bağlı olmadan söz konusu dönemdeki konjonktürün yükselen piyasa ekonomilerinin bu ortak faktöre daha bağımlı hale geldiğini göstermektedir. Her ne kadar finansal bütünleşme derecesi iş çevrimleri arasındaki senkronizasyonun ana nedeni olarak kabul edilse de, iki ülke grubu iş çevrimlerinin yaklaşmasının bu dönemdeki ekonomik gelişmelerden kaynakladığı sonucuna varılmıştır.

Son olarak, faktör analizinden elde edilen ortak faktörlerin hem gelişmiş ülkelerin hem de yükselen piyasa ekonomilerinin iş çevrimleri üzerindeki etkisinin değişip değişmediği panel veride periyodik ilerleyen pencereler yöntemi (Rolling window analysis) ile araştırılmıştır. Periyodik ilerleyen pencereler yöntemi değişkenler arasındaki ilişkinin değişmezliğinin ve öngörüde doğruluğunun test edilmesinde kullanılmaktadır. Bu çalışmada değişmezlik testinden daha ziyade, periyodik ilerleyen pencereler yönteminin kullanılmasındaki ana neden, herhangi bir ülke grubundaki makroekonomik dalgalanmaların gelişmiş ülke ortak faktöründen ve diğer ortak faktörlerden etkilenme derecesinin zaman içinde farklılaşıp farklılaşmadığının incelenmesidir. Bu nedenle, 15 yıl pencere aralığı olarak alınmış ve periyodik ilerleyen pencereler kullanılarak panel veri tahminleri yapılmıştır. Sonuçlar katsayı grafiklerinde sunulmuştur. Sonuçlara göre, tüm ülkeler için gelişmiş ülke ortak faktörünün iş çevrimleri üzerindeki etkisi 1990 sonrasında yaklaşık olarak yüzde 15 yükselmiştir. Yükselen piyasa ekonomileri iş çevrimleri dikkate alındığında görülmüştür ki gelişmiş ülkeler ortak faktörünün etkisi 1995-2009 döneminde yaklaşık yüzde 79 yükselmiştir. Diğer taraftan, ortalama olarak gelişmiş ülke ortak faktörünün etkisi yüzde 11 ikinci dönemde artmıştır. Bulgular önceki sonuçları

desteklemekte ve yükselen piyasa ekonomilerinin gelişmiş ülke ekonomilerine daha bağımlı hale geldiğini göstermektedir. Özetle, iş çevrimlerinin yakınsamasını inceleyen son ampirik bölümde ortaya çıkan ana sonuç yükselen piyasa ekonomilerinin gelişmiş ülke ekonomilerine daha bağımlı hale geldiğidir, böylece birliktelik hipotezi desteklenmiştir.

Bu çalışma esas olarak, yükselen piyasa ekonomilerinde iş çevrimlerinin iç ve dış kaynaklarını araştırmakta olup, bu çevrimlerin gelişmiş ülkelerdekilerden nasıl farklılık gösterdiği sorusunu cevaplamayı amaçlamıştır. Buna ek olarak bu çalışma, her iki gruptaki ülkeler arası iş çevrimlerinin zaman içerisinde birbirlerine yakınsayıp yakınsamadığı konusunu da incelemiştir. Son zamanlara, başka bir deyişle 2008 yılı Ağustos ayı ve 2011 Ağustos ayı küresel krizlerine kadar gelişmiş ülkelerin birçoğu son 10 yıl için daha yüksek büyüme ve daha az enflasyon oranlarını yakalamayı başarmıştır. Bu durum söz konusu olumlu ekonomik manzaranın iç reformlardan mı yoksa uygun dış faktörlerden mi kaynaklandığı konusunda çelişki oluşturmaktadır. Diğer taraftan, artan ticari ve finansal bağlantılar, yükselen piyasa ekonomilerini dış şoklara karşı daha savunmasız hale getirmektedir. Ancak, yükselen piyasa ekonomileri, 2008 yılında meydana gelen küresel ekonomik krizden daha az etkilenmiş görünmektedir ki bu da tartışılması gereken bir başka konudur. Bu tartışmalar yükselen piyasa ekonomilerinde ve gelişmiş ülkelerde iş çevrimlerinin çalışma konusuna dikkat çekmektedir.

Bu çalışmanın ana sonucu şu şekilde özetlenebilir: Kürsel ortak şoklar yükselen piyasa ekonomilerindeki makroekonomik dalgalanmaların öncü kaynağıdır ve son 20 yılda bu ekonomilerdeki dalgalanmalar, gelişmiş ülkelerdeki dalgalanmalara daha bağımlı olmaya başlamışlardır. Son 20 yılda, yükselen piyasa ekonomileri, küresel ekonominin önemli bir katılımcısı olmuştur ve son dönem finansal krizlerin negatif etkilerine karşı daha güçlü görünüm sağlamışlardır. Buna rağmen, sonuçlara göre, bu ekonomiler hala dış şoklara karşı savunmasızdırlar. Diğer taraftan, sonuçlar şunu da belirtmektedir ki; her ne kadar hem yükselen piyasa ekonomilerindeki ve hem de gelişmiş ülkelerdeki iş çevrimlerinin ana etkeni ortak küresel şoklar olsa da iç etkenler iki ülke grubunda farklılık göstermektedir. Bu yüzden, olumsuz dış şokları azaltmak ve pozitif şokların etkisini güçlendirmek amacıyla yükselen piyasa ekonomilerinde ve gelişmiş ülkelerde farklı istikrar politikaları uygulanmalıdır. Yükselen piyasa ekonomilerindeki iş çevrimleri üzerine yapılacak gelecek araştırmaların, son zamanlarda yaşanan küresel krizin yükselen

piyasa ekonomilerine ve gelişmiş ülke ekonomilerine olan farklı etkilerinden ötürü, iş çevrimlerinin hem belirleyicileri hem de senkronizasyonu açısından Ağustos 2011 tarihinde yaşanan son krizin etkileri üzerinde odaklanması gerektiği düşünülmektedir.