GCC Monetary Union
Prospective Effects on Trade and Economic Growth

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ABSTRACT

This thesis empirically investigates two important aspects of the benefits of currency (monetary) union – the beneficial impact of eliminating exchange rate volatility on trade and the possibility of consequent economic growth – in the context of the Gulf Cooperation Council (GCC) countries. Researchers on the GCC monetary union have mostly been busy in analyzing the viability of the proposed GCC monetary union and they focus on convergence criteria. In contrast to those studies, empirical estimates obtained in this study would provide valuable information to the policy makers who have been working towards the realization of the GCC monetary union. As such this study provides significant contribution to the literature of the GCC monetary union. Chapter 2 thoroughly reviews the optimum currency areas (OCA) literature (both theoretical and empirical) starting with the theories advocated by the pioneers of the OCA. Literature on the European Monetary Union (EMU), monetary unions and integration from African, Latin America, Asian and the prospects from the GCC countries are also reviewed. Chapter 3 empirically investigates convergence criteria and shock synchronization of the GCC countries. Results show positive correlation of the structural shocks (synchronized shocks) among the countries except Qatar. Chapter 4 estimates the impact of exchange rate volatility on bilateral trade between the GCC countries. Results obtained using the panel Generalized Method of Moments (GMM) estimator indicates that the bilateral trade among the GCC countries will increase about 6.2 – 8.7 percent (depending on the volatility measure used) with the elimination of the exchange rate volatility. In the second part of the chapter 4 discusses the role of trade on economic growth (income) of a country and estimates the impact of trade on per capita growth rates of the GCC countries. Results based on the preferred sample period and using the panel GMM estimator indicate that a one-standard deviation increase in the trade (or openness) ratio would increase the growth rate per capita on impact by 2 – 3%. Based on these results we may conclude that the monetary union of the GCC countries would enhance trade which in turn would promote economic growth of the region.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION OF RESEARCH

The Bretton Woods fixed exchange rate system failed mainly because countries could not use monetary policy to reach internal and external balance; moreover, countries were forced to import inflation from abroad. However, the alternative flexible exchange rate system that restores monetary policy autonomy is not without problems. Central banks may pursue overexpansionary monetary policy that may result in an inflation spiral and its unpredictability may harm international trade and investment. In other words, both systems have merits and demerits. The theory of optimum currency areas (OCA) originated from the long-standing debate about the merits and demerits of the two exchange rate systems (Ishiyama, 1975).

The theory of OCA, pioneered by Mundell (1961), Mckinnon (1963) and Kenen (1969), proposes abolishing the national currencies of an area consisting of more than one country and the area operates under a single currency; and once it is achieved the area becomes a monetary union which is one of the final stages of economic integration. Countries can benefit from joining a monetary union through the elimination of transaction costs (costs of exchanging one currency into another) and the elimination of exchange rate variability that would stimulate investment, trade and economic growth. These benefits are compared with the costs which are essentially the loss of monetary independence.

It is not clear, however, to what extent countries that have joined a monetary union have been motivated by the cost-benefit analysis. It appears that countries have often been motivated by other factors than those stressed by the theory of optimum currency areas. Many countries have been motivated to enter into a monetary union primarily because this would allow them to achieve overall macroeconomic stability. For instance, countries in West Africa with a history of high inflation have used the entry into the monetary union (the West African Economic and Monetary Union, WAEMU) as an institutional device to commit to a lower inflation which West African countries were unable to do on their own. This idea, incorporated in the 'new theory of optimum currency areas,' has created a large literature on how a monetary union can help countries to commit themselves to low inflation (see, for example, Tavlas (1993), Masson and Pattillo (2004), and Edwards (2006) among others). Another motivation for entering a monetary union has been cited as political. For example, Buiter (2008) suggests that governments of countries such as France and Germany have been motivated mainly by political objectives in their decision to initiate the process towards monetary union in Europe.

Negotiating and attaining favorable trading arrangements are cited another motive for joining a monetary union. It is argued that entry into a monetary union could help in negotiating favorable trading arrangements either globally with the World Trade Organization or bilaterally, for example, with the European Union and the United States (Masson and Pattillo, 2004; and ALKholifey and Alreshan, 2010).

The Gulf Cooperation Council (GCC) consists of six Gulf countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). The GCC was

formed in 1981 with a common objective of coordination, integration and inter-connection among the member countries in all areas of finance, trade, customs, tourism, legislation, and administration in order to achieve unity according to the Article 4 of the GCC Charter. Economic cooperation is considered as one of the main pillars of the joint work in the GCC. Member states are aiming for economic integration by adopting a comprehensive framework for economic cooperation such as the single currency, setting up free trade zones in 1983, customs union in 2003, common market in 2008 and working towards a monetary union supposed to be implemented by 2010. In the meantime, Oman and the UAE decided not to join the union from the beginning. Though the GCC monetary union is not established yet, the plan to establish it (with four remaining members) in future remains active and the intent is shown by appointing the head of the GCC monetary council and the executive directors in 2012 by the Supreme Council of the GCC.

The project of the monetary union among the GCC countries arises naturally from the similarities of their economies' structures and shared economic backgrounds, as well as on a common language, culture and political history. Arabic is the official language across the entire Peninsula. The preponderant role of oil and gas in the Gross Domestic Product (GDP) of these countries, the youthfulness of their development, the level of their per capita GDP, the predominance of the dollar on the revenue side in their balance of payments and their budgets facilitate creating a successful monetary union.

However, member states are different in size, financial resources, and population. The economies of the member states are essentially oriented towards the outside world for both their exports and their imports. Oil and gas endowment differs greatly among the

member countries and oil reserves will exhaust soon in some countries and in the distant future in others. Some countries have started to diversify their economies, focusing in particular on manufacturing, banking and trade. Financial markets are developed in a few member states and less so in others. These differences will have to be taken into consideration when envisaging monetary union.

The roadmap for achieving monetary and economic union among member countries, including currency unification, requires member countries to undertake a number of tasks in accordance with a specified timetable. These include the achievement of a high level of harmonization among member countries in all macroeconomic and structural policies, especially fiscal and monetary policies, banking legislation, setting criteria to approximate rates of budget deficit, public debt, interest rates, and inflation.

During the first three decades of the GCC existence, member countries have succeeded in developing their economic ties to bring them closer to full economic integration and economic unity (Sturmand and Siegfried, 2005; Hebous, 2006; Khan, 2009; and Espinoza, Prasad and Williams, 2010). The Supreme Council of the GCC adopted several resolutions in the economic field that pushed for joint economic action. The most important resolutions have been those related to the GCC customs union in 2003, adopted convergence criteria with related to fiscal deficit, public debt, inflation, interest rate and reserves in 2005, launched the common market in 2008, established the monetary council in 2009, and in 2012 appointed the Head of the GCC Monetary Council and the Executive Directors.

The situation of the GCC countries, regarding the issues of transition toward monetary union, is significantly different from that of, for example, member countries of

the European Monetary Union and other countries in West Africa. The questions that have been asked and analyzed deal with the necessary macroeconomic convergence prior to the start of monetary union, and with the issue of how to select and to fix the exchange rates at which the old currencies will be converted into a new currency (De Grauwe and Spaventa, 1997; and Begg et al., 1998). This seems not to be the serious issue for the GCC countries. With the history of the effective fixed exchange rates against the US dollar, the GCC countries have never used the exchange rate as an adjustment mechanism. Khan (2009) and Espinoza , Prasad and Williams (2010) have pointed out that the GCC countries have met almost all the convergence criteria and have exhibited a high degree of convergence on many macroeconomic indicators .

Four convergence criteria of low inflation, low interest rates, stable exchange rates and sound public finances were laid down in the Maastricht Treaty (1992) as an essential benchmark for a successful economic and monetary integration in Europe. The economic data of the GCC countries reveal that three out of the four criteria do not seem to constitute any serious problem for GCC countries. Inflation in all six countries is low, and this has been the case for more than two decades. Accordingly, interest rates are also relatively low and move broadly in parallel with the US interest rates.

One of the most remarkable features of this region, however, is exchange rate stability. There is no other comparable group of countries in recent history that has managed to keep their exchange rates as stable vis-a-vis each other as the GCC countries for such a long period of time. However, the magnitude of the deficit/GDP ratios differs among GCC member countries. Not surprisingly, the budget balances are strongly influenced by oil price developments, and thus show a significant degree of co-movement

between world oil price and government budgets of the GCC countries.

The study empirically investigates mainly two widely studied benefits of currency (monetary) union, namely, the positive significant impact of currency union on trade and economic growth, in the context of the proposed GCC monetary union.

1.1.1 Importance of the Study

As discussed and referenced in detail in this dissertation, a lot of research has already been carried out on the GCC monetary union.This has concentrated on the viability of the GCC monetary union and whether these countries meet the convergence criteria laid out in the OCA literature and by the Maastricht treaty. To the best of my knowledge the impact of trade on economic growth and the exchange volatility on trade in the context of the GCC monetary union is not studied. Thus, in contrast to those studies, empirical estimates obtained in this study would provide valuable information to the policy makers who have been working to the realization of the GCC monetary union. As such this study provides significant contribution to the literature of the GCC monetary union.

1.1.2 Methodology of the Research

Addressing specific questions in this dissertation, various forms of evidence such as tables, graphs and econometric techniques are applied to evaluate those questions. As such a wide range of econometric techniques such as convergence test technique, Hodrick-Prescott filter, structural vector autoregressive (SVAR), panel least-squares (LS), panel least-squares fixed effects/dummy variables (LSDV), instrumental

variables/two stage panel least-squares (2SLS), and dynamic panel data (DPD)/panel Generalized Method of Moments (GMM). These methods are used to investigate the existence, strength and stability of macroeconometric equations that characterise the relationships identified in section 1.2 below.

1.2 OBJECTIVE OF THE RESEARCH

After discussing the potential benefits and costs of the GCC monetary union, the study concentrates on estimating the prospective benefits of the GCC monetary union on trade and economic growth of the GCC countries using relevant econometric techniques. In particular, the study examines the following themes in detail:

1. The study examines the economic integration of the GCC countries. That is, the study addresses to which extent the GCC countries meet the pre-conditions to form a monetary union. The state of convergence and integration among the GCC countries for the period 1980 to 2010 is discussed and presented econometric evidence. In particular, we consider the convergence criteria in the areas of exchange rates, inflation rates, interest rates, and growth rates. It also computes cyclical components of macroeconomic series, identifies structural shocks and tests whether shocks are synchronized among the GCC countries. This topic forms the background of the GCC monetary union and helps to asses the next two topics.
2. The study examines the impact of the volatility of exchange rate on bilateral trade in the GCC counties and examines whether the GCC countries with a common currency would trade more.

3. The GCC countries with the proposed monetary union would require to give up their own independent monetary policy which may affect economic growth and income of the each GCC countries. The influence of monetary union on economic growth may take place via trade channel (besides exchange rate channel). The output potentials of countries are boosted by forming a monetary union that stimulates trade. The positive impact of monetary union on trade is now well established. Thus, we take the first link from a monetary union to trade and then from trade to economic growth. We test empirically whether trade (or openness) increases economic growth rates of the GCC countries.

1.3 OUTLINE OF THE THESIS

Chapter 2 surveys the literature on economic and monetary integration and on the OCA theory. It begins with a review of the literature on economic and monetary integration in general. This chapter then reviews the original OCA theory, the new OCA theory and endogeneities of the OCA. A huge number of empirical studies on the OCA have emerged in last decade. Thus, this chapter also reviews the empirical literature on the OCA and monetary union in Europe, the rest of the world, and the GCC region.

Chapter 3 examines the issues of economic integration and how economic integration has developed over time in the GCC countries. The chapter highlights the OCA theory that analyses the pre-conditions for a successful monetary union with a common currency and a common monetary policy among different countries. The question of the extent to which the GCC countries meet the pre-conditions to form a monetary union is addressed in this chapter. Discussions and analysis in chapter 3 are

based on tables, graphs, recently developed convergence test technique developed by Phillips and Sul (2007) and SVAR models popularized by Bayoumi and Eichengreen, (1992). This chapter provides an economic background of the GCC countries that would help to understand and asses our econometric results presented in later chapters. It also helps to differentiate the present study from other studies on the GCC monetary union.

Chapter 4 examines the potential trade benefits of GCC monetary union (that would eliminate the exchange rate) and the possibility of consequent growth effects. The analysis applies the gravity model to the GCC countries to see whether the empirical evidence from other areas is also relevant for GCC countries. We use the standard gravity model and followed the benchmark panel specification for the analysis of aggregate trade similar to that used by Rose (2000). Results are obtained using both panel least squares and autoregressive (LS and AR) and panel generalized method of moments (GMM) / dynamic panel data (DPD) methods. One important qualitative result emerges from the exercise is that for the sample period 1989 – 2010 exchange rate volatility negatively affects the bilateral trade among the GCC countries; this result is in line with those obtained from similar studies focusing on different regions.

Chapter 4 then moves to analyze the consequences of a monetary union on economic growth in each of the GCC countries. The literature identifies two channels, namely, exchange rate and trade channels, through which a monetary union can affect economic growth. By stimulating trade, a monetary union boosts the output potential of countries. Thus, the second part of chapter 4 focuses on the trade channel to examine the impact of trade on output and income. To test the impact of trade (openness) on per capita income of the GCC countries we have followed the panel data specification of

Islam (1995) which is the extension of the cross-section study of Mankiew et al. (1992). The chapter details the econometric problems that arise with the estimation and applies Arellano and Bond's (1991) panel generalized method of moments (GMM) which is considered the most efficient and consistent estimator. We find that there is a significant conditional GCC regional convergence and the convergence is conditional to openness ratio (trade), population growth rate and human investment per capita. We also find that trade enhances economic growth rates of the per capita income of the GCC countries.

A summary of the main findings of study is provided in chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The theory of optimal currency areas (OCA) conceived about a half century ago remains a very lively area of research especially after the apparent success of the European Monetary Union which is considered an application of the OCA theory. Many areas in the world, including the Gulf Cooperation Council (GCC), are now contemplating in forming such areas. In a nutshell, an OCA is the optimal geographical area in which the single currency or the pegged currencies among its members can fluctuate only in unison against the rest of the world. Though the theory of the OCA initiated in the 1960s, research on the subject in the following two decades subsided due to contradictions and other problems inherent in the OCA framework. The rational expectations revolution, time-inconsistency and credibility problems and other developments in monetary economics and the experiences of the European Union provided new impetus on the issues of the OCA and gave rise to a huge literature on the subject. Incorporating new developments to the old OCA gave rise to the new theory of OCA in the early 1990s. In line with the new theory, the recent research on the OCA is mainly focused on the endogeneities of the OCA (that is, sharing a single currency may set in motion forces that would bring countries closer) and empirical evidence. Recently several studies are also conducted on the Middle East and North Africa (MENA) and the GCC countries in determining whether these areas are conducive in forming a currency area.

This chapter surveys the literature on economic and monetary integration and on

the OCA theory. The chapter is organized as follows. The literature on OCA dominates the literature on the theory of monetary integration, which is considered to be a higher form of economic integration. Thus, we start with the review of the literature on economic and monetary integration in section 2.2. The original OCA theory, the new OCA theory and endogeneities of the OCA are reviewed in sections 2.3, 2.4, and 2.5, respectively. Sections 2.6 – 2.8 review the empirical literature on the OCA and monetary union in Europe, rest of the world, and the GCC region, respectively. Section 2.9 concludes the review.

2.2 ECONOMIC INTEGRATION

Viner (1950) was the first to lay the foundation for the theory of customs union, in which the countries must agree on tariff rates, is the core of the traditional theory of international economic integration. The term regional economic integration refers collectively the various forms of economic integration among independent states. Researchers [e.g., Pinder, 1969; Kahnert et. al., 1969; Balassa, 1973 ; Maksimova, 1976 ; Holzman, 1976; Panic, 1988 ; El-Agraa, 1985 ; El-Agraa, 1988 ; Robson, 1987; Swann, 1996; Fielding and Shields, 2004; Qureshi and Tsangarides, 2008 ; Debrun et al., 2010; AlKolifey and Alreshan, 2010 ; Asongu, 2012 ; and De Grauwe, 2012] over the years have distinguished the following seven broad forms of economic integration. In ascending order of the degree of integration, they are: (1) as a lowest degree of economic integration, a preferential tariff agreement among countries assumes that the tariffs on trade among the signatory countries are lower in relation to tariffs charged on trade with other countries; (2) a partial customs union is formed when the participating countries

retain their initial tariffs on their mutual trade and introduce a common external tariff on trade with other countries; (3) a free trade area is an agreement among countries about the elimination of all tariff and quantitative restrictions on mutual trade whereas every country in this area retains its own tariff and other regulation on trade with non member countries; (4) in a customs union, participating countries not only remove tariff and quantitative restrictions on their internal trade, but also introduce a common external tariff on trade with non member countries; (5) in a common market, besides being a free trade area, there exists free mobility of factors of production among the common market countries; (6) an economic union among countries assumes not only a common market, but also the harmonization of fiscal, monetary, industrial, regional, transport and other economic policies; and (7) a monetary union is an economic union with a single common currency which is the highest degree of economic integration.

The last form of economic integration is the natural extension of what is known as the theory of optimum currency areas. Since the subject area of this thesis is about monetary union in line of optimum currency areas, we start reviewing the theory of optimum currency areas.

2.3 THE THEORY OF OPTIMUM CURRENCY AREAS (OCA)

The theory of optimum currency areas (OCA) predicts that a single currency among two or more countries in an area would be the optimal (most appropriate) for the area closely integrated through international trade and factor movements. Though Mundell (1961), along with McKinnon (1963) and Kenen (1969), are considered as the original contributors of the theory of OCA, Cesarano (2006), Dellas and Tavlas (2009)

among others have pointed out that the basic ideas of the optimum currency area theory was conceived and imbedded in Friedman's (1953) article on "The case for flexible exchange rates." Instead of going through to the controversy of the original contributors of the idea, we start with the works of Mundell, McKinnon and Kenen who, no doubt, popularized the theory. Then we review other criteria suggested by subsequent researchers.

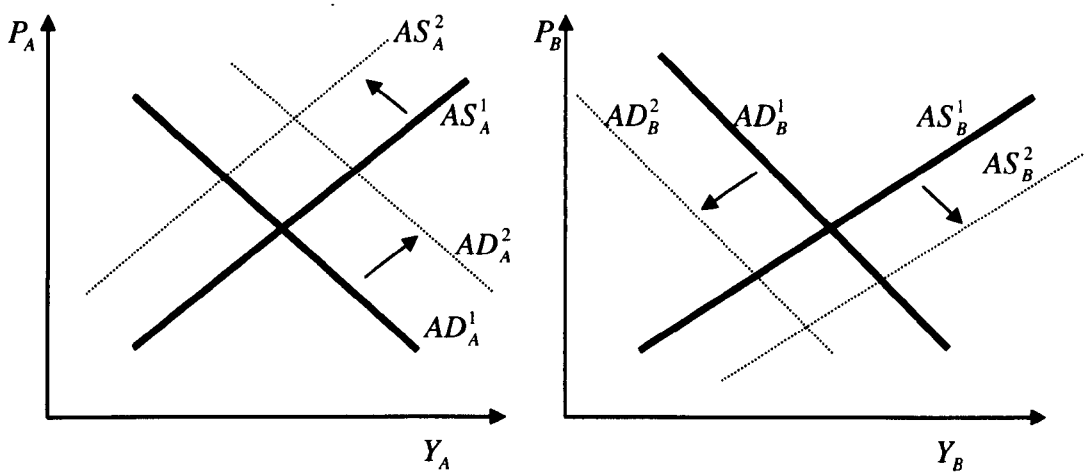
2.3.1 Wage Flexibility and Labor Mobility Criteria

Mundell (1961) appears to put forward an alternative solution in correcting external imbalances (disequilibrium) other than using flexible exchange rates suggested earlier especially by Friedman (1953) and Meade (1955). His main idea of a theory of optimum currency areas can be summarized as follows. Using a two-country and two-good world with initial balance of payments equilibrium, he then illustrates how a favorable demand shift in the first country (due to asymmetric shock in aggregate demand) would create excess demand in the first country and excess supply in the second country. He then put forward two criteria that would restore equilibrium when these two countries form a currency area. The first is the wage flexibility criteria. If wages are flexible in both countries, the wage in the first country would increase and the wage in the second would fall. These changes in wage would shift the supply curve left for the first country and to the right for the second and these shifts would bring back equilibrium. He identified labor mobility is another criteria by which external imbalances could be corrected without the need of nominal exchange rate adjustments.

We can illustrate this model using aggregate demand (AD) and aggregate supply

(AS) curves as shown in De Grauwe (2007). In figure 2.1, P is the aggregate price level and Y is the aggregate output of two countries A and B. If country A experiences a favorable demand (AD_A^1 shifts to AD_A^2 creating excess demand at the initial price level) and country B faces the opposite situation (AD_B^1 shifts to AD_B^2 creating excess supply at the initial price level). This will create adjustment problems for both countries which will be resolved through the wage flexibility and labor mobility criteria if they are in a currency union as shown in figure 2.1. If wages are flexible in both countries, the excess

Figure 2.1: Adjustment Process in Mundell Model



demand for labor in country A will increase the wage rate and the unemployed labor in country B will decrease their claims. As a result the aggregate supply curve of country A shifts from AS_A^1 to AS_A^2 and the aggregate supply curve of country B shifts from AS_B^1 to AS_B^2. These shifts restore the equilibrium by increasing the price level in country A and by decreasing the price level in country B. New equilibrium can also be established by labor mobility between countries in the currency union. Here surplus (unemployed) labors from country B will move to country A where there is shortage for

labors. This movement will restore equilibrium without needing to adjust wages.

2.3.2 The Degree of Openness Criterion

McKinnon (1963) suggested that the degree of openness of a country, defined as the ratio of tradable goods to non-tradable goods (or ratio of imports to GDP), should be considered as another criterion of the optimum currency area. Given that the output of a country is divided between tradables and non-tradables, the economy's general price level, that includes prices of both tradables and non-tradables, would fluctuate more for relatively open economy than the closed economy when the economy is hit by a nominal shock such as currency depreciation. With currency depreciation the price of tradables would rise that will destabilize the general price level. In order to stabilize the general price level the monetary authorities need to reduce the domestic demand to reduce the price of non-tradables. The degree of openness plays a crucial role here: More open the economy is – higher the share of tradables to non-tradables – the more reduction in demand is needed to restore equilibrium. The monetary policy will lead to exchange rate movements which will be more pronounced in more open economy. Since the general price level fluctuation is more prominent in relatively more open economy than closed economy and to the extent that price fluctuation involves costs, the use of monetary policy is more costly in more open economy than in the closed economy. In other words, flexible exchange rate is less ineffective in its corrective functions for more open economies. These considerations led McKinnon to suggest that the relatively open economies (relatively higher imports to GDP) should peg their currencies and join a currency union. He also argued that relatively open economies with flexible exchange

rate regime, the domestic currency would be more unstable in terms of purchasing power and future transactions and as a result money loses its ''liquidity'' (i.e., unit of account and store-of-value) functions.

2.3.3 The Degree of Product Diversification Criterion

Kenen (1969) considered the optimality of currency area when economies are susceptible to sector specific or industry-specific shocks to particular export products. Though he considered criterion such as fiscal integration and production structures, product diversification is his main criterion for the optimum currency area. He compared the need for flexible exchange rates with a currency area. Suppose a country produces a large number of diversified export products and faces asymmetric external demand shocks. Such countries would be able to cope with the external shocks better by forming a currency area because the higher exports of those products whose demands have increased may offset the lower exports of products whose demands have decreased. This would result in a slower decrease in aggregate output of these countries when the demand for its exports goods slows down. In this case exchange rates may not play a major role in output fluctuations of these countries. Thus a currency area with fixed exchange rate is the most appropriate for countries with well diversified products. On the other hand, countries that has low degree of product diversification need flexible exchange rates to cope with asymmetric external demand shocks. Mundell (1969) remained skeptical about the Kennen's (1969) criterion of a currency area by pointing out that the world economy would be most diversified economy.

2.3.4 Similarities of Inflation Rates Criterion

One criterion for monetary integration or to form a currency area is the similarities of inflation rates among the potential member countries proposed by Fleming (1971). Persistent differences in inflation rates between countries can give rise to external imbalances which may cause diverging ratios of employment to inflation among these countries. Countries with external balance surplus would be forced to accept an undesirable inflation rate whereas countries with external balance deficit would be forced to accept an undesirable level of unemployment. Against this background, Fleming (1971) has suggested that the terms of trade will remain fairly stable when countries have low and similar inflation rates over time. The stable terms of trade in turn will give rise to external balance equilibrium and would reduce the need for exchange rate adjustments.

2.3.5 Political Integration Criterion

Mintz (1970) suggests that the political will to integrate is the single most important criterion for adopting a common currency. Along similar lines, Machlup (1979) argues that what ultimately matters is the willingness of all members to give up their independence in matters of money, credit and interest. Haberler (1970) stressed that for the group of countries to achieve a successful currency area, the partner countries must have similar policy attitudes. A reasonable degree of compatibility in preferences toward economics goals such as price stability, higher economic growth and employment and policy makers' ability in trading-off between goals are also needed for a successful currency area (Tower and Willett, 1976).

2.3.6 Conflicting Results

The various criteria developed by Mundell, McKinnon, and Kennon were not internally consistent and they can lead to conflicting results [e.g., Johnson, 1969; Ishiyama, 1975; Tavlas, 2009; and Dellas and Tavlas, 2009]. Consider the degree of labor mobility criterion of Mundell. Suppose an economy is small and open which would prefer a fixed exchange rate regime. However, it may posses a low degree of labor mobility with the neighboring areas which may suggest desirability of flexible exchange rate regime. The openness criterion of Mckinnon suggests that small relatively open economies should adopt fixed exchange rates. If such economies are relatively undiversified then they should adopt flexible rates according to the diversification criterion of Kennen. That is, this leads to the paradox that small and relatively open economies should keep their own currencies and should not join a currency union (Frankel and Rose, 1998). Tavlas (2009) and Dellas and Tavlas (2009) point out many other conflicting results that arise from those criteria. Johnson (1969), by considering the various criteria to assess optimality, concluded that the optimum currency area problem is something of a dead-end problem. Similarly, Ishiyama (1975, p. 378) by surveying the OCA literature up-to mid-1970s, conluded that, "the theory of optimum currency areas is primarily a scholastic discussion which contributes little to practical problems of exchange rate policy and monetary reform." Dellas and Tavlas (2009, p. 1129) by assessing the various criteria of the theory of OCA have pointed out that for 20 years from early-1970s to early-1990s, the subject was of "second-order importance."

2.3.7 Definition Issues

Though the subject was of second-order importance during 1970s and 1980s, some writers concentrated on the appropriate definition of optimum currency areas. Machlup (1979) argues that the ultimately deciding factor is the willingness of all member countries must give up their independence in matters of money, credit and interest. Thus, according to him an optimum currency area may be defined as an area in which no country in the area insists on creating and having monetary policy of its own. Other writers seem to be in search of the meaning of the word optimum in this connection. For example, to Grubel (1984) an optimum currency area is an area in which the net benefits must outweigh the costs of joining the area. On the other hand, Thygesen (1987) points out that an optimum currency area must identify a group of countries within which it is optimal to have pegged exchange rates but to keep certain flexibility in exchange rate with other countries. Others looked at the European Union (EU) in framing the definition of an optimum currency area. For example, Canzoneri and Rogers (1990) point out that very small currency conversion cots among the EU members and openness is most likely to make the EU and optimum currency area.

2.3.8 Bayoumi's Formal Model of OCA

Bayoumi (1994) points out that the pioneers of the OCA have presented the theory on verbal arguments rather than using formal models. His model embodies the criteria of OCA suggested in the seminal works of Mundell, McKinnon, and Kennen and he tries to "augment the existing literature by presenting a formal model of optimum currency areas using a general equilibrium model with regionally differentiated goods"

(Bayoumi, 1994, p. 2). He concludes that the currency union would improve the welfare of the member countries in the union while such union would unambiguously reduce welfare for regions outside the union.

2.4 THE NEW THEORY OF OCA

After two decades of 1970s and 1980s, when subject was of second-order importance, the issue of optimum currency area resurfaced with an added interest in early 1990s. Tavlas (1993, p. 663) refers scores of articles and books in early 1990s that have "resuscitated" the issue and heralded as the new theory of optimum currency area. The beneficial experience of the European Union has been reported as being a catalyst for such resuscitation (Dellas and Tavlas, 2009). Writers in early 1990s have continued with the criteria approach of the pioneers and elaborated the costs and benefits associated with the monetary integration. Tavlas (1993, p. 669) points out that "the theory of optimum currency areas has been modified, however, in line with developments in expectations formation, the time insistency and credibility problems, labor mobility under conditions of uncertainty, and exchange rate determination." The modified theory by incorporating these developments has become known as 'new theory of optimum currency areas' [e.g., De Grauwe, 1992 ; and Tavlas, 1993, 1994]. Since this new theory tries to explain the costs and benefits of the optimum currency area in line with those aforementioned developments, we start with costs and benefits issues.

2.4.1 Costs and Benefits

A critical text-book review of the costs and benefits of the monetary union is

provided in De Grauwe (2012). An extensive review is also available in Emerson et. al (1992), Eichengreen (1994), Santos Silva and Tenreyro (2010), Asonuma, et al. (2012), Rusuhuzwa and Masson (2012), Frankel (2013), and Carney (2014).

2.4.1.1 Costs

There will be administrative and legal costs that would arise due to switching to a new currency. With the introduction of a single currency, a common central bank is to be created that would result in an increased administrative cost for each member country. Such costs are identified as the costs from the deterioration in microeconomic efficiency (Mongelli, 2002).

However, the main costs would arise from the loss of autonomy in monetary and exchange rate policy of the individual member countries and it would also put constraint on the national fiscal policy. Individual member countries would be unable to use its own monetary and exchange rate policies when they are hit by asymmetric shocks affecting differently to each member countries. Even under the currency area an individual country may have different wage, price, and productivity structure that may require its own monetary policy to address its own economic problem but would be unable to address it under the currency area. Common fiscal restraints would limit the ability of the national governments to conduct their fiscal policies. The magnitude of these costs depends on how these economies are vulnerable to shocks (symmetrical/asymmetrical in terms of business cycles) and the ease with which these economies can adjust to these shocks.

Corsetti (2008) analyses a micro-founded model of costs adopting common

currency. He compares this model with a benchmark situation in which domestic monetary authorities pursue monetary policy for stabilization purposes. He finds no differences, that is, a common monetary policy of a currency union can be as efficient as nationally differentiated monetary policy. On the other hand, Rusuhuzwa and Masson (2012, p.3) suggest that "indeed, in a monetary union, member countries lose direct control over instruments of monetary and exchange rate policy that may be useful in dealing with country-specific macroeconomic shocks. This freedom is gone once the monetary union has been formed."

Frankel (2013) points out three distinct sets of difficulties that were structurally built into monetary union from the beginning, namely, inability of members to devalue, fiscal problems and banking supervision. Fiscal policy and banking supervision are kept at the national level whereas the monetary policy moved to euro-wide level. Carney (2014) reiterates the potentially large costs of giving up an independent monetary policy.

2.4.1.2 Benefits

Against the costs from the deterioration in microeconomic efficiency, benefits come from the improvements in microeconomic efficiency which would result mainly from the liquidity services (the medium of exchange, unit of account, the standard of deferred payments and the store of value) provided by a single currency of a currency area (Mongelli, 2002).

The most important benefit of the currency union would come from the improvements resulting from the integration of goods, services and factors markets. Exchange rate risk for trade flows among the member countries would be eliminated.

Transaction and hedging costs will also be reduced. All in all these changed scenarios will bring a high degree of long-term confidence among the member countries of the currency area in making their decisions. Recently, Rusuhuzwa and Masson (2012, p. 3) have emphasized that "the major benefits of a monetary union are the reduction of transaction costs, economies due to the pooling of international reserve, elimination of exchange risk and region-wide price harmonization." The member countries will be able to save on international reserves because they will not be required to have international reserves for transactions with the currency area. Member countries would be more disciplined in their policy commitments, say in controlling inflation, if the anchor country is able to commit monetary rules. This gains from commitment is inherent in OCA was emphasized by Alesina and Barro (2002). In conclusion, by coordinating monetary and fiscal policies, the currency area will bring a greater monetary and price stability which is considered as the prerequisite for economic growth. Asonuma et al. (2012, p.1) have suggested that "participating in the monetary union benefits all members." According to Carney (2014), the elimination of the transactions costs associated with the using and switching between different currencies was the main benefit of the monetary union.

In summary, according to Stankovic (2013) and Carney (2014), countries benefit through lower transaction costs, and the elimination of exchange rate variability that spurs investment, reducing uncertainty about currency movements, intraregional trade, and economic growth. It gives access to bigger and more liquid financial markets that lower borrowing costs and help to increase the mobility of capital, increasing competition, price transparency and it provides potential enforcement of monetary and fiscal discipline.

2.4.2 Ineffectiveness of Monetary Policy

One of the main perceived costs of the old OCA theory is that a member country of currency area cannot use its own monetary policy for stabilization purposes. This cost is negligible if one evaluates it in terms of the developments of the monetary economics that literally started with Friedman's 1968 address on "the role of monetary policy" (Friedman, 1968). Since then the view on the Phillips curve, that shows a trade-off between unemployment and inflation, has changed forever. Implicit in early OCA literature is that the policy makers can "pursue an independent monetary policy so as to choose an optimum point along its Phillips curve" (Tavlas, 1993, p. 669). However, Friedman pointed out that the Phillips curve should be augmented by expected inflation resulting in the vertical long-run Phillips curve, that is, there is no long-run trade-off between unemployment and inflation. The Phillips curve was then displaced by the natural rate of unemployment and the monetary policy is ineffective in the long-run. Therefore, from the standpoint of the augmented Phillips curve, the costs from losing direct control over monetary policy, implicit in early OCA theory, seemed to be negligible.

Groshen and Schweitzer (1996, 1999) have reconsidered the low levels of inflation and unemployment. They find that low levels of inflation work as a "grease" and promote economic growth; however, high levels of inflation work as "sand" that deters economic growth. Mongelli (2002, p. 12) has summarized the debate as follows: "the perceived costs from losing direct control over monetary policy, and the exchange rate, seemed high in the pioneering contribution, then subsided following the monetarist critique, and could now be a bit higher according to some if sub-optimal low inflation is

pursued. However, any short-lived gain from exploiting changes in inflation cannot be exploited systematically."

2.4.3 The Time Insistency and Credibility Problems

People literally face the time inconsistency and credibility problems in their everyday life. That is, people are unable to follow a good plan consistently and the good plan is said to be time-inconsistent and loses its credibility over time.

Kydland and Prescott (1977), Calvo (1978) and Barro and Gordon (1983) have argued that the monetary policy makers face the similar time-inconsistency and credibility problems. The problem that occurs when monetary policymakers pursue expansionary monetary policy that are attractive in the short run; however, long-run outcome is undesirable. Expansionary policy increases output and reduces unemployment in the short but it also creates inflation or makes unstable price level.

A currency union or monetary union can help to eliminate the time-inconsistency and credibility problems of a country experience a high inflation rate when this country joins a currency union with a low inflationary country. When a high inflation country joins a union with low inflation country, it immediately reaps the benefits of a low inflation reputation without any loss of output and employment because there is long-run trade-off between inflation and unemployment (De Grauwe, 1992).

2.4.4 The Effectiveness of the Nominal Exchange Rate Variability

The old OCA literature identified losing control over the exchange rate instrument as a cost of forming currency area. However, this cost depends on the effectiveness of the

nominal exchange rate variability. The portfolio-balance channel of Branson (1985), the Ricardian equivalence and perfect foresight model of De Grauwe (1989) and the sunk cost model of Krugman (1991) point to the fact that changes in nominal exchange rates are not effective in fixing the external disequilibria.

However, some authors have pointed out the episodes in Europe that show the changes in nominal exchange rate are quite effective. For example, the 1982 devaluation in Belgium (De Grauwe, 2000), the French devaluation of 1982 – 83 (Sachs and Wyplosz, 1986) and the Italian devaluation of 1992 have contributed to the revival of these economies. Mongelli (2002) points out that these episodes should be seen as one-off remedies and the exchange rate instrument cannot be used systematically.

2.4.5 Concluding Remarks On Recent Developments

The recent developments in macroeconomic theories related to the Phillips curve, rational expectations, time-inconsistency and credibility problems and exchange rate determination by- and- large are not directly related to the OCA problem. However, they have profound implications for the theory of OCA. In the words of Dellas and Tavlas (2009, p. 1130): "The upshot of these developments is that what had been identified as a major cost of monetary unification, namely, the loss of ability to use a nationally-tailored monetary policy, may not be a cost after all. In fact, a key inference of the recent literature is that, for countries with histories of high inflation, joining a monetary union with a regional central bank can provide credibility, reducing interest rates and the unemployment costs of moving to low-inflation equilibrium. These developments have helped underpin the desire of some formerly-high inflation countries to join the European

monetary union. It needs to be stressed, however, that, although the foregoing developments have contributed to a renewed interest in the theory of optimum currency areas, they represent a distinct shift in emphasis of that theory, that is, a shift away from examination of a country's characteristics and toward the credibility aspects of alternative exchange-rate regimes."

Adao et al. (2009), in a theoretical model, provide one such example. They show that the exchange rate regime is irrelevant and that every currency area is an optimal currency area. They consider a two country model similar to optimal international fiscal and monetary policy literature of Lucas and Stokey (1983) and introduce money in the general equilibrium model through cash-in-advance constraint on the purchases of goods by the households. The government of each country finances expenditures from distortionary income and consumption taxes and seigniorage. They show that in equilibrium fiscal and monetary policies with flexible price and flexible exchange rates would induce stable producer prices and exchange rates which has the implications that under the sticky prices and fixed exchange rates may achieve the same allocations as under flexible prices and exchange rates. This is turn implies that the loss of the country specific monetary tool, identified as the cost of traditional theory of the OCA, is of no cost.

Clerc et al. (2010, p. 15) have used the standard NK model "to offer a synthesis of two important but distinct branches of the monetary union literature : One emphasizing credibility problem. And another emphasizing issues of macroeconomic stabilization. Our main point is that lack of credibility is not incompatible with some, perhaps imperfect but nevertheless potentially welfare improving stabilization . Monetary union,

at least, in the presence of an asynchronous international business cycle. Under these circumstances , the relevant comparison involves the welfare losses from high average inflation, the benefits of inefficient , national stabilization and the benefits from more efficient , union wide stabilization. Neither monetary arrangement can always be superior and cannot be determined on theoretical grounds alone which of two options is likely to be associated with higher welfare."

2.5 ENDOGENEITIES OF OCA

Recent discussions on OCA have essentially moved to endogeneities of OCA. Early studies on the theory of OCA tried to indentify the *ex ante* criteria that an economy should satisfy in joining a monetary union. Recent studies following the initial work of Frankel and Rose (1998), on the other hand, have focused on *ex post* changes in economic structure and performance after joining a monetary union.

De Grauwe and Mongelli (2005) have reviewed the endogenous optimum currency area theory. They first start with the working definition of endogeneities of OCA as removal of "borders" (or broadly removal of national monies) which is considered as an impediment to trade. Monetary union by removing borders or narrowing the distances would change the incentive structure of agents. A currency union strengthens the effects of free market, signals to willingness to commit even broader economic integration on issues such as property rights, non-tariff trade barriers, labor policy, regulations and social policies (Engel and Rogers, 2004). A common currency also precludes future competitive devaluation, facilitates foreign direct investment, and is likely to encourage forms of political integration (McCallum, 1995).

Endogenous OCA theory also proposes a positive correlation between the international trade pattern and business cycles. Frankel and Rose (1997, 1998) have found that the countries with highly correlated business cycles have closer trade links. They have suggested that the criteria of the optimum currency area would most likely to be met by joining a currency union. While early literature on the OCA focused on severity of asymmetric shocks among economies as a criteria for joining a currency area, the endogenous OCA literature postulates that the joining a currency union itself would reduce the incidence of asymmetric shocks among the member countries. Corsetti and Pesenti (2002) shows that a (p. 22) " credible policy commitment to a monetary union is to have the monetary union itself in place" .

Since the endogeneities of the OCA are derived from the empirical evidence, we now review the empirical literature on OCA.

2.6 EMPIRICAL FINDINGS

In all earnest the empirical studies on OCA started at the end of 1990s, though Bayoumi and Eichengreen (1993) and De Grauwe and Vanhaverbeke (1993) initiated some empirical studies related to the cost side of the OCA. The reason for such delayed empirical research is probably provided by Emerson et al. (1992) who noted that, despite the early insights into OCA theory, there was a lack of "ready-to-use" theory for assessing the costs and benefits of economic and monetary union. Early reviews of empirical studies are available in Mongelli (2002), Baldwin (2006) and Horvath (2007) among others. Recent review of empirical studies is available in Santos-Silva and Tenreyro (2010), De Grauwe (2012), and Okafor (2013). We review empirical literature

in line of costs and benefits as in Santos-Silva and Tenreyro (2010) and De Grauwe (2012).

2.6.1 The Costs

The main cost of joining a currency union would arise from the loss of autonomy in monetary and exchange rate policy of the individual member countries. Thus, if a member country of the union experiences shocks, it would be unable to use its own exchange rate and monetary policies. The pattern of shocks was critical determinant of Mundell's (1961) optimal size of a currency year. He focused on asymmetric shock (a shift in demand away from the output one country towards output of another country, figure 2.1). Thus, asymmetric (country-specific) shocks represent crucial components. We start with empirical studies that identified asymmetric shocks.

2.6.1.1 Asymmetric Shocks

The early empirical studies proceeded in identifying asymmetric shocks on the belief that the countries experiencing frequent asymmetric shocks would require more real exchange rate adjustments to deal with these shocks and as a result these countries are likely to experience higher adjustments costs in a monetary union. De Grauwe and Vanhaverbeke (1993) took this approach and found a low occurrence of asymmetric shocks at the national level of European countries than at a regional level within a country which, of course, favored the economic integration. Bayoumi and Eichengreen (1993, 1997) pioneered another empirical literature using a SVAR (structural vector auto-regressive) model in an effort to identify supply and demand shocks and studied the patterns of correlation of these shocks across countries. They clustered countries

according to the degree of correlation of these shocks. They found that the European countries in general had historically faced less correlated shocks than the states of the US and concluded that forming a union in Europe might be costly.

Whitt (1995) examines the historical pattern of aggregate demand and supply shocks in several European Monetary System countries using different data than Bayoumi and Eichengreen (1993). These shocks were identified by estimating a vector autoregressive model. Results indicate that countries with similar patterns of shocks (namely, France, Italy, and the Netherlands with the anchor country Germany) would be better candidates for monetary union than those experiencing wildly disparate shocks.

Dibooglu and Horvath (1997) use data from twenty European market economies (original members, new members and non-members) in which they identify the supply, nominal, and real fiscal shocks. Their results call for alternative adjustment mechanisms after the introduction of a single currency. The alternative adjustment mechanisms have to be different than national monetary policies.

Alesina et al. (2002) and Barro and Tenreyro (2007), using a large sample from developing and developed countries that includes existing currency unions, study the effect of currency unions on the pattern of covariance of shocks. Their results show that while a common currency tends to raise the comovements of real relative price shocks, it decreases the comovement of output shocks. This last result corroborates the conjecture of Krugman (1993) that integration will result in more specialization and thus less synchronization of shocks. Frankel and Rose (1998), using a sample of 21 industrialized countries, find that trade significantly increases the cross country synchronization of shocks. This result, as discussed below, contradicts the empirical results that currency

unions increase bilateral trade.

2.6.1.2 Labor Mobility

Mundell (1961) identified labor mobility is one of the criteria by which external imbalances of regions hit by asymmetric shocks could be corrected without the need of nominal exchange rate adjustments. If labor is mobile, labor would move from the adversely affected areas to the favorably affected areas without the need of monetary policy adjustments. This has implication that labor mobility attenuates cost of currency unions.

Decressin and Fatás (1995) in an early empirical study investigate regional labor market dynamics (mobility) in Europe and compare with the results obtained for the states of the US. They study adjustment mechanism which is triggered by a typical regional-specific shock. Their general finding is that most of the shock is absorbed by changes in the migration in the US and changes in the labor force participation rate in Europe.

Santos-Silva and Tenreyro (2010) contend that there is no consensus that labor mobility can effectively attenuate costs of a monetary union because it cannot be an effective substitute for active monetary policy and the high costs of migration entail larger welfare losses. Bayoumi and Prasad (1997) find that the cross-country labor mobility in the European Monetary Union tends to be significantly lower than across-states in the US.

Reasons for the lack of labor mobility in Europe are cited as heterogeneity of languages, cultural differences, lack of integration in pension systems, differences educational and qualification standards, and the higher contractual costs of hiring and

firing [e.g. Santos-Silva and Tenreyro (2010)]. Alesina et al. (2008) find significant reforms in product markets in Europe that may be an important pre-condition that would foster labor market flexibility.

2.6.1.3 Openness

Rose (2000) find that degree of openness increases with the formation of the currency union due to the elimination of exchange risk and transaction costs. However, any cost-benefits analysis of the degree of openness should be based on post-unification [e.g. Santos-Silva and Tenreyro (2010)].

2.6.1.4 Price and Wage Flexibility

There is broad consensus that the lack of price flexibility in European countries is due to low wage flexibility which is easy to understand because product and wage markets interlinked (Mongelli, 2002). Main factors cited in literature behind the higher wage rigidity in Europe are wage bargaining arrangements, measures of employment protection, minimum wage provisions and others [e.g. Blanchard and Wolfers, (2000)].

2.6.2 The Benefits

2.6.2.1 Increased Trade and the Gravity Model

Some early empirical studies [e.g. Frankel and Wei (1993), Eichengreen and Irwin (1995), Frankel (1997), and see Tenreyro (2007) for early references] have tried to identify the effects of currency union on trade and have found small effect. However, Rose (2000) presented the first systematic empirical study to quantify the effect of currency union on trade and found a very large positive impact of a common currency on

bilateral trade between countries. Rose, using a gravity model, found that two countries that share a common currency trade over three times as much as do otherwise similar countries with different currencies. Since Rose's (2000) work is considered as seminal, we have reproduced his use of the gravity equation as a reference:

$$\ln X_{ij} = \beta_0 + \beta_1 \ln(Y_i Y_j) + \beta_2 \ln(\frac{Y_i Y_j}{Pop_i Pop_j}) + \gamma CU_{ij} + \delta V(\varepsilon_{ij}) + \mathrm{B}' D_{ij} + u_{ij} \qquad (2.1)$$

where X_{ij} is the value of bilateral trade between countries i and j, Y is the real GDP, Pop is population, CU is the common currency dummy, $V(\varepsilon)$ is the volatility of bilateral exchange rate, D is a vector of other dummy variables that include the distance between countries, contiguity (common land border), common language, regional trade agreement, common nation, common colonies, colonization of country i by country j and vice versa, and u is the error term. In equation (2.1), the main coefficient of interest to him has been γ, the impact of currency union on trade flows. His data consist of 186 countries, dependencies, territories and so forth with 33903 observation. His preferred (pooled) estimated value of γ is $\hat{\gamma}$ = 1.21 which is smaller than the values obtained using many other different specifications. From the specification of (2.1), the estimated value of 1.21 implies that $\delta X_{ij} / \delta CU_{ij} = e^{1.21} = 3.35$. This has the implication that the "countries with the same currency trade over three times as much with each other as countries with different currencies" (Rose 2000, p. 17).

This rather very large (more than 300 percent) impact of currency union on trade raised a huge skepticism and saw a plethora of subsequent studies. Persson (2001) argues that the results in Rose (2000) suffer from two biases, namely, non-linearities and non-random selection. He argues that the linear estimate of γ in equation (2.1) is high. That

is, some of the variables (output-trade, for example) in equation (2.1) are non-linear. He also argues that the country pairs inside the currency unions are systematically different (usually smaller, poorer and geographically closer) from those not in currency unions. That is, countries in currency unions selected in Rose's study were not random. Persson (2001) using data used by Rose (2000) provides alternative estimates which he considers to be robust to non-linearities and selection problem. He found that a currency union increases trade between 13 and 66 percent (though results were statistically insignificant). However, Rose (2001) in an immediate response disagreed with the diagnosis of the problems raised by Persson (2001). Using a larger data set and Persson's matching technique he is able to confirm the results of his seminal paper.

Alesina et al. (2002) and Barro and Tenreyro (2007) use a three-step instrumental variable to tackle the self-selection problem. The general finding of these studies, according to Santos Silva and Tenreyro (2010, p. 11) is "that a currency union is more likely when countries speak the same language, are geographically close, and share former colonial links."

Time versus spatial dimension is another issue. Rose (2000) exclusively focused on spatial dimension but realized the importance of the time-series approach that would allow the measurement of the variation of trade among countries before and after the creation of a monetary union. The problem is that no matter how many time-invariant variables one adds to the regressors, there may still remain some that are difficult to proxy, thus seriously running the risk of a mis-specified model. On the other hand, a fixed-effect method estimation in panel data allows to control for all the possible time-invariant factors specifically affecting the bilateral trade of each pair of countries

including those factors for which it would be impossible to find an explicit approximation. Though Rose (2000) noted that a fixed -effect estimation would in many ways be preferable to estimation techniques based on cross-sectional evidence, the scarcity of regime changes in his data did not enable him to adopt this method. In a later study Glick and Rose (2002) have used panel data from 1948 to 1997 and have used a modified specification of the gravity equation with a fixed-effect. They have found that the currency union trade effect is reduced by about one third of the original estimate found by Rose (2000). That is, bilateral trade among member countries adopting currency unions would nearly be doubled.

Estevadeordal et al. (2002) and López-Córdova and Meissner (2003) provide the currency union effect on trade using historical data of the gold standard from 1870 through 1939 and from 1870 through 1910, respectively. Their sample consists primarily of industrial countries and a small group of large developing countries. Estevadeordal, et al. (2002) find that common participation in the gold standard increased trade between 34 and 72 percent while López-Córdova and Meissner (2003) find the gold standard effect to be 60 percent. They also find that currency unions double trade which is very similar to that found by Glick and Rose (2002). Anderson and van Wincoop (2001) have developed a model of bilateral trade which states that bilateral trade between a pair of countries depends on their bilateral trade barrier relative to average trade barriers with all trade partners. Their methodology has allowed Rose and van Wincoop (2001) to estimate the trade effect of different potential currency unions, even those that have not yet been created. They find that the trade would increase about 60 percent for the EMU.

There are still some other issues of Rose (2000) study that needs to be mentioned

which may prove useful for subsequent analysis. The sample of countries in the Rose study was extremely heterogeneous. As stressed by Lockwood (2000) and Rose (2000) himself that it is not possible to extrapolate relevant information about the trade repercussions of the euro from this kind of sample. To infer the impact of the euro on the transactions of EMU countries it is necessary to refer to a sample somewhat narrowly defined around a core consisting of the Euroland economies.

Some empirical studies tried to estimate the impact of the euro on trade in the euro zone. Baldwin (2006) has a comprehensive survey on this literature. These studies use the gravity equation framework using the data from the nineties to the early years of the last decade. Micco et al. (2003) find that the euro increased trade, between 8 to 16 percent, among the euro zone members compared to other European Union members not using the euro.

The unusually large currency union trade effect in Rose's original estimate sparked a huge literature attempting to "shrink the Rose effect." Subsequently studies based on meta-analysis – a set of quantitative techniques for evaluating and combining empirical results from different studies – found much smaller changes in trade volumes (usually around 30–90 percent). Because of the nature of meta-analysis these papers used much smaller datasets over shorter time series than Rose (2000). For large panel datasets, Rose and Stanley (2005) using large panel datasets still report trade gains exceeding 100 percent which was confirmed by the latest large panel study of Frankel (2008). Baldwin (2006) provides a comprehensive survey of econometric approaches used in the currency union literature and has suggested two crucial sets of controls necessary in the gravity equation to obtain unbiased currency union trade effects. Baldwin and Taglioni (2006)

implement these controls in a small panel to find either negative or zero trade effects of the euro.

Rose (2008) also rejects the hypothesis that the currency union has no trade effect. He has performed a meta-analysis using twenty-six recent studies on European countries that have investigated the effect of currency union on trade. Taking all these studies into account he contend that there is no consensual view concerning the effect of EMU. However, his conservative estimate is that the EMU has increased trade inside Eurozone by at least 8%, though he does not rule out more substantive effect of 23%. Taking the literature as a whole he categorically rejects the hypothesis that the currency union had no effect on trade.

2.6.2.2 Increased Capital (Financial) Integration

The theory of OCA argues that a common currency would lower transaction costs and eliminate the exchange rate risks. Following this line of argument some authors [e.g. Lane, 2006; and Santos-Silva and Tenreyro, 2010 and references therein] have argued that a currency union should create a deeper liquid financial markets integration and should lead to a higher cross-border investment through equities and foreign direct investment (FDI). Higher financial markets integration in turn should increase the allocative efficiency of capital and would allow higher diversification of shocks.

Recently several empirical studies (see, for example, Mongelli and Wylposz, 2008, and Kalemi-Ozcan et al., 2010) have tried to assess the capital market integration in the euro zone (EZ) after the introduction of euro. Santos-Silva and Tenreyro (2010, p. 19) have summarized as: "The consensual findings are i) a swift integration of the EZ

bond market following the introduction of the euro, with a sharp fall in yield differentials across member countries; ii) an increase in cross-border bond and equity holdings, as well as FDI activity among EZ countries."

Alesina et al. (2008) have argued that common currencies are likely to make way to broader structural reforms that would increase flexibility and deeper integration. However, empirical evidence shows that the increased financial integration has not led to remarkable improvements in the diversification of risks (Caselli, 2008).

2.6.2.3 Commitment Gains

Alesina and Barro (2002) have suggested that high-inflation countries would gain (that is, achieve low inflation) if they join a union with credible anchors committing to time consistent monetary policy. Santos-Silva and Tenreyro (2010) have pointed out that though some countries within the EZ experienced higher levels of inflation, in general the EZ performed very well in terms of inflation.

2.7 EMPIRICAL FINDINGS FROM OTHER PARTS OF THE WORLD

2.7.1 Evidence from Africa

Three widely cited existing monetary unions in Africa are: (1) The Central African Economic and Monetary Union (CAEMC) consists of Cameroon, Congo, Gabon, Equatorial Guinea, Central African Republic, and Chad; (2) The Common Monetary Area (CMA) consists of Lesotho, Namibia, Swaziland, and South Africa; and (3) The West African Economic and Monetary Union (WAEMU) consists of Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The general

findings from these areas can be summarized as follows: there is a progress in convergence (narrowing the gap in real income per capita), though at a slow space, benefits of joining in the union is very marginal, and synchronization across countries are quite low

Carmignani (2010) studies the countries in CAEMC. He proceeds from the hypothesis of endogenous OCAs that the degree of business cycle synchronization should increase over time among the member countries of the CAEMC. He examines various indicators the CAEMC countries such as bilateral correlations, first order autocorrelation and volatility among GDP, detrended GDP, and their first differences. These indicators suggest that synchronization is generally low but somewhat increasing over time. He concludes that these results are quite consistent with the weak progress on trade integration and macroeconomic policy convergence of the region.

Wang et al. (2007) study the countries in the CMA. They compute shocks to real output per capita (measured as the deviations of the first difference of real GDP per capita from its long-run trend) and examine whether they are correlated among countries of the CMA. The shocks are considered as symmetric (asymmetric) if the correlation is positive (negative) and significant (insignificant). Empirical results indicate that external shocks affect asymmetrically on countries of the CMA. In response to this, they conclude, South Africa moved from pegged exchange rate to a flexible exchange rate and adopted inflation targeting as a monetary policy goal; some other small countries in the CMA sustained fiscal deficits financed through domestic borrowing.

Fielding and Shields (2004) examine the monetary unions of WAEMU (or UEMOA as they call it) and the union of Central African states (or UDAEC as they call

it) on the CFA (African Financial community) franc zones. They examine whether sharing a common currency (both areas pegged to French Franc/Euro) gives an extra degree of macroeconomic integration based on indicators such as trade intensity, real exchange rate correlation, and business cycle synchronization. They find that pegged exchange rate delivers more integration than a flexible exchange rate. The also find no economic consequence of dividing the CFA zone into two separate monetary areas.

Some empirical studies evaluate the prospects of monetary union in other regions of African including countries in WAEMU. For example, Qureshi and Tsangarides (2008) examine, using cluster analysis, the prospects of forming the proposed monetary unions of the Western Monetary Zone (WAMZ) and the Economic Community of West African States (ECOWAS). They cluster countries at each stage into a group sharing greatest similarities based on OCA theory and convergence criteria such as output volatility, terms of trade synchronization, real exchange variability, regional trade intensity, inflation, government balance, and debt-servicing requirement. They continue this process till they reach the last group that consists all countries. They find countries in WAEMU tend to cluster together. Their results show considerable dissimilarities in the economic characteristics of the West African countries which include countries of the WAEMU and WAMZ (viewed in one group). Based on these results they suggest against the formation of ECOWAS at this stage. This result is also echoed by Houssa (2008) who uses dynamic structural factor analysis to identify demand and supply shocks for West African countries. He finds negative and low positive correlations of supply shocks and concludes against forming monetary union in West African countries.

Debrun et al. (2010) examine the costs and benefits of three pursued monetary

unions of Sub-Saharan Africa: the East African Community (EAC), the Southern African Development Community (SADC), and ECOWAS. They use a model that integrates the traditional criteria of OCA with the financial needs of the government because fiscal discipline is believed to be a prerequisite for price stability. In their words: "With few exceptions, the model suggest that the gains stemming from enhanced monetary stability tend to offset – albeit often by a very narrow margin – the costs arising from the impossibility to stabilize idiosyncratic shocks with national monetary policy" (p. 36 – 37). In their reckoning the net gain is quite small which may not be particularly beneficial.

Asonuma et al. (2012) study the welfare effects arising from monetary union among Southern African Development Community (SADC) countries and report that "participating in the monetary unification benefits all members, and can deliver major credibility gains" (p. 22).

Okafor (2013) estimates the costs and benefits of the common currency in West African Monetary Zone (WAMZ) and argues that the potential benefits of common currency are likely marginal and the cost due to loss of monetary policy could be monumental.

2.7.2 Evidence from MENA Countries

The Middle East and North Africa (MENA) countries share a common language but differ in great deal in terms of real per capita income and more importantly in political system. Within this region there are also Gulf Cooperation Council (GCC)

countries aspiring their own monetary union which is discussed in details below. This explains why a very few attempts in enhancing monetary union in MENA countries.

Sahin (2006) evaluates the likelihood of forming a currency area for MENA countries. He constructs a model that minimizes a loss in output that arises if a country experiences shock which is less than the average of shocks. In other words, his finding of union based on optimization would decrease the macroeconomic stability.

2.7.3 Prospects from Latin America

Bayoumi and Eichengreen (1994) analyzed whether supply and demand disturbances were symmetrically distributed across different countries in each region of Europe, Asia and Americas that include NAFTA countries (Canada, Mexico, and the US). Their results show higher degree of correlation among smaller countries in the Latin American rather than larger countries in Americas (including NAFTA countries). Their results do not support the formation of a currency union involving the Latin American countries. Since then many empirical studies appeared. Edwards (2006) reviewed these studies. Many of these studies analyzed whether the Latin American countries specially the original Mercosur countries (Argentina, Brazil, Paraguay and Uruguay) satisfied the OCA criteria and concluded that these countries did not satisfy many of the OCA criteria. Some of these studies found benefits of dollarization of the Central American nations; that is, these countries would benefit if they give up their currencies and adopt the US dollar as legal tender.

Edwards (2006) points out that, during the last six decades, the Latin American countries have been characterized by recurrent and massive external crises which led

them to large devaluations of almost every currency in the region. Many of these crises saw "sudden stops" of capital flows and experienced large and very rapid "current account deficit reversals". Thus, he investigates the performance of the Latin American countries from the "sudden stop" and "current account reversal" positions because they are costly in terms of growth. He analyzes the empirical evidence on the economic performance of currency union countries from all over the world and interprets these results from the perspective of Latin American nations. He divides countries in three groups: (1) countries with national currency; (2) countries with a currency of their own and flexible exchange rate regimes; and (3) currency union countries. The main result of this exercise is that currency union is not a solution of lowering the probability of facing sudden stop or current account reversal of the Latin American countries.

2.7.4 Prospects from Asia

In a recent study Watanabe and Ogura (2010) review the existing studies who considered the prospects of forming Asian currency union from the various aspects of the OCA theory. Most of the studies have identified that Malaysia and Singapore as an optimal currency area. Many other studies have considered many other possible combinations of countries that could form OCA. Among all combinations Japan and South Korea combination ranks the highest in terms of the OCA criteria. The combination of China, Japan, South Korea, Singapore and Malaysia ranked the second. The general conclusion of these studies is that the conditions for a currency union, such as same level of external openness, intra-regional trade and symmetricity in macroeconomic shocks, are met by subsets of Asian countries mentioned above.

However, Watanabe and Ogura (2010) point out that there is a great distance between Asian currency unit and the Asian currency union that would prevent Asian currency union in foreseeable future. An Asian currency unit (ACU) is a weighted average of Asian currencies including currencies of Japan, China and South Korea. It is expected to evolve into a common currency through three stages: in the first stage adoption of a managed float based on a country specific basket, in the second stage harmonization of the weights of the currencies in the basket and in the final stage the establishment of a currency union. It is proposed that an ACU be created before creating the currency union. However, historical and political background, institutional set-ups and regional convergence in early stage may prevent creation of ACU because as they have shown when a currency with significant weight difference moves independently and the weight difference affects ACU fluctuations.

2.8 PROSPECTS FROM THE GCC COUNTRIES

The Gulf Cooperation Council (GCC) countries consist of the six countries in the Arabian Gulf: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). The GCC was formed in 1981. At the end of 2001 the GCC Supreme Council meeting laid down some concrete steps to launch a single currency in the beginning of 2010. In Article 4 (Monetary and Economic Union Requirements), Chapter 3 (Economic and Monetary Union) of the Supreme Council (2001) it is stated that: "For the purpose of achieving a monetary and economic union between member States , including currency unification , Member States shall undertake , according to a specified timetable , to achieve requirements of this union. These include the achievement of high

level of harmonization between Member States in all economic policies , especially fiscal and monetary policies , banking legislations, setting criteria to approximate rate of economic performance related to fiscal and monetary stability, such as rates of budgetary deficit, indebtedness and price level." As we know now that it did not happen but they expect to introduce in near future; though Oman and the UAE pulled out of this union at the moment.

In recent years researchers have been busy in studying the different aspects (prospects) of a monetary union among countries in the GCC (see, for example, Jadresic, 2002, Schaechter, 2003, Abed et al., 2003. Darrat and Al Shams, 2005, Alturki, 2007, Abu-Qarn and Abu-Bader, 2008, Buiter, 2008, Louis et al., 2008, Rutledge, 2008, Al-Hassan, 2009, Khan, 2009, Alkholifey and Alreshan, 2010, Espinoza et al., 2010, Benbouziane et al., 2010, World Bank, 2010, Sedik and Willams, 2011, Echchabi et al., 2011, Al Khater, 2012, Hassan et al., 2013, and Marzovilla, 2014 , among others). Most of these studies discuss (analyze) the viability of the GCC monetary union from the standpoint of costs and benefits and focus on convergence criteria such as openness, similarity of production structure, similarity of inflation rates, financial market integration, fiscal integration, political integration, factor mobility, diversion of production, and price and wage flexibility. For example, Alturki (2007) finds first six, out of the nine criteria mentioned above, are favorable towards moving to the GCC monetary union. Some other studies mentioned above focus on the suitability of the pegging of the GCC common currency to another currency (basket). Rutledge (2008), on the other hand, compares six EMU's Maastricht convergence criteria of exchange rates, foreign reserves, interest rates, inflation rates, fiscal deficits and debt with the GCC countries. Based on

the number of breaches of each criterion by each of the six countries during the period 1980 – 2006, he concludes that only two criteria of exchange rate stability and interest rate convergence will be easy to achieve in the long run.

Schaechter (2003) points out that direct benefit from intraregional trade from the union will be relatively small because of the insignificant intraregional trade among the GCC countries. However, the indirect benefits should be more significant. The planned monetary union should reinforce their present attempt of diversifying the economy that would increase employment opportunities for the rapidly growing domestic labor force; it may enhance fiscal discipline across the membership, increase price transparency and facilitating appropriate investment decisions across the GCC area. However, the most important benefit will come from the financial and money markets integration that will increase the efficiency of the financial services which in turn will promote the growth of the non-oil GDP. Espinoza et al. (2010) examine the regional financial integration in the GCC countries using capital flow data, interest rates, and equity prices and find that regional integration is non-negligible. Sedik and Willams (2011) analyze the impact of global and regional spillovers to the GCC markets. They find that spillovers from the US and regional markets impact significantly the GCC equity markets. They conclude that the GCC equity markets are not immune from global financial shocks.

Jadresic (2002) points out benefits and costs and suggests that the success of the union is conditional on measures that would help to promote trade and foreign investment, ensure macroeconomic stability and enhance political integration. Buiter (2008) offers the most dismal view. According to him, though there is an economic case for GCC union which is not overwhelming, the political arguments against the union

appears to be overwhelming. He finds the lack of economic integration among the GCC members is striking. He concludes: "Without anything approaching the free movements of goods, services, capital and persons among the six GCC member countries, the case for monetary union is mainly based on the small size of all GCC members other than Saudi Arabia, and their high degree openings. Indeed, even without the creation of a monetary union, there could be significant advantages to all GCC members, from both an economic and security perspective, from greater economic integration, through the creation of a true common market for goods, services, capital, labor and from deeper political integration" (p. 43). One of his concern, in contrast to other researchers referred above, is of loosing the revenue from the distortionary inflation tax (seigniorage) of the member countries which is relevant because these countries do not have sufficient-distortionary taxes at their disposal. He points out that: "If the GCC countries differ in the effectiveness of their tax administration, different national inflation rates may be optimal. This would be an argument against monetary union" (Buiter 2008, p. 7). One of argument in favor of a union is that these countries face symmetric shocks. However, he contends that asymmetric shocks are certainly possible with the rapidly growing service sectors that include financial services and tourism. Alkharofey and Alreshan (2010), on the other hand, concede that a number of economic arguments do not support the monetary union at the moment; however, the support the project in the long-run when the mutual benefits would be reaped most.

Darrat and Al-Shamsi (2005) performed cointegration analysis between GCC countries' real GDP, inflation rates, financial markets, monetary policies, and found that these variables are cointegrated, their results indicate that "more efforts should be

directed at resolving possible sociopolitical differences that may have hampered real progress toward the emergence of a genuine and effective economic integration in the Gulf region"(p. 1061). Echchabi et al. (2011) believe that the GCC monetary union will bring many benefits to the GCC countries as well as to those developing countries who are receiving financial aids from the US. Unfortunately, their discussions are based on some ad-hoc arguments.

Schaechter (2003) contends that the main costs from the sacrifice of the national monetary policy should be limited because exogenous shocks such as oil price changes would affect all GCC countries in a similar way; that is, they face symmetric shocks. However, there is no consensus on this issue. Abu-Qarn and Abu-Bader (2008) analyze the viability of a monetary union in the GCC based on these symmetric/asymmetric shocks in GDP and the price level. First, they use structural VAR to identify both demand and supply shocks and see whether these shocks are symmetric or not. They find that demand shocks are symmetric while supply shocks are asymmetric (no significant positive correlations) which they consider as the better indicators of costs of forming a monetary union. The lack of correlations does not support a viable currency union. Second, they perform co-integration tests to find the existence of long-run relationships of real GDP among possible pairs of the GCC countries. They find only four (out of possible fifteen) pairs are correlated and they conclude that the GCC countries are not linked. Third, They test for common serial correlation (short-run synchronization) of the business cycles for the four pairs of countries which were cointegrated. They find only three cases to have common business cycles. In short, they do not find synchronous short-

run and long-run movements in output for GCC countries. Based on these findings they conclude that the requirements are not yet met for a successful monetary union.

Louis et al. (2008) ask whether these countries are subject to non-oil GDP rather than GDP as used by Abu-Qarn and Abu-Bader (2008). They argue that the breaking GDP in oil and non-oil GDP for the GCC countries is important because external shocks affect these two components differently. The other difference is that they also examine the commonality of shocks with the US, France, Germany and Italy in order to decide the suitability of the anchor currency dollar or euro. However, they use structural VAR models as in Abu-Qarn and Abu-Bader (2008). They find that non-oil aggregate supply shocks are weakly symmetrical across the GCC countries; neither aggregate demand nor aggregate supply shocks are symmetrical between the GCC countries and the three European countries; and only aggregate demand (not aggregate supply) shocks are symmetrical to the US. Based on these results they favor a monetary union for the GCC countries and recommend the US dollar as the viable anchor currency.

Benbouziane et al. (2010) examine the symmetry in each country's response to external shocks using the VAR technique and the multivariate threshold autoregressive model to identify and analyze the symmetry of these shocks. Their results indicate that the GCC countries should be grouped in two sub-groups: UAE, Oman and Bahrain in one group and Saudi Arabia, Qatar, and Kuwait in another group. Based on these results they conclude that GCC countries are still far away from an optimal currency area. Al-Hassan (2009) employs coincident indicator approach that consists of three steps. First, he estimates the covariance matrices of the common and idiosyncratic components, then he estimates the static factors, and finally he estimates the cyclical components of the GCC

GDP growth, financial variables, prices, international trade and monetary aggregates. He finds that the GCC coincident index and the real GDP growth have moved closely together, especially over the last decade. He finds a strong correlation between the indicator and real GDP which is an indicative of a high degree of commonality across the GCC countries.

Abed et al. (2003) point out that a crucial step in the formation of a currency union in the GCC region, in addition to creating the required institutional framework, is choosing an appropriate exchange rate regime. They compare the dollar peg to a dollar-euro basket peg as alternative exchange rate regimes at the start of the union. They present an estimable model of external stability that provides elasticity estimates for the various components of the trade account and examine if their stability improves by switching from dollar to a dollar-euro basket peg. They denote R as the common GCC currency. Their elasticity estimates for the $-R real effective exchange rate for most of the major components of the GCC trade account aggregates are statistically significant while the same elasticity estimates for the €-R real effective exchange rate are statistically insignificant. This implies that the main source of instability for the trade account has been the exchange rate with the dollar and if pegging to the dollar already minimizes this instability, there are no significant gains from the dollar-euro basket peg.

Khan (2009) points out that the choice of the dollar peg served these countries well for many years in maintaining macroeconomic stability. However, the recent continuing depreciation of the dollar against the major currencies raised the questions about the pegging the GCC common currency to the dollar. He recognizes the criteria of choosing exchange rate regime such as preserve monetary credibility and international

competiveness. However, he reminds that necessity of taking account of the dominance influence of the oil sector in GDP, exports, and government revenue. He discusses the four main options: pegging to the US dollar, managed floating, pegging to a basket, or pegging to the export price of oil. The dollar peg, seems to him, at this stage is the most appropriate option. He recommends to stick with the dollar peg leading to the monetary union and also in the short-run after the establishment of the monetary union. However, if the dollar continues to depreciate, pegging to a common basket of currencies may be the more appropriate exchange rate regime. Marzovilla (2014) argues that the conditions ensuring the success of a single currency are still lacking in the GCC countries. The author suggests that a basket peg would be the best exchange rate system for these countries and the basket should include the commonly used currencies in their international trade.

2.9 CONCLUSION

The theory of the OCA, conceived about a half century ago, remains a very important area of economic (both theoretical and empirical) research. After a relatively short pause in the 70s and 80s (probably due to the inherent inconsistencies in the criteria of the theory), the issues related to the theory of OCA resurfaced in the early 1990s with more interest. The experience of the European Union served as a catalyst. Developments of macroeconomic (monetary) theories such as rational expectations, time inconsistency and credibility problems added another impetus. These issues are added to the old OCA theory to give birth to the new OCA theory. Endogeneities of OCA are now much discussed topic which focuses on *ex post* changes in economic structure (incentive structure) and performance after joining a monetary union.

Empirical research, especially on EMU countries, is now plenty. Early evidence showed that the European countries in general had historically faced less correlated shocks than the states of the US and concluded that forming a union in Europe might be costly. Recent results show that while a common currency tends to raise the comovements of real relative price shocks, it decreases the comovement of output shocks. On the benefits side, there is a consensus that a currency union increases trade and income, however, the magnitude of the effect varies from researcher to researcher and how they tackled the inherent econometric problems.

We have also reviewed empirical evidence from Africa, Asia, and Latin America. Results from CAEMC, CMA, and WAEMU countries, in general, do not meet the criteria of a monetary union. Similar consensus arises from the proposed monetary unions from other African countries. One lesson from Latin America is that currency union is not a solution to the recurring problems of the sudden stop or current account reversal of the Latin American countries. The main problem of a successful currency union in Asia is that of a consensus agreement on Asian currency unit.

Finally, we have reviewed the evidence of a proposed monetary union in the GCC countries from the perspectives of costs and benefits. After discussing the benefits and costs of the GCC monetary union, the study mainly concentrates in estimating the prospective effects of the GCC monetary union on trade and economic growth.

CHAPTER 3

CONVERGENCE AND THE SHOCK SYNCHRONIZATION OF THE GCC COUNTRIES

3.1 INTRODUCTION

The Gulf Cooperation Council (GCC) countries are traditionally a homogenous group in the sense that they share a common history, language, culture, and social and political background. They have similar production structures and economic policies and are mainly exporters of oil and products related to hydrocarbon. The GCC was formed in 1981 and the members signed an economic agreement to coordinate their financial, monetary, and banking policies. They have also agreed to enhance cooperation between monetary agencies and central banks, including an endeavor to establish a common currency in order to further their desired economic integration. However, in the next two decades very limited progress was achieved in the intended integration process that would pave the way to a common currency. The Heads of States of the GCC countries met in Muscat in December 2001 to lay down some concrete steps to launch a single currency in the beginning of 2010. However, the proposed GCC monetary union is not yet materialized.

Since 2001 much progress has been made toward achieving the goal of the GCC monetary union. For example, to facilitate the monetary integration process, the GCC countries since 2003 have opted to maintain *de jure* pegged exchange rates against the US dollar though they previously maintained *de facto* fixed exchange rates against the dollar for a long time (Khan, 2009). In accordance with the economic agreements among the GCC countries in 2001, a common tariff that includes a common external customs tariff and common custom regulation was introduced in 2003. This agreement has also

eliminated all tariff and non-tariff barriers and has been treating any good as a national product if it is produced by any GCC member state.

According to the economic agreement, the GCC common market was launched from the beginning of 2008. The common market provides GCC citizens equal treatment in all economic activities, especially freedom of movement and residence, work in private and government jobs, pension and social security, engagement in all professions and crafts. Citizens are also given equal treatment in investment and real estate ownership, capital movements, tax treatment, stock ownership and formation of corporations, education, health, and social services. There is virtually no restriction on the mobility of goods, national labor and capital among the member countries. Regulations and supervision of the banking sector are being harmonized over time.

However, there have also been some unanticipated setbacks that may have contributed to the failure in establishing the GCC monetary union by 2010 as was originally planned. In 2007 Kuwait unilaterally moved from the dollar peg to an undisclosed currency basket. Oman in 2006 and the UAE in 2009 pulled out of the proposed monetary union.

The viability of the GCC monetary union will be considered by evaluating the costs and benefits of the monetary union. In general, countries can benefit from a monetary union through lower transaction costs and the elimination of exchange rate variability that foster investment, intraregional trade and economic growth (Rose, 2000, Alesina and Barro, 2002, Mongelli, 2002, Rose and Stanley, 2005, and De Grauwe 2012). However, the most important benefit from the monetary union of the GCC countries, according to Schaechter (2003), would come from the integration and development of the

money, bond and equity markets of the area that would improve the efficiency of banking and financial services which in turn would foster the desperately needed growth of the non-oil output of the region. Al-Turki (2007) also has emphasized similar benefits such as structural and institutional reforms, price transparency, integration and development of the GCC financial markets, elimination of currency conversion costs, and boosting the flow of regional and international investment in the region. Onour (2008), while acknowledging the gains in market efficiency from the integration of banking and financial markets, argues that it may also reduce the opportunities for regional diversification. The main cost of a monetary union is to give up the ability to set independent monetary and exchange rate policies. On this count, according to Schaechter (2003), the cost is limited "because important exogenous shocks (such as crude oil price changes) would affect GCC countries in a similar way given the still high importance of oil in their economies" (p. 16). Al-Turki (2007) also contends that the costs are limited because these countries have already been coordinating their monetary, financial and other policies. Their exchange rates have remained almost unchanged for the prolonged period under similar pegged exchange rate regimes.

This chapter examines the desirability and feasibility of establishing the GCC monetary union in two complementary ways. First, it discusses briefly the state of monetary (such as exchange rate, inflation, and interest rate), fiscal, and growth convergence of the GCC countries. However, the discussion is basically descriptive without any econometric evidence. In recent studies on forming the GCC monetary union, researchers have been examining such feasibility by assessing the symmetry of the external shocks that these countries experience and by examining the business cycle

synchronization. Thus, the second part of this chapter supplements the above discussion by providing econometrics evidence based on these recent lines of research.

The rest of the chapter is organized as follows: Section 3.2 briefly reviews the literature that specially deals with the possibilities of forming the GCC monetary union. The state of monetary, fiscal and growth convergence among the GCC countries for the period 1980 to 2010 is discussed in section 3.3. Section 3.4 presents econometric evidence on the business cycles synchronization and shocks correlations of the GCC countries using a structural Vector Autoregressive (SVAR) model. Section 3.4 concludes the chapter.

3.2 LITERATURE REVIEW – INTEGRATION AMONG THE GCC COUNTRIES

Dar and Presley (2001) in one of the earlier studies on economic integration among member countries of the GCC countries found a low level of integration measured by a very small volume of intra-regional trade. The authors attributed this low level of integration to the characteristics and economic structure of the member states. Laabas and Limam (2002) addressed the viability of the GCC monetary union by testing some eligibility criteria for monetary unions, and concluded that launching the GCC monetary union could result in the synchronization of the business cycles and more intra-regional trade.

Darrat and Al-Shamsi (2005) performed cointegration analysis between GCC countries' real GDP, inflation rates, financial markets, monetary policies, and found that these variables are cointegrated and have suggested that "more efforts should be directed at resolving possible sociopolitical differences that may have hampered real progress

toward the emergence of a genuine and effective economic integration in the Gulf region" (p. 1061).

Because of their prevailing exchange rate regime and free capital mobility, these countries cannot have an independent monetary policy. The monetary policy of these countries is essentially to manage the liquidity that mainly fluctuates with international reserves (capital inflows) which in turn fluctuate with the fluctuations in oil prices and foreign direct investments. Fasano (2003) has pointed out that these countries use different indirect monetary policy instruments (such as open market operations using treasury bills and government development bonds, foreign exchange swap operations and repos, central bank certificates of deposits, reserve requirements) to manage their liquidity. However, there is a commonality of their policy in the sense that the central banks of the GCC countries have been fully (with some exceptions) sterilizing the impact of international reserves on their monetary base to stabilize the domestic prices for the last two decades (Nakibullah 2011). The commonality of this policy (stable growth rates of monetary base around zero) and the dollar peg suggest that monetary integration is already in place.

Al-Turki (2007) reviewed many criteria of the optimum currency areas to evaluate whether the GCC region is an optimum currency area. He argued that the most of the criteria found in the literature supports the movement toward a monetary union in the region. Kamar and Naceur (2007) contend that the coordination of the macroeconomic polices is a pre-requisite for launching a successful common currency in the GCC countries. Based on their empirical evidence, they have reached the conclusion that though there is a high (deeper) coordination that reduced the misalignments of the

real exchange rate and led to its convergence among the GCC countries, there is a room for further coordination and harmonization.

Abu-Qarn and Abu-Bader (2008) analyze the viability of a monetary union in the GCC based on symmetric/asymmetric shocks in GDP and the price level. First, they use structural VAR (SVAR) to identify both demand and supply shocks and see whether these shocks are symmetric or not. They find that demand shocks are symmetric while supply shocks are asymmetric (no significant positive correlations) which they consider as the better indicator of costs of forming a monetary union. The lack of correlations does not support a viable currency union. Second, they perform co-integration tests to find the existence of long-run relationships of real GDP among possible pairs of the GCC countries. They find only four (out of possible fifteen) pairs are correlated and they conclude that the GCC countries are not linked. Third, they test for common serial correlation (short-run synchronization) of the business cycles for the four pairs of countries which were cointegrated. They find only three cases to have common business cycles. In short, they do not find synchronous short-run and long-run movements in output for GCC countries. Based on these findings they conclude that the requirements are not yet met for a successful monetary union.

Louis et al. (2008) using a SVAR approach where they split GDP into oil and non-oil GDP and ask whether these countries are subject to non-oil GDP rather than GDP shocks as used by Abu-Qarn and Abu-Bader (2008). They argue that non-oil GDP for the GCC countries is important because external shocks affect these two components differently. Based on their results they favor a monetary union for the GCC countries and recommend the US dollar as the viable anchor currency. Bacha (2008), using the impulse

response function from a VAR, finds strong monetary sector integration among GCC countries. Al-Hassan (2009) employs coincident indicator approach that consists of three steps. First, he estimates the covariance matrices of the common and idiosyncratic components, then he estimates the static factors, and finally he estimates the cyclical components of the GCC GDP growth, financial variables, prices, international trade and monetary aggregates. He finds that the GCC coincident index and the real GDP growth have moved closely together, especially over the last decade. He finds a strong correlation between the indicator and real GDP which is an indicative of a high degree of commonality across the GCC countries. Espinoza at al. (2011), using beta and sigma convergence approaches, has argued that the GCC countries have attained significant progress toward economic integration and have achieved the convergence criteria on nearly all fronts except the financial markets which are in different stages of development.

3.3 STATE OF CONVERGENCE AMONG THE GCC COUNTRIES

This section reviews whether the GCC countries fulfill the convergence criteria mentioned in the traditional theory of the OCA and in the OCA literature in general. In particular, we consider the convergence criteria in the areas of exchange rates, inflation rates, interest rates, fiscal and growth rates. We start with the exchange rate convergence because that was the officially declared first step taken by the GCC toward monetary integration.

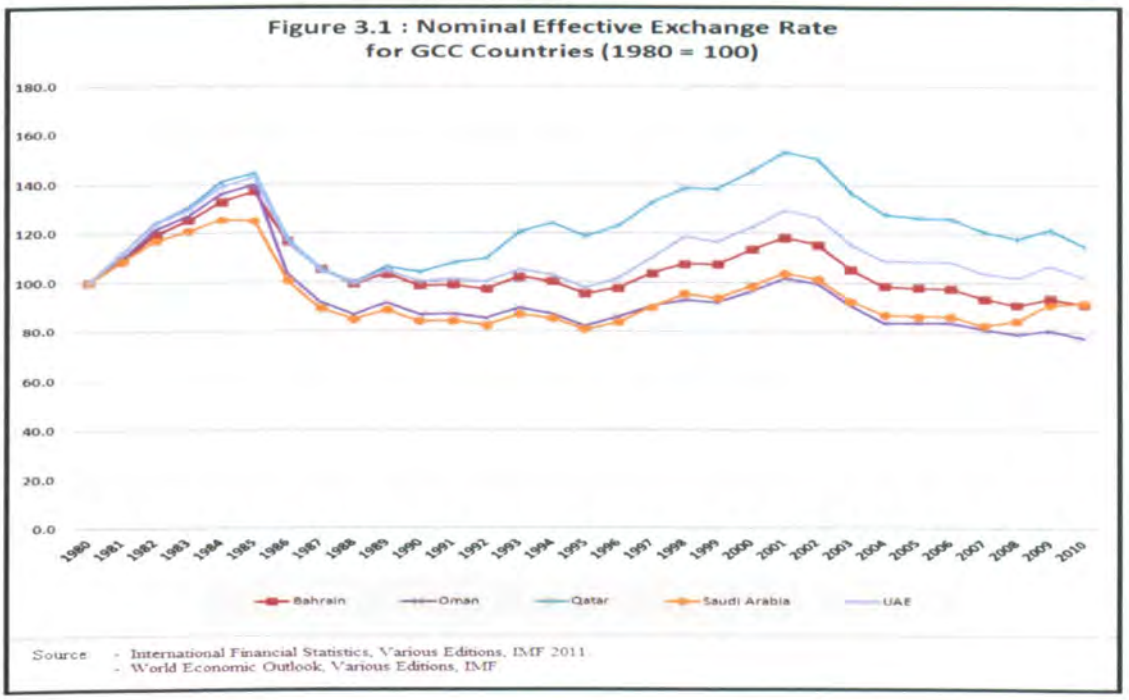
3.3.1 Exchange Rates Convergence

Khan (2009) suggests that officially pegging the currencies of the GCC countries to the U.S. dollar would maintain stability and strengthen confidence in the economies and it would help these countries to go into the monetary union at those parities. He also suggests that the strongly and positively correlated business cycle dynamics (cyclical synchronicity) of output and consumption between the GCC and the US are achieved through their credible pegged exchange rate against the dollar. The absolute purchasing power parity (PPP) states that the structural inflation rates in two countries would converge when the long-term bilateral exchange rate variability is low – for example if they are both pegged to the same reserve currency. The terms of trade would exhibit narrow fluctuations between countries pursuing intra-regional exchange rate stability or even planning to share a single currency (see, for example, Eichengreen, 1990).

We evaluate the nominal exchange rates of the GCC countries over the period 1980 to 2010. During the 80s and in the 90s, though the exchange rates of Bahrain, Qatar, Saudi Arabia and the UAE were officially (*de jure*) pegged to the Special Drawing Rights (SDR) , they were effectively (*de facto*) fixed to the US dollar. The Omani riyal has officially been pegged to the US dollar since 1986. Though Kuwait had fixed but adjustable exchange rate between Kuwait dinar and a weighted basket of currencies, it had also *de facto* fixed exchange rate against the dollar because the dollar (greatly) dominated in the currency basket. Though these countries had *de facto* fixed exchange rates against the dollar, they (including Kuwait) opted to maintain *de jure* pegged exchange rates against the US dollar in 2003 as a first step to their currency union.

Besides the US, Japan, Korea and the large European countries are the major trading partners of the GCC countries. Thus, the relevant exchange rates in evaluating the convergence should be the nominal effective exchange rates (NEER) of the GCC countries against their trading partners. The NEER is a ratio of an index of country's period average rate to a weighted geometric average of exchange rates for the currencies of selected (major) trading partners. Even though the GCC countries have maintained a fixed nominal exchange rate against the dollar for a long time, their effective nominal exchange rates fluctuate with the fluctuations of the dollar against the major currencies of their trading partners (figure 3.1).

Figure 3.1 shows the movements of the NEER of the GCC countries from 1980 to 2010. The NEER of Kuwait is not presented because the series is not available in the International Financial Statistics most probably because of the undisclosed weights of the basket of currencies. Figure 3.1 shows that the degree of nominal effective exchange rate stability among GCC currencies during the sample period 1980 – 2010 is significant. It reflects the long-standing common commitment of the GCC countries' exchange rate policies towards a peg to the US dollar. Figure 3.1 also shows that there was no significant divergence of the exchange



rates among the GCC countries except for Qatar for the last 15 years or so. Qatar experienced a dramatic turnaround in economic performance in the second half of the 90s when it broke away from its dependence on oil to its large untapped natural gas. This means Qatar has been experiencing expanded and diversified economic activities more so that any other GCC countries which led to some divergence of its NEER from other GCC countries.

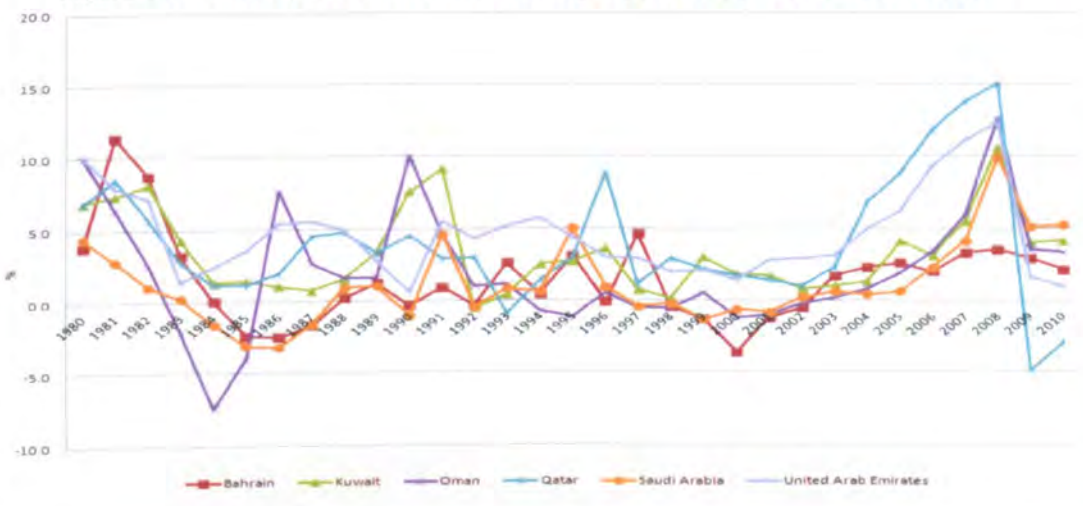
Sturm and Siegfried (2005) have identified the reasons for such stability as: " (i) the similarity of economic structures of the GCC member states , notably the role of oil in their economies, which reduces the potential for asymmetric shocks and thus the need to resort to exchange rate adjustments; (ii) economic policies in GCC member states , which have largely been consistent with the exchange rate pegs and have not undermined their credibility ; and (iii) the accumulation of significant foreign exchange reserves by the GCC member states, which have underpinned the credibility of the peg and deterred

speculative attacks" (p.36). Moving toward monetary union would not require exchange rate conversion as the EMU did. However, this would not be a problem for the GCC countries because of their long-standing exchange rate regimes of fixed exchange rates against the US dollar. There may be some requirement for a limited adjustment for Kuwait.

3.3.2 Convergence of Inflation Rates

Inflation is one of the five convergence criteria that has been agreed by the heads of states of the GCC countries in the Muscat meeting of 2001 (Khan, 2009). Here, we measure the convergence of inflation as the difference of the annual percentage changes in the consumer price indices (CPI) for each of the GCC country. Figure 3.2 shows that inflation has been low within the GCC countries, except early years and the spikes at end of the sample period 1980-2010. Except in few countries and in exceptional years, inflation rates rarely exceeded 10%. Inflation rates have also moved together (more or

Figure 3.2 : Annual Consumer Price Changes (Inflation) for GCC Countries



Source : - International Financial Statistics, Various Editions, IMF 2011.
- World Economic Outlook, Various Editions, IMF.

less) for the GCC countries during this period. This is one of encouraging results in Al-Turki (2007) and Abu-Qarn and Abu-Bader (2008) that inflation rates in the GCC countries are correlated and exhibited a great deal of convergence. Since the oil recession in the GCC countries in the mid-80s, inflation rates remained stable till 2003 when inflation rates of these countries converged to about 2.5%. From 2003 inflation rates among the countries started to diverge due to higher oil price and rising import prices with the depreciation of their currencies along with the depreciation of dollar (Sturm et al., 2008).

Table 3.1 shows the average inflation rates for three different periods: 1980 – 2010, 1992 – 2002, and 2003 – 2010. That is, the whole sample period is divided in two other sub periods after the Kuwait (Gulf) war when the money and capital markets of these countries started to develop and the central banks started to use more indirect

Table 3.1: Average inflation rates (%) of the GCC countries

Period	**Bahrain**	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**UAE**
1980 - 2010	1.62	3.28	1.97	3.83	1.21	4.48
	(180)	(88)	(206)	(108)	(226)	(64)
1992 - 2002	0.86	1.48	–0.10	2.21	0.27	3.27
	(253)	(88)	(830)	(90)	(641)	(41)
2003 - 2010	2.49	4.21	3.82	5.97	3.43	5.93
	(25)	(70)	(97)	(119)	(91)	(68)

Note: Coefficients of variation (%) in parentheses.

Source: International Financial Statistics, Various Editions, IMF.

monetary instruments. The period 1992 – 2002 remained one of the stable periods and inflation rates were quite stable and they converged to about 2.5% in 2002. Then started

two external shocks of dollar depreciation (starting from 2003) followed by unprecedented oil price increase. Though the average inflation rates for Kuwait, Qatar, and the UAE (the three highest per capita income countries of the GCC) were higher than other three countries, these rates are not in any way hindrance to the long-term growth. However, it is encouraging to note that the coefficients of variation (reported in parentheses of table 3.1) for these three countries were substantially smaller than the other three countries (Bahrain, Oman and Saudi Arabia) that experienced smaller average inflation rates for the whole sample period. Though the coefficient of variation for Qatar increased during the turbulent period 2003 – 2010, it is not very far from Oman and Saudi Arabia.

The break-down of inflation rates for different periods in table 3.1 shows that the GCC countries have experienced episodes of high cross-sectional variation in inflation rates. This raises the question of long-run convergence of the inflation rates of the GCC countries. To test it the Phillips and Sul (2007) test of convergence is performed. First, following Phillips and Sul (2007) recommendation, the Hodrick-Prescott (1997) filter (or HP filter) is used to filter out the cyclical component of the inflation rates data series of each country and then work out with the filtered or trend component of the series to construct transition factor for each country and year. The transition factors or coefficients for each country and year (h_{iij}) is defined as the ratio of the (trend or filtered) inflation rates of each country and year to the (filtered) GCC mean for each year. From these transition factors, the cross-sectional variance for each year is constructed. The transition path for each country is plotted in figure 3.3. Figure 3.3 shows one prominent blip around 1999. The inflation rates of Qatar and the UAE around 1999 were substantially above the

GCC mean whereas the inflation rates of Oman and Saudi Arabia were substantially below the GCC mean. This has caused a substantial variance blip around 1999 as we see in figure 3.4.

The Phillips and Sul test for convergence recommends trimming at least 20% of

Figure 3.3: Transition Path of the GCC Inflation Rates

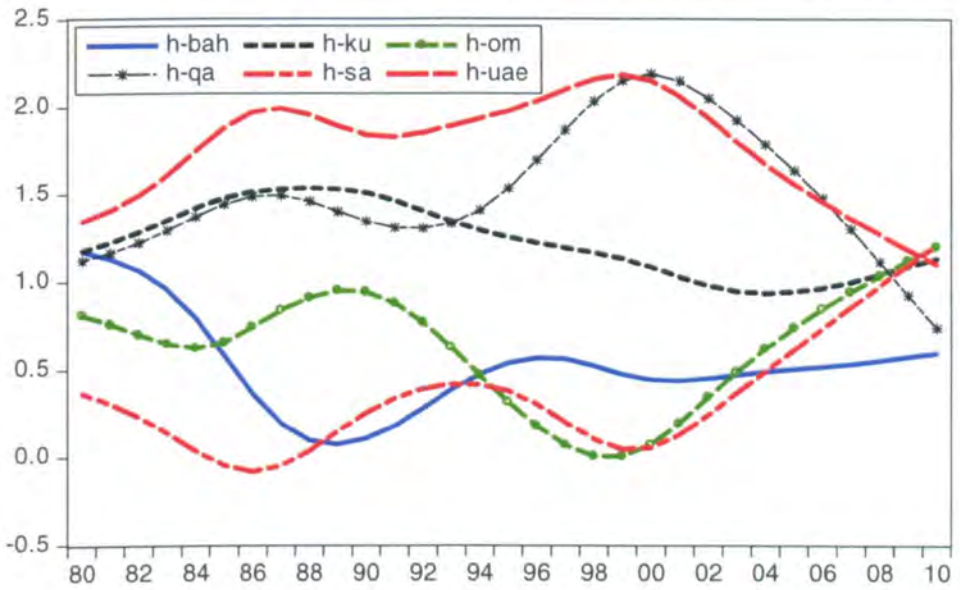
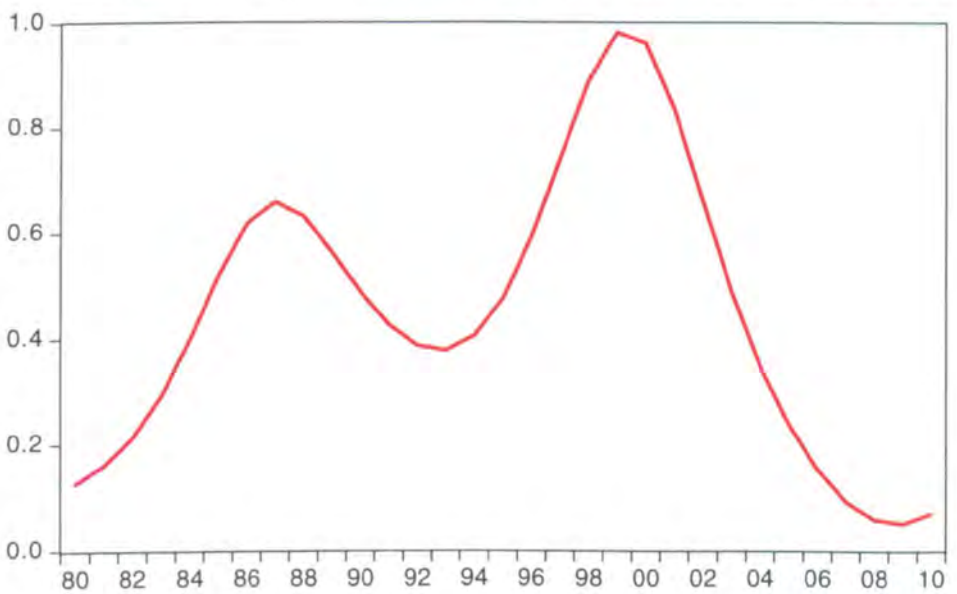


Figure 3.4: Cross-Sectional Variance of the GCC Inflation Rates



the sample at the origin. This means in our case we start the sample in 1988. The Phillips and Sul test results are presented in table 3.2. The dependent variable in table 3.2 is DEPVAR = –log(var) + log(var1) – 2log(log(t)) and the explanatory variable (EXPVAR) is log(t). Because the DEPVAR is based on the negative log of the variance series, a significant positive coefficient on the EXPVAR is evidence of convergence. Results in table 3.2 show that for the period 1988 – 2010 (after trimming about 20% sample at the

Table 3.2: Results of Convergence Test for Inflation Rates

DEPVAR = –log(var) + log(var1) – 2log(log(t))				
Period	Variable	Coefficient	HAC Standard Error	Probability
1988 – 2010	Constant	–3.049	1.800	0.105
	EXPVAR	0.662	0.657	0.325
1994 – 2010	Constant	–9.812	3.869	0.023
	EXPVAR	2.787	1.230	0.039

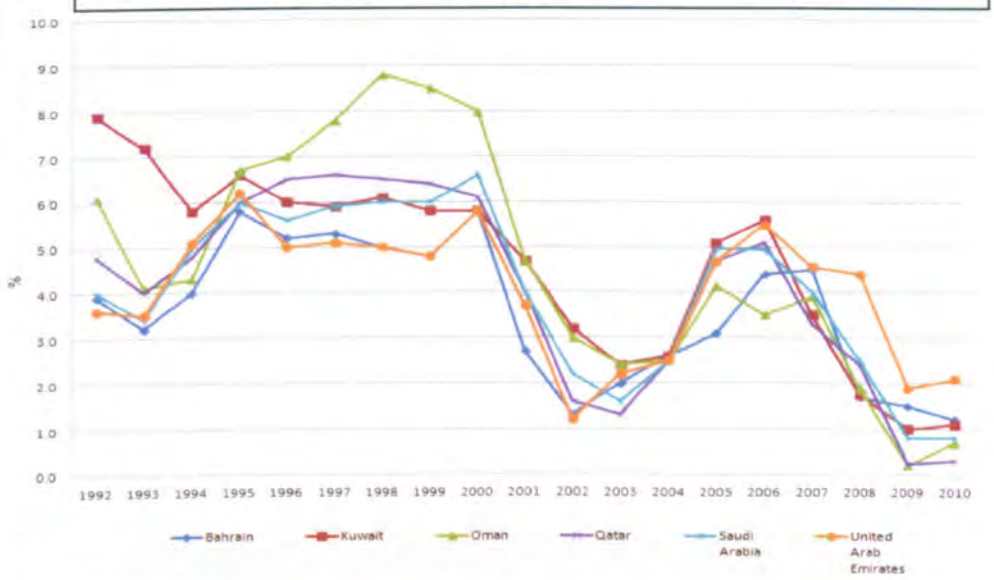
origin) the coefficient of EXPVAR is positive but it is not significant indicating no convergence. However, if we trim the sample a bit more till 1993, the results in table 3.2 indicate convergence. If we ignore the formal log(t) test as in table 3.2 and we look at figure 3.4, the cross-section variance for the whole decade has been declining all the way to the end of the sample. This suggests the inflation convergence criterion based on the recent trend should not be a problem in forming the GCC monetary union. .

3.3.3 Convergence of Interest Rates

The ability of the countries to set their own nominal interest rates is considered as a measure of their ability to set independent monetary policy. Thus, the convergence of interest rates can be used as a measure of financial market integration as well as the measure of the degree of synchronization of the monetary policy stance across countries. Dorrucci et al. (2002) have pointed out that the rationale for measuring monetary policy

synchronisation is that the higher the initial similarity of interest rates, the less is the cost for each country of moving to a common monetary policy. Because of the lack of monetary independence due to free capital movements and the pegged exchange rate regime, the interest rates of the GCC countries cannot diverge greatly from the comparable US interest rates. Fasano (2003) found similar nominal short-term interest rates (measured by three-month interbank rates) among the GCC countries and they diverged narrowly from the comparable US interest rate. Here we use three-month nominal deposit rates for the period 1980 – 2010. The three-month nominal deposit rates are used for all GCC countries because of the availability of the comparable data. It should be noted that the short-term credit market is prevalent in the GCC countries. In this region the long-term interest rates, for example, 10-year bonds, virtually do not exist.

Figure 3.5: Interest Rates (%) in GCC Countries (3-months deposit rates)



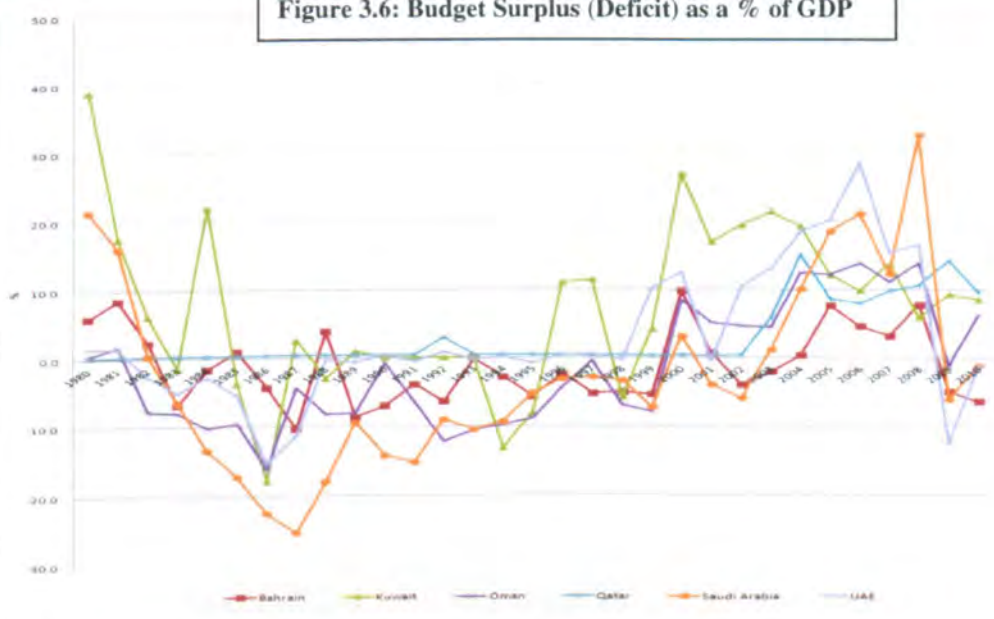
Source: - International Financial Statistics, Various Editions, IMF 2011
- World Economic Outlook, Various Editions, IMF

Figure 3.5 shows the trend of three-month deposit rates for all countries for the period 1980 – 2010. It shows that interest rates in GCC member states have been drifting in the same direction or have been following the same trend. Sturm and Siegfried (2005) have suggested that over the past 20 years , interest rates in GCC member state have co-moved in similar ranges. Country specific (internal) developments in some GCC countries led interest rates to behave differently in few occasions over the sample period.

3.3.4 Fiscal Convergence

Fiscal integration is another criterion typically used in judging whether economies are ready to form monetary union. Fasano and Iqbal (2002) stated that fiscal discipline is crucial for the success of the monetary union. Large differences in fiscal stances among the member countries can create tensions that may lead to political disagreement which in turn may hinder other key macroeconomic convergence requirements such as price stability for the smooth functioning of the union. The theory of fiscal integration deals with the issue of optimal fiscal domains analyzed in relation to the EMU (Robson, 1987). It studies the rationale, structure and impact of fiscal (tax and budgetary) systems of the integrated countries. Fiscal convergence is examined here using the fiscal surplus (+) or deficit (–) to GDP ratio to obtain a clear overview of the fiscal situation in the GCC countries during the sample period of 1980-2010 (Figure 3.6).

Figure 3.6: Budget Surplus (Deficit) as a % of GDP



Source : International Financial Statistics, Various Editions, IMF 2011
World Economic Outlook, Various Editions, IMF

The budget deficit/surplus as a share of the GDP of the GCC countries for the period 1980 - 2010 is plotted in figure 3.6. The lion's shares of the government revenues of the GCC countries come from the oil revenue. Thus, it is obvious that the budget positions of the GCC countries would fluctuate with the fluctuations of the oil prices. This is very much evident in figure 3.6 . We know that after the unprecedented surge in oil price in the mid 70s, oil price was depressed during most of the 80s and 90s. Thus, as we see from figure 3.6, budgets of these countries were in deficit during those years. Deficits turned to surpluses in the last decade when oil prices started to rise again. Surpluses have started to build up and converging for Kuwait, Oman and Qatar with the recent increase in oil price. However, the budget surpluses of Bahrain, Saudi Arabia and the UAE have turned to deficits by 2010. Obviously, the magnitudes of the deficits and surpluses of these countries differ because of their huge differences in their share oil and gas sector in their GDP. For example, Saudi Arabia is one of largest oil producer in the world and it experienced the highest annual average deficit of 7.7% of GDP during the period 1980 - 2002. Obviously, the country specific problems also influence fiscal positions. For example, as we see from figure 3.6, Kuwait experienced a large deficit following the Iraqi invasion in the early 90s.

3.3.5 Growth Convergence

Economic growth is a key economic integration variable outlined in the original OCA theory (Emerson et al. 1992). Economic growth rate is the rate at

which real GDP per person (standard of living) increases over time. Here we discuss real economic convergence based on the neoclassical growth model. The real economic convergence across countries (or regions) stems from the traditional neo-classical model of Solow (1956) and Swan (1956). The neo-classical model assumes that the factors of production are continuously substituted for each other and each factor of production is subject to diminishing returns. The basic Solow model predicts that continuous investment by itself cannot generate long-run growth because diminishing returns would eventually cause the gains in output from investment to approach zero. . In other words, the long-run growth that applies to well over a century for advanced countries cannot be simply attributed to an expanding capital stock. However, the model does explain such long-run growth when it incorporates exogenous technological progress. Modern theories of endogenous growth (see, for example Romer, 1990) attempt to explain technological progress rather than assuming it as exogenous. These theories try to explain the decisions that determine the creation of knowledge through the investment on research and development. Some of these models assume increasing returns to reproducible factors such as human capital which makes the return on investment an increasing function of the accumulated stock of capital. As a result the growth rate and the standard of living will increase with time. Table 3.3 shows that the average annual growth rates over the last three decades differ across the GCC countries. The average growth rate of Kuwait would be lower than 4.9% if abnormal growth rates leading to the Kuwait (Gulf) war and few years following it were ignored. The growth rate in Saudi Arabia has been sluggish in Saudi Arabia.

Table 3.3 – Real GDP % Change for GCC Countries
Descriptive Statistics – Sample Period (1980 – 2010)

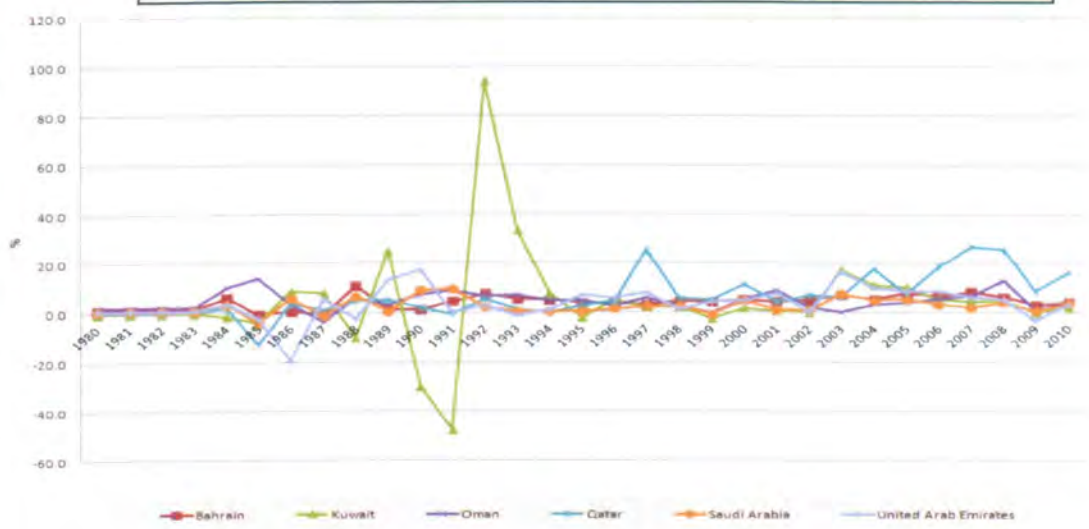
Countries	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Mean	4.2	4.9	4.8	6.7	2.6	3.9
Maximum	10.9	94.6	13.7	26.8	9.9	17.5
Minimum	-1.2	-47.6	-3.7	-13.0	-4.1	-19.4
Std. Deviation	2.85	22.09	3.76	8.73	3.12	6.84
Skewness	0.04	1.92	0.42	0.80	0.55	-0.91
Kurtosis	-0.23	9.98	0.61	0.98	0.35	3.87

Source: United Nations Statistics Division – National Accounts 2011

Qatar has been growing at a faster rate than any other GCC countries. The economies of Bahrain, Oman, and the United Arab Emirates have witnessed persistent growth, though standard deviation the UAE witnessed a higher standard deviation. This is because overall growth rates of these countries depend on the share of their oil sector and non-oil sector (diversification) to overall GDP.

Figure 3.7 shows the trend of the overall real per capita GDP growth of the GCC countries for the period 1980 – 2010. However, Figure 3.7 is not very helpful in untangling the year to year fluctuations of growth rates because of the abnormal change in growth rates of Kuwait from –48% in 1991 to +95% in 1992 following the Kuwait war. Figure 3.8 repeats the per capita growth rates ignoring the growth rates of Kuwait from 1989 to 1992 (that is, ignoring years leading to and after the war). Figure 3.8 shows clearly year to year changes in the per capita growth rates of real GDP of the GCC

Figure 3.7: Growth Rates (%) of Per Capita Real GDP of the GCC Countries

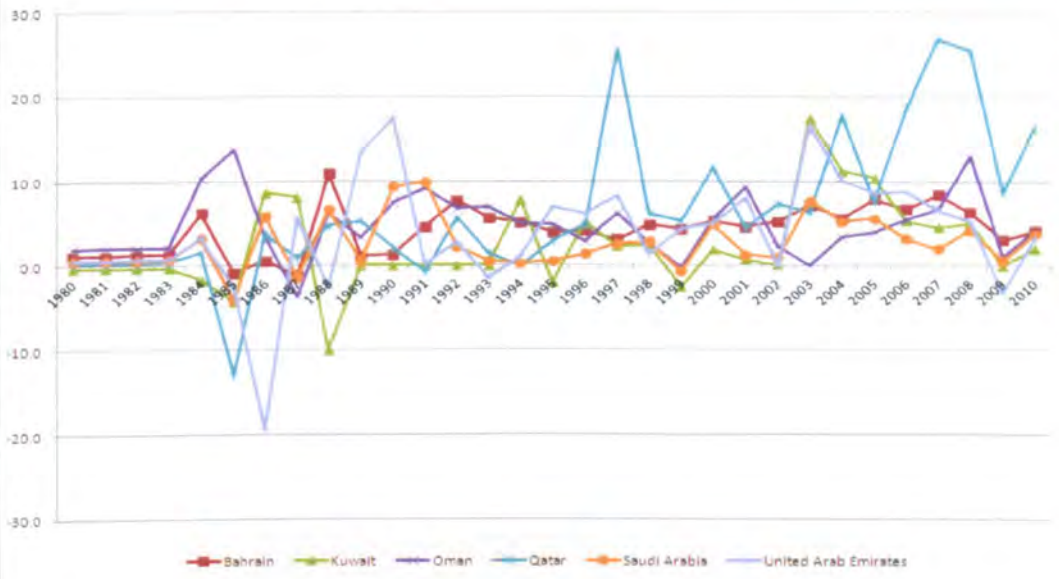


Source: – United Nations Statistics Division - National Accounts 2011

countries. No doubt non-renewable natural resources are the main driving forces for the overall growth rate of these countries. Figure 3.8 shows clearly that Qatar has been diverging away from the per capita growth rates of other GCC countries since the discovery of its huge reserve of the liquefied natural gas at the end of the 90s. It shows how oil price development determines their growth rates. For example, let us consider the recent oil price hike for the period 2003 – 2008. All these countries experienced healthy per capita growth rates during this period (figure 3.8). However, the divergence of the growth rates due to the share of their non-renewable resources is also very clear. It also shows the importance of the diversification of their economies. The oil boom led to a boom in construction (a way of diversification), especially in the UAE and then the worldwide financial crisis of September 2008 followed by a fall in oil price most probably caused such an unprecedented capital flight from the UAE and eventual accelerated decline in its growth rate.

Figure 3.8 seems to corroborate the finds of Al-Hassan (2009) that the real per GDP growth rates of the GCC countries have moved closely together and have shown a

Figure 3.8: Growth Rates (%) of Per Capita Real GDP of the GCC Countries



Source: - United Nations Statistics Division - National Accounts 2011

high degree of commonality across the GCC countries. This is also consistent with Al-Turki (2007) findings that the trend or permanent component has shown a very strong correlation between their growth paths but not with their cyclical components.

The Phillips and Sul (2007) test of convergence is also performed to test the long-run convergence of the per capita growth rates. As in the case of inflation rates, the HP filter is used to filter out the cyclical component of the per capita growth rates data series of each country and then work out with the filtered or trend component of the series to construct transition factor for each country and year. The transition path of the per capita growth rates for each country (except Kuwait) is plotted in figure 3.9. Figure 3.9 shows

Figure 3.9: Transition Path of the per capita Growth Rates

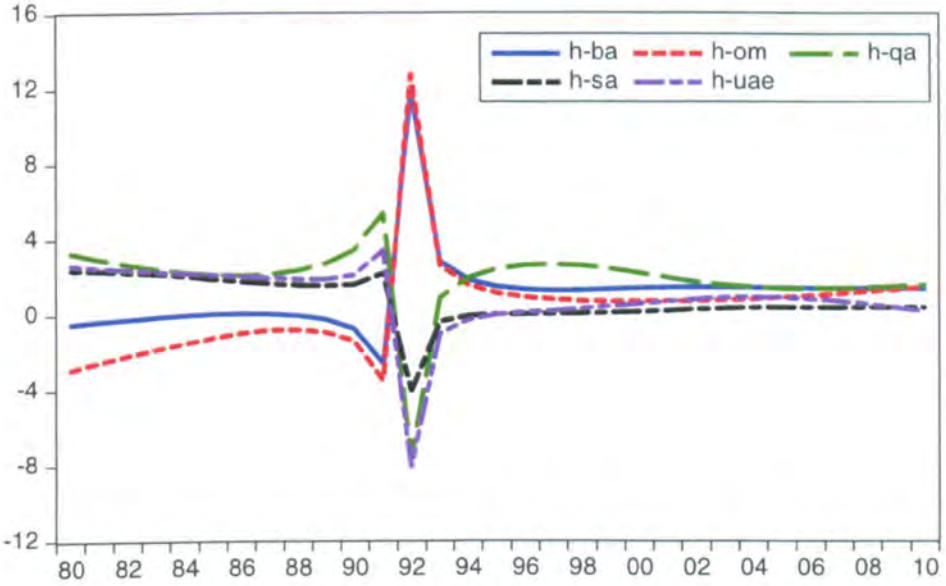
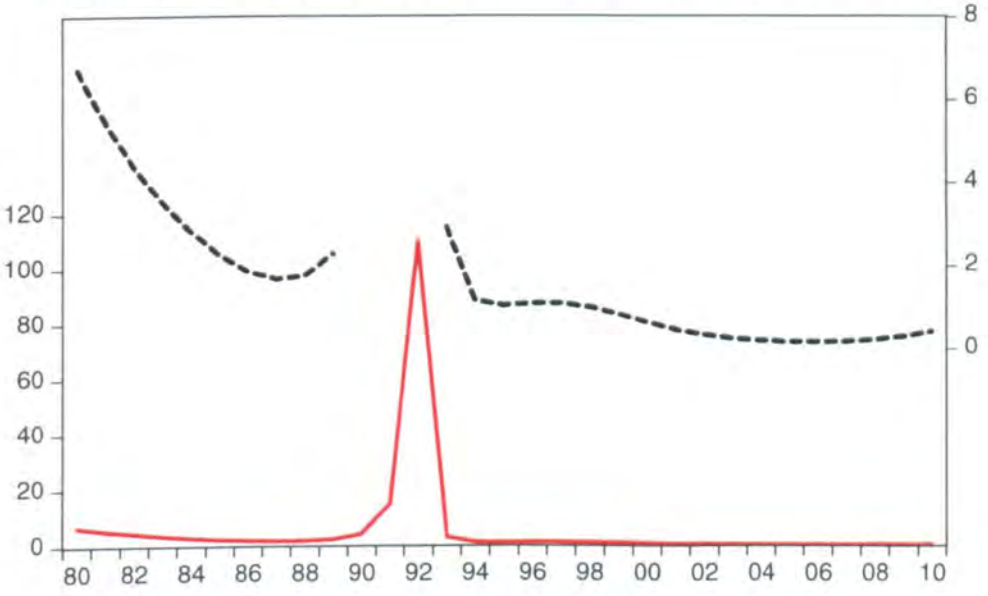


Figure 3.10: Cross-Sectional Variance of the Per Capita Growth Rates



one prominent spike in 1992 even when we have excluded Kuwait. The per capita growth rates of Qatar, Saudi Arabia and the UAE were substantially below the GCC mean in 1992 whereas the per capita growth rates of Bahrain and Oman (two smallest oil dearth economies of the GCC) were substantially higher than the GCC mean. This has caused a

huge spike in the variance of per capita growth rates (solid line left hand scale) in figure 3.10. The variance of the per capita growth rates excluding the period 1990 – 1992 of the spike (broken lines right hand scale) is also plotted in figure 3.10.

The variance of the per capita growth rates from 1993 shows a continued decline (though there is a tendency of reverting at the end of the sample). Thus, we expect a convergence of the per capita growth rates at least from 1993. The Phillips and Sul test results for per capita growth rates are presented in table 3.4. Results in table 3.4 show that for the period 1988 – 2010 (after trimming about 20% sample at the origin) the

Table 3.4: Results of Convergence Test for Per Capita Growth Rates

DEPVAR = –log(var) + log(var1) – 2log(log(t))				
Period	Variable	Coefficient	HAC Standard Error	Probability
1988 – 2010	Constant	–9.631	2.894	0.004
	EXPVAR	2.496	0.920	0.013
1994 – 2010	Constant	–8.013	1.758	0.000
	EXPVAR	2.105	0.591	0.003

coefficient of EXPVAR is positive and it is highly significant indicating convergence. As expected the results for the period 1994 – 2010 also shows the convergence of the per capita growth rates.

3.4 BUSINESS CYCLE AND SHOCK SYNCHRONIZATION OF THE GCC COUNTRIES: ECONOMETRIC EVIDENCE

The previous section has described the state of the convergence criteria that would be helpful in forming the GCC monetary union. It is argued (with some empirical evidence) that the GCC countries more or less have met these criteria. In recent studies on forming the GCC monetary union, researchers have been examining such feasibility

by assessing the symmetry of the external shocks that these countries experience and by examining the business cycle synchronization. This section provides econometric evidence based on these recent lines of research.

Following Blanchard and Quah (1989), studies have used structural Vector Autoregressive (SVAR) models to identify structural demand and supply shocks (see, for example, Bayoumi and Eichengreen, 1992). The imbedded assumption (as in the standard macro AD-AS model) is that the demand shocks have only temporary effects on output but have permanent effects on prices. On the other hand, supply shocks have permanent effects on both output and prices. Based on these assumptions and other identifying restrictions, structural shocks are identified (recovered) and correlations of the shocks across countries are computed. Positive correlation of the shocks is taken as evidence that the shocks are symmetrically distributed across countries in which case feasibility of forming a monetary union is high and the cost of losing monetary independence is low.

Bayoumi and Eichengreen (1994) analyzed whether supply and demand disturbances were symmetrically distributed across different countries in each region of Europe, Asia and Americas that include NAFTA countries (Canada, Mexico, and the US). Their results show higher degree of correlation among smaller countries in the Latin American rather than larger countries in Americas (including NAFTA countries). Their results do not support the formation of a currency union involving the Latin American countries. Since then many empirical studies appeared. Wang et al. (2007) study the countries in the Common Monetary Area (CMA). They compute shocks to real output per capita (measured as the deviations of the first difference of real GDP per capita from its long-run trend) and examine whether they are correlated among countries of the CMA.

The shocks are considered as symmetric (asymmetric) if the correlation is positive (negative) and significant (insignificant). Empirical results indicate that external shocks affect asymmetrically on countries of the CMA. In response to this, they conclude, South Africa moved from pegged exchange rate to a flexible exchange rate and adopted inflation targeting as a monetary policy goal; some other small countries in the CMA sustained fiscal deficits financed through domestic borrowing.

The SVAR approach has also been applied for the GCC countries (for example, Al-Turki, 2007, Abu-Qarn and Abu-Bader 2008, Louis et al., 2012, Ben Arfa, 2012, and Alshehry and Slimane, 2013) and for African currency union (for example, Etta-Nkwelle, 2012, and Zbzienicka and Kolerus, 2013). Houssa (2008) has used dynamic structural factor analysis to identify demand and supply shocks for the West African countries. He finds negative and low positive correlations of supply shocks and concludes against the forming of the monetary union by the West African countries.

Examining business cycle synchronization is taken as another method in assessing the feasibility of forming a monetary union. It examines how the business cycles evolved over time among the member countries. The idea is that if the business cycles of the member countries are not well synchronized macroeconomic policies would be ineffective in absorbing the asymmetric or idiosyncratic shocks (Karras, 2006). In other words, with a better synchronization of business cycles, convergence criteria are met and a loss of monetary instruments does not pose a problem to individual members. This approach has been applied for the GCC countries (for example, Al-Turki, 2007 and Ben Arfa, 2012) and for African currency union (for example, Zbzienicka and Kolerus, 2013).

In this section we use approaches of business cycles synchronization and SVAR models to examine the optimality of the GCC monetary union. One of the first papers on the possibility of establishing the GCC monetary union using the SVAR approach is that of Abu-Qarn and Abu-Bader (2008) and their results do not support the prospects for forming a viable GCC monetary union. Ben Arfa (2012) and Alshehry and Slimane (2013), with a similar approach, come to the same conclusion. Abu-Qarn and Abu-Bader's (2008) sample periods start from early 1960s or early 1970s and end with 2003. Similarly, Ben Arfa (2012) and Alshehry and Slimane's (2013) sample period start from 1970. Obviously, by extending the data to sixties or early seventies one improves on the degrees of freedom. However, it is a common knowledge that the early data in the sixties and the seventies on the GCC countries are not reliable (Summers and Heston, 1991). Moreover, Hasan and Alogeel (2008) have pointed out that the periods in the sixties and seventies witnessed different exchange rate systems and structural breaks in the relation between inflation and exchange rate. Thus, the sample period of this chapter starts from 1980 as in Al-Turki (2007). Al-Turki's (2007) sample period ends in 2005. The sample period of our data ends in 2010. Al-Turki's (2007) evidence, especially for the later period of 1993 – 2005, on both counts of shocks correlations and business cycles synchronization, offers support for the GCC monetary union.

First we provide evidence on the business cycles synchronization of the GCC countries and then present evidence of shocks correlations using a SVAR model.

3.4.1 Business Cycles Synchronization

The Hodrick-Prescott (1997) filter approach has widely been used by macroeconomists to separate series' trend and cycle components in order to assess

convergence criteria or study business cycles synchronization (see, for example, Inklaar and de Haan, 2001, Al-Turki, 2007, Ben Arfa, 2012, and Zbzienicka and Kolerus, 2013). The HP filter is used to obtain a smooth estimate of the long-term trend component of a macroeconomic time series. The difference between the long-term trend and the actual series gives the cyclical component. If the cyclical components of the member countries are positively correlated, business cycles are synchronized, convergence criteria are likely to be met and monetary union among the member countries is viable.

We decompose logarithms of real GDP of the GCC countries for the period 1980 – 2010 into trend and stationary (cyclical) components using the HP filter. Then the correlations of cyclical components are computed and presented in table 3.5. Results are mixed as we see that the correlations between the countries are positive for some of them and negative for others. Moreover, out of 15 pairs only six of them are statistically significant at the 10% or lower levels. Bahrain, except with Qatar, has positive

Table 3.5: Business Cycle Correlation among the GCC countries, 1980 – 2010.

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Bahrain	1.0000					
Kuwait	0.1339	1.0000				
Oman	0.2949*	–0.1186	1.0000			
Qatar	–0.0691	0.2993*	–0.0684	1.0000		
Saudi Arabia	0.2256	–0.1470	–0.5494*	–0.0625	1.0000	
UAE	0.4973*	–0.1337	–0.2764*	0.0273	0.6136*	1.0000

Note: A superscript of a star (*) indicates significant at the 10% or lower levels.

correlation with other countries, though significant with only Oman and the UAE. Highest significant correlation is between Saudi Arabia and the UAE. Oman, except with Bahrain, has all negative correlation. Overall the correlations among the cyclical components indicate that the GCC countries' business cycles are not synchronized during the period 1980 – 2010.

The GCC countries have undergone many economic and structural changes after the Gulf (Kuwait) war in 1990 and 1991. Al-Turki (2007) has detailed those changes. All countries more or less have been pursuing policies to reduce dependence on oil and diversify their economies, especially after the mid-nineteen nineties. Moreover, Frankel and Rose (1998) have pointed out that the business cycle synchronization may increase over time with the level of integration within a monetary union. The GCC countries are yet to announce the date of their integration but they have been taking steps toward it.

In the light of these arguments, we have calculated the business cycles correlations for the later period of 1993 – 2010. Even with the later period, Oman's business cycles had been negatively correlated with Kuwait and the UAE. Oman's business cycles had only been positively significantly related to Qatar with correlation coefficient of 0.72. Also, as mentioned elsewhere that Oman is the first country who withdrew from joining the GCC monetary union, we report the correlations without Oman in table 3.6 for the period 1993 – 2010.

Results in table 3.6 for the period 1993 – 2010 seem quite different from that in table 3.5 for the entire sample period. Bahrain business cycles are all positively correlated

Table 3.6: Business Cycle Correlation among the GCC countries, 1993 – 2010.

	Bahrain	Kuwait	Qatar	Saudi Arabia	UAE
Bahrain	1.0000				
Kuwait	0.6598*	1.0000			
Qatar	0.4044*	0.0912	1.0000		
Saudi Arabia	0.7691*	0.8748*	0.3070	1.0000	
UAE	0.6805*	0.7792*	0.1532	0.8394*	1.0000

Note: A superscript of a star (*) indicates significant at the 10% or lower levels.

with all the GCC countries (even with Oman, not reported here) and the correlation coefficients are mostly statistically significant. The Kuwait business cycles had been positively correlated with Saudi Arabia and the UAE, besides Bahrain. Again, these correlation coefficients are mostly statistically significant. Starting from the mid 1990s, Qatar had experienced a dramatic economic growth with the development of its liquefied natural gas (LNG) sector (figure 3.8 above). Though the correlations with Saudi Arabia and the UAE are positive, results in table 3.6 seem to confirm that Qatar is in its own league. Overall, the results in table 3.6 seem to indicate that the business cycles of the GCC countries, excluding Oman and Qatar, have been synchronizing.

3.4.2 Structural Decomposition: Shocks Synchronization

A widely used alternative method in assessing the viability of actual or potential monetary union is to estimate or identify the structural shocks from a structural VAR (SVAR) model and compute the correlations among the shocks that are identified. In doing this we follow the Bayoumi and Eichengreen (1992) approach which models an economy as subject to demand and supply shocks. Accordingly, we estimate a two-

variable VAR model consisting of real GDP and the price level (GDP deflator) for each of the GCC countries. We denote y_t = ln (real GDP) and p_t = ln (GDP deflator). In order to apply the SVAR method of Bayoumi and Eichengreen (1992), which is based on Blanchard and Quah (1989) technique, the series forming the SVAR must be stationary. At the same time, shocks can only have a permanent effect on a variable that is non-stationary. Hence we need our examined series to be I(1), i.e. non-stationary in levels but stationary in first differences. We do indeed find that our level series are I(1) (as shown below in table 3.5), and so can estimate an SVAR in their first differences (Δy_t and Δp_t) which are stationary. We can represent the first differences of these variables as an infinite moving average representation:

$$\Delta y_t = \sum_{k=0}^{\infty} a_{11}(k)\varepsilon_{st-k} + \sum_{k=0}^{\infty} a_{12}(k)\varepsilon_{dt-k}$$

$$\Delta p_t = \sum_{k=0}^{\infty} a_{21}(k)\varepsilon_{st-k} + \sum_{k=0}^{\infty} a_{22}(k)\varepsilon_{dt-k}$$

or in a more compact form,

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \sum_{k=0}^{\infty} L^k \begin{bmatrix} a_{11}(k) & a_{12}(k) \\ a_{21}(k) & a_{22}(k) \end{bmatrix} \begin{bmatrix} \varepsilon_{st} \\ \varepsilon_{dt} \end{bmatrix} \tag{3.1}$$

where L is the lag operator and ε_{st} and ε_{dt} are independent white noise structural supply and demand shocks. To identify the structural shocks, following Blanchard and Quah (1989) and Bayoumi and Eichengreen (1992) we assume that demand shocks have no permanent (or long-run) effect on real GDP which means we have in equation (3.1):

$$\sum_{k=0}^{\infty} a_{12}(k) = 0. \tag{3.2}$$

Let us define $\Delta Z_t = \begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix}$ and $e_t = \begin{bmatrix} e_{st} \\ e_{dt} \end{bmatrix}$ which are the supply and demand residuals from an estimated reduced form VAR with finite lag length. We first estimate this reduced form VAR as:

$$\Delta Z_t = B_1 \Delta Z_{t-1} + B_2 \Delta Z_{t-2} + \ldots\ldots\ldots + B_i \Delta Z_{t-i} + e_t \tag{3.3}$$

where B's in equation (3.3) represent 2x2 matrices of estimated coefficients from the VAR. Then using the idea that the VAR residuals e_t are composites of the pure innovations or structural shocks ε_{st} and ε_{dt}, that is, we can write

$$\begin{bmatrix} e_{st} \\ e_{dt} \end{bmatrix} = \begin{bmatrix} c_{11}(0) & c_{12}(0) \\ c_{21}(0) & c_{22}(0) \end{bmatrix} \begin{bmatrix} \varepsilon_{st} \\ \varepsilon_{dt} \end{bmatrix} \quad \Rightarrow \quad e_t = C\varepsilon_t \tag{3.4}$$

Four restrictions are needed to identify the four elements of the C matrix, three of them are related to the variances and covariances of the structural shocks ε_t and the fourth is the restriction given in equation (3.2) (Blanchard and Quah, 1989 and Bayoumi and Eichengreen, 1992). Once the elements of the C matrix are identified, we recover the structural shocks as:

$$\varepsilon_t = C^{-1} e_t. \tag{3.5}$$

3.4.2.1 Stationarity Tests

As mentioned earlier to apply the Blanchard and Quah (1989) decomposition, at least one of the variables in the system must be nonstationary. To confirm this we have performed the unit-root or nonstationary test for each series in the system using the Augmented Dickey-Fuller (ADF) test and the results are reported in table 3.7. Each time series is

Table 3.7: ADF unit-root test statistics

	y_t	Δy_t	p_t	Δp_t
Bahrain	–1.362	–4.795	–1.614	–5.529
	(0.852)	(0.003)	(0.763)	(0.000)
Kuwait	–3.088	–5.732	–1.779	–5.675
	(0.127)	(0.000)	(0.689)	(0.000)
Oman	–4.359	–3.588	–1.359	–7.401
	(0.009)	(0.012)	(0.852)	(0.000)
Qatar	–0.607	–6.071	–1.899	–6.123
	(.971)	(0.000)	(0.630)	(0.000)
Saudi Arabia	–2.926	–4.827	–1.610	–6.172
	(0.169)	(0.003)	(0.765)	(0.000)
UAE	–1.910	–5.028	–1.326	–6.161
	(0.624)	(0.002)	(0.862)	(0.000)

Note: y_t = ln (real GDP), p_t = ln (GDP deflator), and p-values are in parentheses for the null hypothesis that a series has unit-root.

assessed for stationarity with a constant and trend in the test equation and the ADF test statistics are reported in table 3.7. The probability value (p-value) for the null hypothesis that a series is nonstationary is reported in parenthesis. Results in table 3.7 show that all series (except the real GDP of Oman) are nonstationary as their p-values are very high at least higher than 0.10. However, the first difference of all series is stationary as their p-values are quite low. For Oman the real GDP (y_t) is stationary, but the other variable (p_t) in the system is nonstationary.

3.4.2.2 Correlations of Shock

We first estimate a finite reduced form VAR model for each country. The lag length of each model is chosen on the basis of the Akaike information criterion (AIC) (though, final prediction error (FPE) and Schwarz information criterion (SC) are also checked for consistency). Residuals from each VAR model are used to estimate a SVAR model for

each country and using the estimates of each element of the C matrix of the equation (3.5), the structural supply and demand shocks of each country are identified and finally we compute the correlation of these shocks among the GCC countries. For the VAR model of Kuwait we have used a dummy variable that captures the Kuwait war in 1990 and 1991. We first report the correlation of supply shocks in table 3.8. As we know, with

Table 3.8: Correlation of supply shocks of real GDP growth and inflation, 1980 – 2010.

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Bahrain	1.0000					
Kuwait	0.2734*	1.0000				
Oman	0.3738*	0.1029	1.0000			
Qatar	–0.1806	–0.1392	–0.1002	1.0000		
Saudi Arabia	0.3365*	0.3340*	0.1672	–0.2143	1.0000	
UAE	0.4364*	0.5111*	0.2851*	–0.2359	0.3141*	1.0000

Note: A superscript of a star (*) indicates significant at the 10% or lower levels.

more symmetric shocks (or positive shocks) it is more viable for group of countries to form a monetary union. Results in table 3.8 show that correlations of supply shocks are all positive except with respect to Qatar. To appreciate it better, table 3.9 reports the

Table 3.9: Correlation of supply shocks (without Qatar) of real GDP growth and inflation, 1980 – 2010.

	Bahrain	Kuwait	Oman	Saudi Arabia	UAE
Bahrain	1.0000				
Kuwait	0.2734*	1.0000			
Oman	0.3738*	0.1029	1.0000		
Saudi Arabia	0.3365*	0.3340*	0.1672	1.0000	
UAE	0.4364*	0.5111*	0.2851*	0.3141*	1.0000

Note: A superscript of a star (*) indicates significant at the 10% or lower levels.

correlations without Qatar. All correlations are positive and the majority of them are statistically significant at the 10% or lower levels. Results in table 3.9 are quite encouraging about the viability of monetary union for these countries, so far as supply shocks are concerned.

Now a word on Qatar; as we have mentioned above (for example, see figure 3.8 above) Qatar has experienced a dramatic economic growth with the development of its liquefied natural gas (LNG) sector. The country is now on its own league among the GCC countries and it is not surprised that its supply shocks are not symmetric with the other GCC countries.

Demand shocks correlations reported in table 3.10 are even more favorable regarding the prospects of GCC monetary union. All correlations are positive and they are all statistically significant except between Bahrain and Oman. A plausible explanation for the demand shocks being more symmetric than the supply shocks is that these countries are oil based economies and their demand moves together with the rise and fall of the world oil price.

Table 3.10: Correlation of demand shocks of real GDP growth and inflation, 1980 – 2010.

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Bahrain	1.0000					
Kuwait	0.5017*	1.0000				
Oman	0.2335	0.5338*	1.0000			
Qatar	0.4745*	0.6225*	0.6107*	1.0000		
Saudi Arabia	0.5209*	0.7954*	0.6357*	0.7469*	1.0000	
UAE	0.3429*	0.5420*	0.4433*	0.3167*	0.4247*	1.0000

Note: A superscript of a star (*) indicates significant at the 10% or lower levels.

3.5 CONCLUSION

The GCC member countries have agreed to five convergence criteria as a first step towards to form their monetary union. They are inflation, interest rates, reserves, fiscal balance, and public debt. Although they are not preconditions for entry, in this chapter we have examined the state of some of these criteria and to the extent to which they are fulfilled. These countries more or less have met these criteria. Because of the exchange rates arrangement and the free capital movements, the convergence of the exchange rates and interest rates is not an issue. There is no other comparable group of countries in recent history that has managed to keep their exchange rates as stable vis-a-vis each other as the GCC countries for such a long period of time. Of course, this is the result of the long-standing – US dollar pegs of five GCC currencies. Kuwait's *de jure* classification is de facto fixed exchange rate against the dollar because dollar dominates the basket. Researchers on the GCC economies have suggested that the US dollar peg has contributed to the convergence of the inflation and interest rates in the GCC countries in addition to the limited the intra-GCC currency fluctuations. These countries experienced prolonged dollar fluctuations against major currencies, large oil price movements, emerging market crisis and financial and economic crisis world wide. However, exchange rates among the GCC countries have remain stable which is even remarkable given these countries have relatively open capital accounts.

As expected interest rates move in unison and there is a narrow spread across the GCC countries and they move broadly in parallel with the US interest rate. Inflation in all six countries is low, close to European levels, and this has been the case for more than

two decades. Though Qatar and the UAE experienced a higher inflation rates in recent times and had inflation spikes in 2008, they did not persist. Inflation rates of these countries again converged around 3% in 2010. The Phillips and Sul (2007) test for convergence for inflation rates and the per capita growth rates indicate convergence especially for the period 1994 – 2010. Thus, the GCC countries more or less have met those agreed criteria.

This chapter also provides more econometric evidence which can be seen as a complement to the previous discussions and evidence. It provides two types of the econometric evidence, namely, business cycle synchronization of the aspirant member countries and the structural shocks synchronization.

The HP filter is used to compute business cycle component of the real GDP of each of the GCC countries for the period 1980 – 2010. If the cyclical components of the member countries are positively correlated, we say that the business cycle is synchronized and the region is viable for the monetary union. For the whole sample period, the results are mixed. However, as suggested in the literature, business cycle synchronization increases over time with the level of integration within a monetary union or prospective union. We have argued that though the GCC countries are yet to announce the date of their integration but they have been taking steps toward it (especially after the Kuwait war) which may have increased synchronization. Thus, we have looked at the business cycle synchronization for the period 1993 – 2010. All correlations are positive and most of them are significant except Oman who withdrew from the proposed union anyway. That is, results are now more favorable to the formation of the GCC monetary union.

The other evidence is provided by computing structural demand and supply shocks from a SVAR model. Following Bayoumi and Eichengreen (1992), we compute demand and supply innovations for each country for the period 1980 – 2010 and compute correlations of these shocks. We know if the shocks are symmetric (positive correlation), then prospects of a viable monetary union are improved. We find positive correlation (synchronized shocks) among the countries except Qatar and explain why we believe Qatar is running away from other GCC countries in its economic growth. However, Qatar has not shown any intent of not joining the GCC monetary. Qatar is still with the idea of forming monetary union along with the other GCC members. Our results differ from some previous authors (see, for example, Laabas and Limam, 2002) who used unreliable data from early decades and conform, with more recent data, the findings of other existing studies [Al Hassan, 2009 and Alshehry and Ben Slimane 2013).

CHAPTER 4

EXCHANGE RATE VOLATILITY, BILATERAL TRADE AND ECONOMIC GROWTH: THE GCC PERSPECTIVE

4.1 INTRODUCTION

One of the main reasons for the process towards Monetary Union (MU) in the GCC region is the widespread view that MU would enhance trade among member states. It is believed that monetary union with common currency would encourage trade among the GCC countries by developing more industrial sectors to produce more competitive products (Echchabi et al., 2011). That is, there is a potential impact of trade on economic growth of the proposed monetary union in the GCC region. This chapter investigates these issues from the perspective of the GCC countries.

The overall degree of trade openness and the degree of the intra-regional trade openness are important factors to assess whether a group of countries qualifies to form a monetary union or an Optimal Currency Area (OCA). Arroyo (2002) has suggested that stabilizing exchange rates among countries within a region or establishing monetary union among the countries in a region makes more sense if the degree of trade interdependence (or intra-regional trade linkages) among these countries are high. Frankel and Rose (1998) also pointed out that countries that are highly integrated with each other, with respect to international trade in goods and services, are more likely to constitute an optimum currency area. Edwards (2006), in considering the main prerequisites for joining a currency union, has summarized the basic criteria as: (1) high level of trade in goods across the members of the union, and (2) different (or diversified) composition of output and trade across countries.

The intra-GCC trade had been low; as Roy and Zarrouk (2002, p. 13) reported: "Given the similarity of the natural resource endowments of many GCC countries and their small size, it is not surprising that they tend to trade relatively little with each other. Imports from the rest of the world account for 90 percent or more of total imports for most GCC states." However, the shares of intra-GCC trade have increased over the past decade which indicates that a process of increasing regional trade integration has been started (Turki 2007 and see also table 4.1 and figure 4.2 below). It is understood that the increased regional trade integration has been facilitated by the efforts undertaken by the GCC in eliminating tariff and non-tariff barriers to intra-regional trade (Khan, 2009).

The increased regional trade integration is believed to grow further by eliminating (reducing) exchange rate volatility. Economic agents base their decisions concerning production, investment and consumption on the information that the price system, especially future prices, provides for them. Exchange rate uncertainty introduces uncertainty about the future prices of goods and services. The single currency would eliminate (nominal) exchange rate risk, making trading profits less risky, so that the risk averse traders would increase trade. Moreover, the single currency would reduce intra-GCC foreign exchange transactions costs. If these prices become more uncertain the quality of these decisions will decline. Most of the existing literature presumes that a common currency is equivalent to reducing the bilateral exchange rate volatility to zero within the union (Rose, 2000).

Empirical results obtained by Parsley and Wei (2002) indicate that there is a strong integration effect in economies that adopt more institutionalized exchange regimes such as currency boards or currency unions. Krugman and Obstfeld (2003) argued that a

major economic benefit of fixed exchange rates compared to floating rates is that they simplify economic calculations and provide a more predictable basis for decisions that involve international transactions. The monetary efficiency gain from joining the fixed exchange rate system would be equal to the saving from avoiding the uncertainty (confusion) and calculation of the transaction costs that arise when exchange rates float. In other words, intra-area nominal exchange rate uncertainty and the corresponding intra-area exchange rate risk will disappear that would lead to savings in transaction and hedging costs (Mongelli 2002). Single currency of a monetary union would eliminate these transaction costs and uncertainties (Abu-Qarn and Abu-Bader, 2008). Al Kholifey and Alreshan (2010) suggest that a single currency would remove foreign exchange risk and would increase intra-trade by eliminating transactions costs and accounting costs. Additionally, as Echchabi et al. (2011) have pointed out that the common currency among the GCC countries will help to develop and integrate financial markets such as bond and stock markets.

There is a long-standing common commitment on exchange rate policies of the GCC countries towards maintaining a peg to the US dollar. According to Khan (2009, p. 3): " Although the choice of the U.S. dollar peg as the external anchor for monetary policy served the countries of the GCC well for many years in maintaining macroeconomic stability, the peg to the U.S. dollar allows the region to reduce volatility in the exchange rate and in capital flows that could result from nominal shocks (such as continuing geopolitical risks and oil price volatility unrelated to fundamentals), provides a credible and easily understood anchor for monetary policy, and simplifies trade and financial transactions , accounting and business planning."

In pursuit of their single currency all the GCC countries have moved to *de jure* from *de facto* pegged exchange rate in 2003. However, due to the dollar depreciation against major currencies in most part of the last decade, Kuwait has moved from the dollar peg to an undisclosed currency basket in May 2007 and allows its currency to fluctuate in a band of +/- 3.5% around the central rate. There is little exchange rate fluctuation among five GCC countries because of their common US dollar peg. This little (bilateral) fluctuation arises due to the cross demand and supply changes among the currencies of these countries. Even the fluctuation between those five GCC currencies and the Kuwaiti dinar is minimal because the US dollar dominates the currency basket of the Kuwaiti dinar. The exchange rates among the GCC countries have remained stable for a long time even when these countries were more or less affected periodically by world events and shocks such as large oil price fluctuations, crises in various emerging market economies with a global fall-out, the 1990/1991 Gulf war (following the Iraqi invasion of Kuwait) and the military intervention in Iraq in 2003.

There exists a significant empirical literature with reference to the European Union (EU), U.S. and Canada analyzing the effect of exchange rate volatility on bilateral trade. However, there is a lack of such empirical studies on GCC countries and to provide such an empirical analysis is one of the main motivations for this chapter. Thus, the empirical results in this chapter would help to infer whether the GCC countries with a common currency would have more intra-regional trade.

The second complementary objective of this chapter follows from the idea that trade is the engine of growth. That is, we investigate the potential impact of trade on economic growth of the proposed monetary union in the GCC region. On the growth

front the economies of Bahrain, Qatar, and the United Arab Emirates have witnessed persistent growth, particularly during the second half of the 1990s. In contrast, growth has been sluggish in Saudi Arabia, while it has stagnated in Kuwait since 1997 (see table 3.8, chapter 3). Much of these differences have been a reflection of the pace of diversification, as well as changes in oil output growth. Meanwhile, except in Qatar, per capita GDP has not grown significantly in the first few years of 2000 partly due to continued rapid population growth. However, following the recent oil price increase in 2003, the non-oil GDP growth of the GCC countries has accelerated and exceeded oil real GDP growth (Sturm *et al.*, 2008). The non-oil GDP growth per annum on average was higher in each of the six countries during the five years of 2003 – 2008 compared to the previous five years. Though these countries experienced a very high non-oil GDP growth per annum in the recent past, growth rates in each country differed. For example, Qatar (13%) and the UAE (11%) recorded the highest growth rates per annum; Saudi Arabia (5.3%) recorded the lowest non-oil GDP growth rate per annum.

It is expected that forming a monetary union may spur economic growth. The transmission mechanism for the influence of monetary union on economic growth may take place via exchange rate and trade channels. The output potentials of countries are boosted by forming a monetary union that stimulates trade. Here the first link is from a monetary union to trade and then from trade to economic growth. Thus, the second purpose of this chapter is to test empirically whether trade (or openness) increases the income of the GCC countries.

The idea that international trade is the engine of growth goes back at least to Adam Smith (Edwards,1993). Edwards (1993) thoroughly reviewed the literature,

especially on the linkage between trade and growth and argued that the theoretical underpinnings of such linkage were not convincing till the emergence of the endogenous growth theories popularized by Romer (1986, 1990). Romer's endogenous technological change postulates that more productive resources are devoted to research and development that results in a larger availability of intermediate inputs. These inputs have higher marginal productivity of capital and with trade countries are allowed to specialize in the production of these intermediate inputs because of their inherent comparative advantage. With free trade a larger number of intermediate inputs are available at a lower cost which means there is higher equilibrium growth.

The rest of the chapter is organized as follows. Section 4.2 analyses the impact of exchange rate volatility on bilateral trade. It starts with a literature review; then presents the gravity model which has now for sometimes been used as a predictor of trade flows between countries. After specifying the model, empirical results linking exchange rate volatility to trade are presented. Section 4.3 analyses the impact of trade on economic growth. It also starts with a literature review followed by a description of empirical methodology and model specification linking trade and economic growth. Key empirical findings regarding the impact of trade on economic growth of the GCC countries are also presented in this section. The Conclusion of the chapter is presented in section 4.4.

4.2 EXCHANGE RATE VOLATILITY AND BILATERAL TRADE

4.2.1 Literature Review

Clark (1973) provided a simple example describing how the volatility of *real* exchange rates could affect the level of exports of an exporting firm. The exporting firm

is assumed to use all domestic inputs to produce one commodity which is then sold entirely to one foreign market and it operates under a competitive market environment with no market power. After receiving the payments for its exports in foreign currency, the firm converts the proceeds at the current spot exchange rate. The firm is assumed to not hedge against exchange rate risk. This means, with the fluctuations of the spot exchange rate, the proceeds from its exports would fluctuate in an unpredictable way. Furthermore, the firm cannot change its output decisions in response to either favorable or unfavorable movements in exchange rates because it involves costs in adjusting the scale of production. In this simple scenario, the variability in the profits of the firm arise solely form the fluctuations of the exchange rate. Hooper and Kohlhagen (1978), among others, have elaborated this model and have reached the same conclusion that the exchange rate volatility and the level of trade are negatively related.

Researchers have realized the importance of sunk costs in the relationship between the trade and exchange rate volatility (Clark et al., 2004). This is because much of international trade consists of firms producing differentiated manufactured products that require significant investment in setting up production facilities specially designed for export markets, marketing and distributing networks; all of which incur substantial sunk costs. These sunk costs would make firms less responsive to short-run movements in the exchange rate. They rather prefer to adopt a wait-and-see approach. They will stay in the export market as long as they can recover their variable costs, and wait for a turnaround in the exchange rate to recover their sunk costs. Thus, the entry, exit or stay in the export market decision (hence overall trade) depends on the exchange rate volatility.

Bacchetta and van Wincoop (2000) compare the level of trade and welfare for

fixed and floating exchange arrangements in a two-country general equilibrium model rather than partial equilibrium models mentioned above. In their model uncertainty arises from monetary, fiscal and technology shocks. They find no clear relationship between the level of trade and the type of exchange rate arrangement and there is no one-to-one relationship between levels of trade and welfare. Reviewing this literature, Clark et al. (2004) (and see references therein) conclude that the theoretical relationship between trade and the exchange rate volatility is not unambiguous.

However, results are mixed on empirical evidence. Many researchers (see for example, Frankel and Wei, 1993, Wei, 1999, Dell'Ariccia, 1999, Rose, 2000, and Rose, 2008) on this topic employing the gravity model (discussed below) have found some significant evidence of a negative relationship between exchange rate variability and trade. De Grauwe (1987), Arize (1998) and Fountas and Aristotelous (1999) have found a significantly negative impact of exchange rate variability on trade flows. Arize (1998) estimates that real exchange rate stability would increase imports by a maximum of 15 percent. Fountas and Aristotelous (1999) studied the impact of the exchange rate volatility on exports volumes among the larger EU economies. They find a significant short-run negative relationship. However, their results are based on error-correction models for exports volumes for Germany, France, Italy and the UK.

Clark et al. (2004) using the full sample of counties found that the increase in volatility by one standard deviation around its mean would generate a reduction of trade flows of somewhat over 9 percent. These results are comparable to those found by other authors using the same methodology and the gravity model. For example, Ross (2000) estimated a reduction of 13 percent. Anderton and Skudelny (2001) also find that extra-

euro area exchange rate volatility may have significantly decreased extra-euro area imports by about 10 per cent and rising to as much as 14 per cent in the long run. Lejour et al. (2006) talks about the common currency in general. They find that the common currency leads to 70 percent extra trade between the trading partners.

General conclusion from studies relating to exchange rate variability and the trade flows is that the impact (if any) is fairly modest negative effect on trade. Studies have resorted to longer-run volatility or taking a sectoral view in order to have more successful in identifying the expected negative relationship. Nonetheless, even among that subset of studies which have found a statistically significant impact, the estimated gain to trade arising from the elimination of volatility is typically found to be not more than 10 percent. Baldwin (2006) in a very comprehensive review of the state of this literature finds that the euro (which can be considered as the elimination of exchange rate variability) probably did already boost intra-euro area by something like 5 to 10 percent. Melitz (2006) finds the estimated impact ranging from 5 to 7 percent. Tenreyro (2007) presents careful Instrumental Variables (IV) estimates in the presence of heteroskedasticity and endogeneity problems and by controlling time-varying fixed effects. She concludes that "the results of this estimation method point at the absence of any statistical significant causal effect from exchange rate variability to trade" (Tenreyro 2007, p. 499). Berger and Nitsch (2008) find an effect of 5 percent when they use the sample from 1992 to 2003. Kelejian, et al. (2011) estimated the impact on trade 6.4 percent.

Al-Turki (2007), using a version of the gravity model, has studied the impact of exchange rate variability on trade flows of the GCC countries for the period 1980 to

2004. He finds a negligible (0.3 percent) potential gain from reducing the exchange rate variability on the average annual trade flows of the GCC countries during the sample period. His results indicate that Qatar would have the highest (1 percent) potential gain, followed by Bahrain (about 0.35 percent), whereas the UAE would have gained nothing (0.04 percent). He has also studied the impact of currency union on intra-union FDI, again using a version of the gravity model. His results indicate the impact of a currency union on intra-union FDI would be insignificantly smaller than the impact of currency union on trade, which is found to be between 30 and 40 percent.

4.2.2 Gravity Model

Empirical studies have extensively used gravity models in studying the impact of currency unions, exchange rate volatility, distance, and host of other factors on trade flows. Gravity models of bilateral trade derived from Newton's theory of gravity that the force exerted by two objects is a function of their respective masses and the square of the distance between them. Pöyhönen (1963) and Tinbergen (1962) originally applied this theory in representing trade between two economies as a function of their respective economic masses, the distance between the two economies, and a variety of other factors. Since then versions of the model have been extensively used (McCallum, 1995, Helliwell, 1996, 1998, Fitzsimons et al., 1999, Xing, 2008). Chaney (2011, p. 1) points out that "the gravity equation in international trade is one of the most robust empirical finding in economics: bilateral trade between two countries is proportional to their respective sizes, measured by their GDP, and inversely proportional to the geographic distance between them."

Rose and a number of his co-authors (e.g. Rose, 2000; Frankel and Rose, 2002; Rose and van Wincoop, 2001; and Glick and Rose, 2002) have attempted to show the impact that currency arrangements may have on bilateral trade using the gravity model. Rose (2000), in order to capture the partial impact of currency arrangements, takes into account structural and institutional features such as common language, common colonial history, the presence of trade agreements, etc. – features that might also be correlated with a 'common currency' dummy variable. The impact of currency union is also found to be distinct from currency volatility. The currency union literature that exploits gravity models has essentially an empirical focus that makes them interesting. It is not surprising that it has experienced something of a renaissance of late. Frankel and co-authors (e.g., Frankel and Wei, 1993; and Frankel and Romer, 1999), for example, have used it extensively to show that trade does indeed spur growth, and to investigate a host of other issues.

4.2.3 Empirical Methodology and Model Specification

Despite criticism for its lack of theoretical foundations in its initial years of application, the gravity model has been found to be a particularly good predictor of trade flows. The gravity model in its simplest form predicts bilateral trade flows on the basis of the sizes (measured by their GDP) of the respective economies and the distance between them. Trade is assumed to depend positively on the sizes of the two economies and negatively on the distance. These variables are the main ingredients of all standard gravity models. It is not surprising then that recent work has shown that the gravity model is consistent with standard theoretical models that explain the pattern of trade based on

factor proportions, patterns of demand, and product differentiation. For example, Deardorff (1998) shows that the gravity model is quite consistent with the Hecksher-Ohlin theory of trade based on factor proportion with or without free trade. Helpman (1987) and Feenstra et al. (2001) have shown that the model can also be derived from theories of trade based on differentiated products, imperfect markets and increasing returns, and trade based on differences in tastes and preferences of domestic consumers.

Besides economic mass and distance between them, the bilateral trade flows may depend on land areas, cultural similarity, geographical position, historical links, and preferential trading arrangements and many other factors. The empirical specifications of the gravity model typically control for these factors augmenting or reducing trade. These factors tend to affect the transaction costs relevant for bilateral trade and have been found to be statistically significant determinants of trade in various empirical applications. The model also controls for the level of economic development, which is expected to have a positive effect on trade because more-developed countries tend to specialize and trade more.

We use the standard gravity model that follows the benchmark panel specification for the analysis of aggregate trade similar to that found in Rose (2000). The model in a log linear form (reproduced here for convenience) is expressed as follows:

$$\begin{aligned}\ln X_{ij,t} = {} & \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln\left(\frac{Y_i Y_j}{Pop_i Pop_j}\right)_t + \beta_3 \ln D_{ij} + \beta_4 Cont_{ij} \\ & + \beta_5 Lang_{ij} + \beta_6 FTA_{ij,t} + \beta_7 ComNat_{ij} + \beta_8 ComCol_{ij} + \beta_9 Colony_{ij} \\ & + \beta_{10} CU_{ij,t} + \beta_{11} V(e_{ij})_t + \varepsilon_{ij,t} \qquad (4.1)\end{aligned}$$

where subscripts i, j and t refer to countries i, j and time period, respectively, X denotes the value of bilateral trade between countries, Y is the real GDP,

Pop is population, *D* is the distance between countries, *Cont* is a binary (dummy) variable for a common land border, *Lang* is a binary variable for a common official language, *FTA* is a binary variable for the same regional trade agreement during the time period, *ComNat* is a binary variable for the same nation, *ComCol* is a binary variable for common colonies, *Colony* is a binary variable for colonization of country i by country j, *CU* is a binary variable for the same currency, $V(e)$ is the volatility of the bilateral nominal exchange rate between countries at time t and ε is the error term representing the myriad other influences on bilateral exports and assumed to be well behaved.

The binary variables for common language, regional trade agreement, part of the same nation, common colonies, colonization and sharing same currency could not be included in our estimation because of the homogeneity among all the GCC countries in our data set. Therefore, we have omitted these binary variables and the resulting final specification of our model is as follows:

$$\ln X_{ij,t} = \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln\left(\frac{Y_i Y_j}{Pop_i Pop_j}\right)_t + \beta_3 \ln D_{ij} + \beta_4 Cont_{ij} + \beta_5 V(e_{ij})_t + \varepsilon_{ij,t} \quad (4.2)$$

As standard in the literature, trade is defined as the sum of exports and imports and distance is measured in terms of great circle distance between the capitals of country i and j. Consistent with the arguments made before, the coefficients of the income (β_1) and per capita income (β_2) are expected to be positive. The idea is that higher income countries trade more in general. β_3 is expected to be negative. One explanation for the trade impeding effects of distance is transaction cost caused by inability to communicate

and cultural differences. β_4 is expected to be positive because adjacent countries that share a border are also proved to trade more. Finally, the coefficient of exchange rate volatility (β_5) is expected to be negative. A common currency or reduced exchange rate volatility increases bilateral trade flows. Bhattacharya and Wolde (2010) have recently suggested that bilateral trade flows also depend on transport constraints and custom clearance procedures. The distance variable included in our gravity equation indirectly controls for the above variables.

4.2.3.1 Data Sources

The dataset includes annual time series from 1989 to 2010 for six countries. There are 15 bilateral trade relationships with six countries. Thus, with 15 bilateral trade relationships and 22 time periods there are a total of 330 observations. Trade data (in billions of US dollars) are compiled from the *International Monetary Fund Direction of Trade Statistics* (IMF DOTS). Real GDP and Population data are from the *IMF World Economic Outlook*. The distance data is obtained from the *Time and date website* (timeanddate.com) and the data on distance between capitals of member countries from the list of countries and outlying territories by total area. Bilateral monthly exchange rates data are from *Bloomberg* for the period 1989 to 2010.

4.2.3.2 Measures of Exchange Rate Volatility

Meese and Rogoff (1983) have pointed out that there are inherent difficulties in predicting exchange rates. Thus, there is no consensus on measuring exchange rate volatility (variability). There are a wide variety of methods used in measuring the

exchange rate variability. For example, in time series estimation the autoregressive conditional heteroskedasticity (ARCH) and generalized ARCH (GARCH) approaches have been used to measure exchange rate volatility. GARCH estimates are usually employed as an alternative measure of volatility. The most widely used measure of exchange rate volatility is the standard deviation of the first difference of logarithms of the exchange rate [e.g., Frankel and Wei (1993)]. Other studies , for example, Bailey and Tavlas (1988) have used short-run volatility as the absolute value of the quarterly percentage change in real effective exchange rate (REER); Brada and Méndez (1988) have used a dummy for exchange rate regime; De Grauwe and Verfaille (1988) have used variance of annual changes of real exchange rate; Koray and Lastrapes (1989) and Koray and Lastrapes (1993) have used 12 – month moving standard deviation of growth rate of real exchange rate; Mann (1989) has used 3 or 6 – month moving average of monthly percentage change in nominal effective rate; Asseery and Peel (1991) have used squared residual from ARIMA process fitted to real exchange rate; Feenstra and Kendall (1991) and Kroner and Lastrapes (1993) have used GARCH model. Liu (2009) has used the GARCH approach on high frequency data, i.e., the daily data of the nominal exchange rate vis-a-via U.S dollar. However, most of the studies [e.g., Bini-Smaghi, 1991; Kumar, 1992; Savvides, 1992; and Clark et al., 2004] preferred measure is a variation of standard deviation.

In this study two measures of the exchange rate variability are used. First, following the practice in most studies, the data on exchange rate volatility is computed as the standard deviation within a year of monthly nominal bilateral exchange rates. Thus, exchange rate variability for a particular year (t) is calculated as the standard deviation

(std) of the percentage change in the nominal exchange rate from one month to its preceding month over the whole year, using a difference-in-logs approximation to percentage growth rates . It is denoted as $LERVP$ and calculated as:

$$LERVP^{i}_{j,t} = std_{t}\left\{\ln(E^{i}_{j,m} / E^{i}_{j,m-1})\right\}^{m-12}_{m-1} \tag{4.3}$$

where $E^{i}_{j,m}$ is the nominal exchange rate between countries i and j in month m. Thus, the standard deviation for any particular year is calculated over the whole year using the percentage change in the monthly nominal exchange rate during the year.

The second measure of volatility, following Kenen and Rodrik (1986), is the standard deviation of the nominal exchange rate around its predicted trend and it is estimated by running the regression over the 12-month period as:

$$\ln E^{i}_{j,t} = \alpha^{i}_{0} + \alpha^{i}_{1}t + \alpha^{i}_{2}t^{2} + u^{i}_{j,t} \tag{4.4}$$

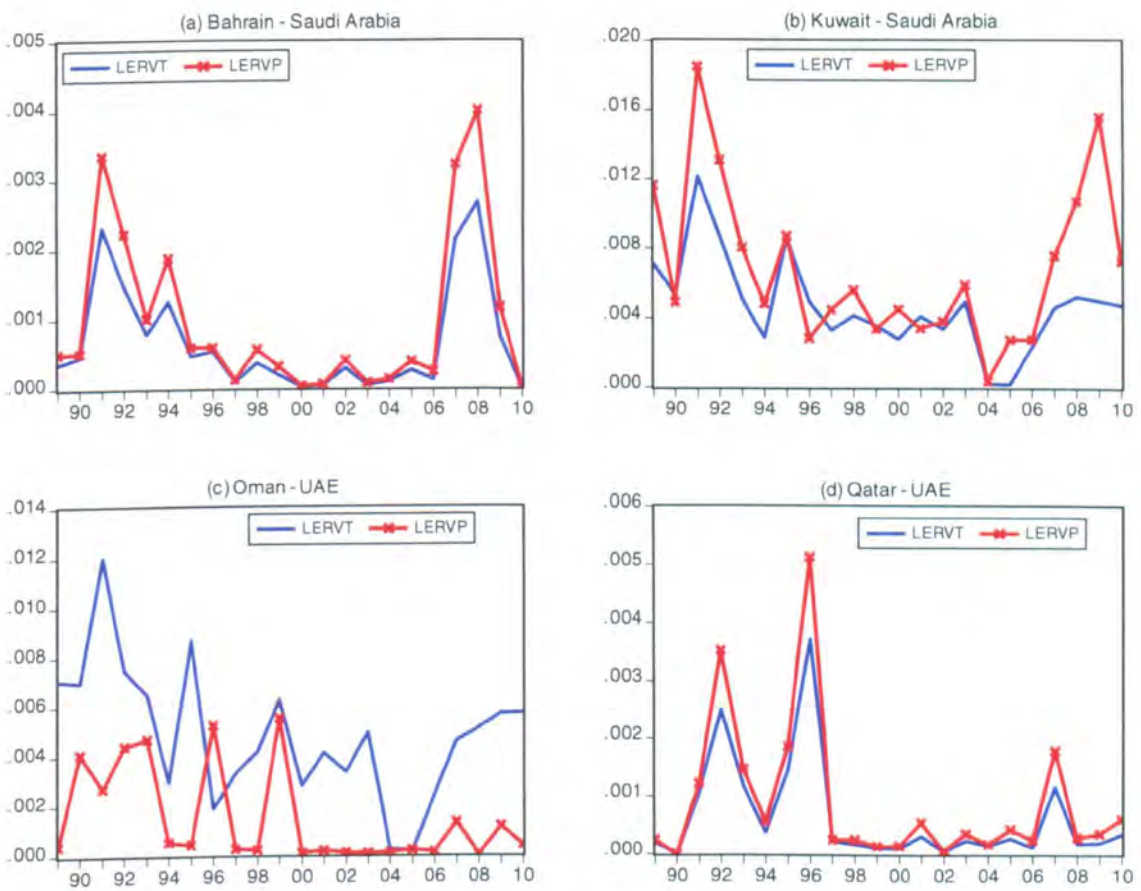
where E^{i}_{j} is the monthly nominal exchange rate between countries i and j, t is the time trend. A quadratic time trend is added because for most cases it is found to be statistically significant. The estimated standard error of the regression ($\hat{\sigma}$) over the twelve months in a year is taken as the exchange rate volatility of the year and denoted as $LERVT$. For example, the estimated equation (4.4) between Kuwaiti dinar and Omani riyal for the period 2010:1 – 2010:12 is

$$\ln \hat{E} = \underset{(0.006)}{0.295} - \underset{(0.002)}{0.005t} + \underset{(0.0001)}{0.0006t^{2}} \qquad \overline{R}^{2} = 0.799 \qquad se = \hat{\sigma} = 0.00533 = LERVT_{2010}$$

where numbers in the parentheses are the standard error of the coefficients and $\hat{\sigma}$ is the standard error of the regression. Thus, we have taken 0.00533 as the measure of the exchange rate variability between Kuwaiti dinar and Omani riyal for the year 2010.

We have plotted the two exchange rate volatility measures – *LERVP* based on percentage change (equation 4.3) and *LERVT* based on trend fitting (equation 4.4) – in figure 4.1. We have plotted only for a selected pair of countries. Because the trade between the country pairs (Bahrain, Saudi Arabia), (Kuwait, Saudi Arabia), (Oman,UAE)

Figure 4.1: Measures of Exchange Rate Volatility: Selected Pair of Countries



and (Qatar, UAE) are the most, we have selected these pairs of countries as a sample. We see from figure 4.1 that the values of volatility measure based on *LERVP* are usually higher than based on *LERVT*. Figure 4.1 also shows that the two measures of the exchange rate volatility trend quite well for most of the country pairs. For example, the two measures are almost inseparable for the pairs (Bahrain, Saudi Arabia - figure 1a) and

(Qatar, UAE – figure 1d). However, small difference (Kuwait, Saudi Arabia – figure 1b) and significant difference (Oman, UAE – figure 1c) are also observed. Thus, the empirical results linking the relationship between trade and the exchange rate volatility may depend on the measure chosen.

4.2.3.3 Summary Statistics and Correlations of Key Variables

Table 4.1 reports summary statistics and correlations of key variables for 15 cross-sections and 22 time periods. As mentioned above, logarithm of bilateral trade (LTRADE) is the sum of exports and imports and is measured in billion US dollar. The mean of LTRADE is negative (–1.4007) means the average bilateral trade among the GCC countries has not reached billion dollars (though for the individual pair of countries it reached more than billion dollars as confirmed by the positive maximum value of 2.3368). Table 4.1 shows standard deviations of the main variables are quite low, though it is little bit in higher side for the LGDP and for the main dependent variable LTRADE. Correlation statistics from table 4.1 also show that all variables have expected correct sign including the both measures of the exchange rate variability (LERV) variable which is expected to be negatively related to LTRADE. The mean value of LERVP is higher than LERVT which we have also observed in figure 4.1. The two measures of the exchange rate volatility are also highly positively correlated.

4.2.3.4 Trend in Bilateral Trade and the Exchange Rate Volatility in the GCC countries

As mentioned elsewhere the bilateral trade flows among the GCC countries are

Table 4.1: Summary Statistics of Main Variables Used in Estimation, 1989 – 2010

Variables	Definition	Mean	Max	Min	S.D.	N
LTRADE	Log of bilateral trade	-1.4007	2.3368	-7.1871	1.720	330
LGDPP	Log of Real GDP Product	7.2500	11.9181	3.2312	1.885	330
LGDPOP	Log of Real per capita GDP product	19.431	22.2908	17.2545	1.051	330
LERVP	Exchange rate volatility using equation (4.3)	0.0030	0.0214	0.0000	0.004	330
LERVT	Exchange rate volatility using equation (4.4)	0.0024	0.0121	0.0000	0.003	330

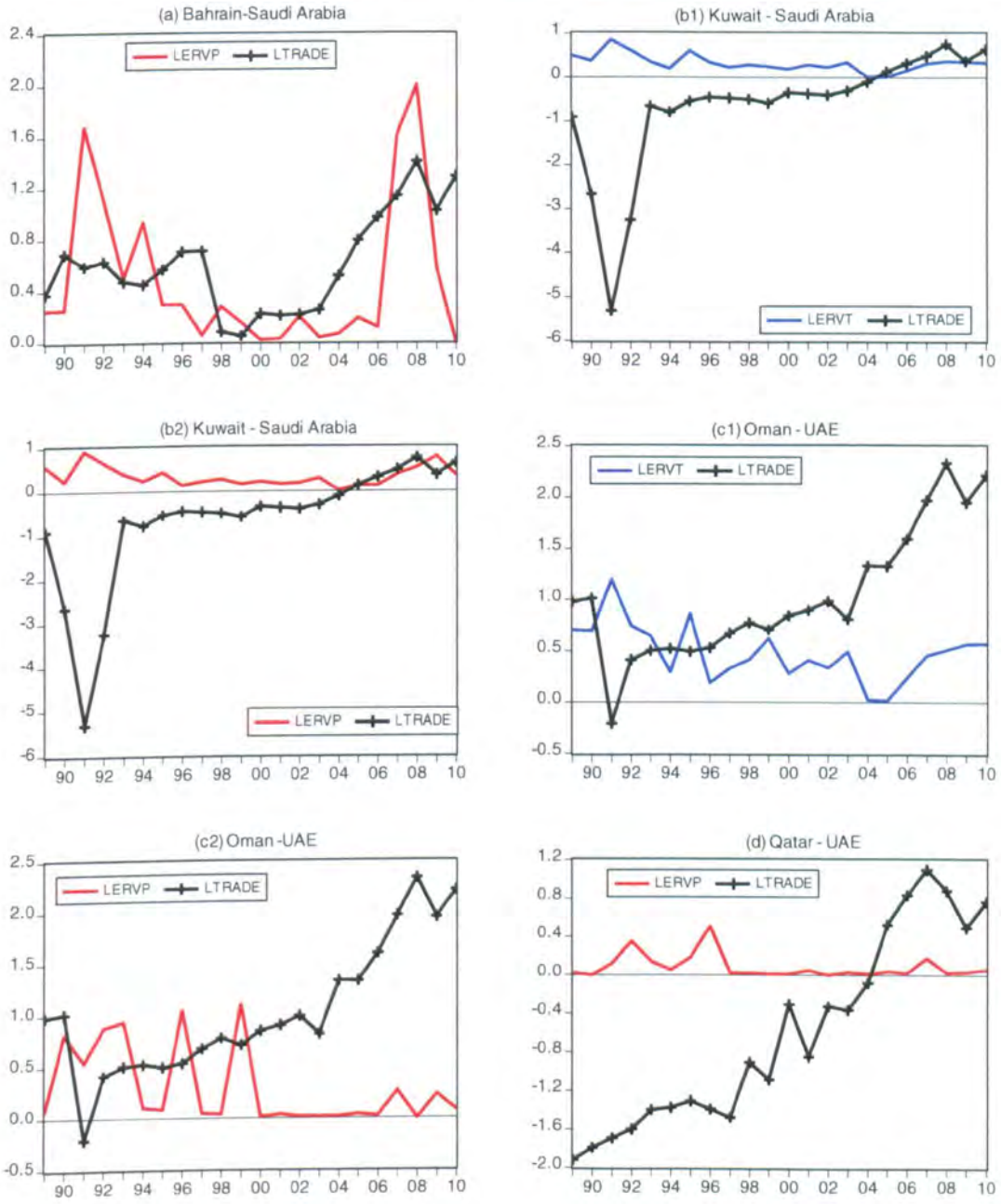
Correlation Matrix of Main Variables

	LTRADE	LGDPP	LGDPOP	LERVP	LERVT
LTRADE	1.0000				
LGDPP	0.7305	1.0000			
LGDPOP	0.3516	0.5670	1.0000		
LERVP	-0.3104	-0.0572	-0.0593	1.000	
LERVT	-0.2261	-0.1196	-0.1429	0.8078	1.000

Note: S. D. is the standard deviation, N is the number of observations (22 time periods × 15 bilateral trade).

rather small compared to their combined GDP. The mean value of the *logarithm* of total trade (exports plus imports measured in billion dollars) among the GCC countries over the period 1989 – 2010 is –1.4007 (table 4.1) which is approximately equal to $0.25 billion. However, it is encouraging that the trade flows among these countries are increasing over time. To see how trade flows are trending over time, I have plotted them

Figure 4.2: Trend in Trade (LTRADE) and Volatility



in figure 4.2. Figure 4.2 shows that the bilateral trade flows between Bahrain and Saudi Arabia and between Oman and the UAE have been more than billion dollars (LTRADE positive) whereas for the country pairs Kuwait and Saudi Arabia and Qatar and UAE

trade flows had been below billion dollar (LTRADE negative) until recently when they have reached more than billion dollar mark.

The same pairs of countries are selected as in figure 4.1 and plotted them against the volatility measures. One volatility measure for the country pairs (Bahrain, Saudi Arabia) and (Qatar, UAE) is plotted because the two volatility measures are almost inseparable. For country pairs (Kuwait, Saudi Arabia) and (Oman, UAE) both volatility measures are compared. Figure 4.2 confirms that the bilateral trade flows among the GCC countries are increasing over time. Though only a selected pairs of countries are plotted here, it is generally true that the trade among the GCC countries is increasing.

Absolute values of LTRADE are much larger than volatility measures. Thus, we have multiplied the volatility measures by some (constant) multiples to bring the two series closer to each other. Figure 4.2 also shows that the LTRADE and volatility (either measure) are trending in an opposite direction thus confirming a cursory view that trade flows and exchange rate volatility of the GCC countries are negatively related.

4.2.3.5 Some Issues of Estimation

The gravity model performs well empirically, yielding precise and generally reasonable estimates that are broadly consistent with the results of other papers employing a gravity model using trade data (see, for example, Clark et al. 2004). However, assessing trade patterns on the basis of the empirical results based on the gravity model is also subject to several econometric challenges. Researchers often ignore country heterogeneity altogether (see, for example, Hamilton and Winters, 1992). However, as Shin and Snell (2004) and Cheng and Wall (2005) have demonstrated that

failing to account for unobserved country heterogeneity can lead to biased estimates of bilateral trade relationships. Subsequent research on panel estimation (see, for example, Egger and Pfaffermayr, 2004) suggest that instead of using one dummy variable per country, individual country pair dummies (fixed effects) should be included to get efficient estimators. These specifications along with time dummies that control for common shocks would fully utilize panel dimensions of trade flows between countries.

Against this background, our estimation is based on panel data taking country pair-specific fixed effects into account. This should, as emphasized by Micco et al. (2003) and Cheng and Wall (2005), reduce both the heterogeneity bias and the endogeneity bias. The intuition is that fixed effects take into account whether two countries have traditionally traded a lot.

The model, as described by equation (4.2) above was estimated as panel estimation using Eviews. The issue was number of cross-sections to be included. The number of cross-sections depends on the number of trade routes. There are 30 trade routes if we consider trade as either import or export. However, there will be 15 trade routes if we consider trade as total trade (exports and imports together). This is more appropriate since we are modeling total trade for each country. Therefore, we have estimated our model based on 15 cross-sections. Different versions of our basic model (equation 4.2) were estimated and the results are reported in table 4.2.

It is fairly common to include country-specific fixed effects to control for the remoteness or multilateral resistance effects. The concept of multilateral resistance was proposed by Anderson and Van Wincoop (2003). It is also common to include time effects to control for time-specific factors, such as global business cycle, oil price shocks,

etc., so that the intercept in the model is allowed to change both across countries and overtime.

Results are obtained first using panel Least Squares (LS). However, as Clark et al. (2004) have pointed out the exchange rate volatility cannot be safely assumed as exogenous; it is rather endogenously determined. Thus, equations are estimated using instrumental/2 stage least squares (2SLS) to control for the endogeneity bias. We still have other estimation problems. Preliminary results indicate that the lagged dependent variable is an important regressor. The estimated coefficient of the lagged dependent variable is about 0.80 which is highly statistically significant. This is also understandable that the past trade influences the present trade. In this case either using LS method or 2SLS method (due to endogeneity problem) will not provide efficient estimates. The presence of lagged dependent variable makes it a dynamic panel data (DPD) model. With the presence of the lagged dependent and endogenous variables, the panel Generalized Method of Moments (GMM)/Dynamic Panel Data (DPD) method, as discussed below, is the most consistent and efficient estimator. Thus we have also estimated the trade flow equations using panel GMM/DPD method.

4.2.4 Empirical Results

4.2.4.1 LS and 2SLS Estimates

The first model (model 1) was estimated by the panel Least Squares (LS) method by excluding cross-section but including time specific fixed effects. We were unable to estimate the model with the inclusion of the cross-section fixed effects because of

singularity problem. The "distance" and "common border" variables are time invariant, preventing the use of both cross-section and time-period fixed effects in models 1 – 4

Table 4.2: Panel Estimation of Bilateral Trade

Dependent Variable →	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$
Independent Variables ↓	(Model 1) **(LS)**	(Model 2) **(LS)**	(Model 3) **(2SLS)**	(Model 4) **(2SLS)**
Constant	0.415 (0.158)	–0.291 (–0.108)	1.456 (0.508)	0.055 (0.020)
$LGDPP_{ij,t}$	0.555 (6.543)***	0.473 (5.522)***	0.682 (7.089)***	0.487 (5.487)***
$LGDPOP_{ij,t}$	–0.094 (–0.829)	–0.047 (–0.401)	–0.164 (–1.314)	–0.059 (–0.494)
$LERVP_{ij,t}$	–72.619 (–4.454)***	–	–184.507 (–6.216)***	–
$LERVT_{ij,t}$	–	–24.540 (–1.041)	–	–38.835 (–1.086)
D_{ij}	–0.675 (–4.421)***	–0.665 (–4.219)***	–0.685 (–4.118)***	–0.690 (–4.280)***
$Cont_{ij}$	1.043 (4.582)***	1.349 (4.219)***	0.553 (2.059)**	1.301 (5.518)***
	SE = 0.928 $\overline{R}^2 = 0.709$ $D-W = 0.371$	SE = 0.956 $\overline{R}^2 = 0.691$ $D-W = 0.302$	SE = 0.987 $\overline{R}^2 = 0.672$ $D-W = 0.498$	SE = 0.954 $\overline{R}^2 = 0.693$ $D-W = 0.276$
Cross-Section Fixed Effects	No	No	No	No
Time-Period Fixed Effects	Yes	Yes	Yes	Yes
Total panel (balanced) observations	330	330	315	315

Note: D is the distance between the capitals of the GCC countries and Cont is a binary variable of the common land border. *LERVP* and *LERVT* are exchange rate volatility measures using equations (4.3) and (4.4), respectively, in the text. Numbers in parentheses are t-statistics. ***, ** and * indicate 1 percent, 5 percent and 10% level of significance, respectively.

reported in table 4.2. We report results using both measures of exchange rate volatility:

LERVP (using equation 4.3, model 1) and *LERVT* (using equation 4.4, model 2).

The estimated Durbin-Watson (D-W) statistics of 0.371 (model 1) and 0.302 (model 2) are quite low. This may suggest that there is autocorrelation in the data. Of course, a low D-W value could also be due to the specification error. The results are also questionable as the sign of one of the coefficients, product of per-capita GDP, is unexpectedly negative. The effect of exchange rate volatility is also turned out to be much higher than expected. The estimated coefficient of the exchange rate variability using *LERVP* is about –73 (model 1) which means a one percent increase in exchange rate variability would lead to a 73 percent decrease in bilateral trade between two GCC countries which seems to be implausible. Though the estimated coefficient of the exchange rate variability using *LERVT* is somewhat smaller (about –25 in model 2), it is not acceptable for the reasons explained below.

It is true that exchange rate volatility affects trade. It is also plausible that trade itself may cause exchange rate volatility. To control this simultaneity bias we have estimated models using the two stage least squares (2SLS) method and results are reported in models 3 and 4 in table 4.2. The estimated Durbin-Watson (D-W) statistics of 0.498 (model 3) and 0.276 (model 4) are still quite low. Moreover, the estimated coefficients of the exchange rate volatility are even larger. To check for the autocorrelation problem we have reestimated models 1 – 4 (without fixed effects) with the first order autoregressive term (AR1) and found that it is highly statistically significant. It implies that the past trade ($LTRADE_{t-1}$) is an important determinant of the current trade ($LTRADE_t$) for the GCC countries. Thus the models are estimated by including the lagged dependent variable as one of the explanatory variables and results

are reported in table 4.3.

Table 4.3: Panel Estimation of Bilateral Trade with Lagged Dependent Variable

Dependent Variable →	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$
Independent Variables ↓	(Model 1) **(LS)**	(Model 2) **(LS)**	(Model 3) **(LS)**	(Model 4) **(LS)**
Constant	–1.575 (–1.047)	–0.821 (–0.552)	–1.794 (–1.199)	–0.949 (–0.639)
$LTRADE_{ij,t-1}$	0.782 (23.999)***	0.820 (25.477)***	0.796 (25.129)***	0.829 (26.649)***
$LGDPP_{ij,t}$	0.118 (2.477)**	0.082 (1.592)	0.097 (2.106)**	0.073 (1.488)
$LGDPOP_{ij,t}$	0.059 (0.894)	0.031 (0.472)	0.072 (1.098)	0.038 (0.584)
$LERVP_{ij,t}$	–19.330 (–2.266)**	–12.041 (–1.230)	–	–
$LERVT_{ij,t}$	–	–	–23.308 (–1.978)**	–18.475 (–1.396)
D_{ij}	–0.112 (–1.214)	–0.097 (–1.084)	–0.093 (–1.008)	–0.086 (–0.962)
$Cont_{ij}$	0.234 (1.859)*	0.224 (1.687)*	0.264 (2.124)**	0.231 (1.777)*
	SE = 0.536 $\overline{R}^2$ = 0.903 $D-W$ = 1.721	SE = 0.514 $\overline{R}^2$ =0.911 $D-W$ = 1.770	SE = 0.537 $\overline{R}^2$ = 0.902 $D-W$ = 1.742	SE = 0.513 $\overline{R}^2$ = 0.911 $D-W$ = 1.778
Cross-Section Fixed Effects	No	No	No	No
Time-Period Fixed Effects	No	Yes	No	Yes
Total panel (balanced) observations	315	315	315	315

Note: D is the distance between the capitals of the GCC countries and Cont is a binary variable of the common land border. *LERVP* and *LERVT* are exchange rate volatility measures using equations (4.3) and (4.4), respectively, in the text. Numbers in parentheses are t-statistics. ***, ** and * indicate 1 percent, 5 percent and 10% level of significance, respectively.

The results of models 1 – 4 in table 4.3 are much improved than results presented

in table 4.2. The inclusion of the lagged dependent variable resulted in a substantially lower standard error of regression (SE) and an increased adjusted R^2 from 0.70 (on average) to about 0.90 (on average). The D–W statistic is now also improved a lot and this suggests that models in table 4.2 were misspecified. As we see from table 4.3, all the estimated coefficients have expected signs and the main explanatory variables are highly significant at least for no fixed effects.

We first summarize the key findings of the results presented for models 1 and 3 in table 4.3 with no fixed effects and then point out the shortcomings as well as remedies of these shortcomings. The estimated coefficients of LGDPP are 0.12 (model 1) and 0.10 (model 3) which are significant at the 5 percent level. These results imply that on average if the product of the real GDP of two GCC countries increases by 1 percent, their bilateral trade would increase by 0.12 or 0.10 percent which is very small and not far from reality. We have seen from our previous discussion, especially in chapter 3, that intra-trade among the GCC countries improved but not substantially even in recent times when their real GDP increased substantially. Results in table 4.3 also show that the estimated coefficients of per-capita GDP product (LGDPOP) have expected positive sign but very small and, more importantly, they are statistically insignificant. The estimated coefficients of distance variable are negative (–0.11 for model 1 and –0.10 for model 3) but statistically insignificant.

It is the common border that seems matter most for the GCC countries. We see that the estimated coefficients of the common border (Cont) are positive and they are all statistically significant at the 5 or 10 percent levels. This supports the GCC countries intra-trade data that two highest intra-trade flows are between Bahrain and Saudi Arabia

and between Oman and UAE both of them have common borders.

Our main variable of interest is the variability of the exchange rate. The estimated coefficients on exchange rate volatility are negative (–19.33 using *LERVP*, model 1, and –23.31 using *LERVT*, model 3), as expected, and are statistically significant at the 5 percent level. The point estimates of –19.33 and –23.31 imply an increase of trade flows by 8% and 7%, respectively, with the elimination of the exchange rate volatility. This impact is computed as follows: the estimated coefficients in the regression equations are multiplied by one standard deviation (from table 4.1) of the volatility measures and then multiplied by 100 to convert to percent. These results are quite comparable with other panel studies.

Results obtained with time-period fixed effects (models 2 and 4) show that main variables such as GDP products and exchange rate volatility (especially *LERVT*) are statistically insignificant. Similar results obtained with 2SLS (not shown here).

However, the main finding of the results presented in table 4.3 is that the lagged dependent variable is an important regressor. The estimated coefficient of the lagged dependent variable is about 0.80 which is highly statistically significant. This is also understandable that the past trade influences the present trade. In this case, as mentioned above, either using LS method or 2SLS method (due to endogeneity problem) will not provide efficient estimates and the panel GMM/DPD method is the most consistent and efficient estimator. In that case standards errors are robust to conditional and unconditional heteroskedasticity and contemporaneous correlation. We have presented estimates based on the LS and 2SLS (tables 4.2 and 4.3) for comparison purposes.

4.2.4.2 Key Findings from the GMM Estimator

The GMM estimation results are presented in table 4.4. Adjusted R^2 is not available but the standard errors (SE) of regressions are much lower compared to results reported in table 4.2 and also lower compared to results presented table 4.3. Two time invariant explanatory variables, distance (D) and the common land border dummy (Cont), are dropped out due to first-difference transformation. In models 1 and 3 in table 4.4 (without time-period fixed effects), all the estimated coefficients are individually highly statistically significant with the correct expected signs. The *p values* (not reported here) of most of the estimated t coefficients are extremely low. The lagged dependent variable in all estimations in table 4.4 has positive sign and they are all highly statistically significant. Thus, the models presented in table 4.2 are clearly misspecified. Results in table 4.4 (for all models) show that the per capita GDP product (LGDPOP) has higher impact on the GCC trade flows than GDP product (LGDPP). The estimated coefficients of LGDPOP for all models are highly statistically significant. The estimated coefficients of LGDPOP imply that one-third to two-third of trade flows among the GCC countries occur due to their change in per capita GDP product. That is, if the per capita GDP product of the GCC countries increases by 1 percent, trade flows of the GCC countries will increase by 0.38 to 0.64 percent depending on the selected model.

The estimated coefficients of the exchange rate variability measures have expected negative sign and they are statistically significant at the 5 to 10 percent levels. The estimated values of the exchange variability vary from –15.49 to –28.86. The values of the exchange variability are found to be higher using *LERVT* compared to the results found with *LERVP*. However, both measures provide similar (comparable) impact on the

Table 4.4: The GMM (First Difference) Estimates of Bilateral Trade

Dependent Variable →	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$	$LTRADE_{ij,t}$
Independent Variables ↓	(Model 1)	(Model 2)	(Model 3)	(Model 4)
$LTRADE_{ij,t-1}$	0.264 (3.681)***	0.393 (4.959)***	0.255 (5.333)***	0.480 (5.333)***
$LGDPP_{ij,t}$	0.207 (2.212)**	0.194 (1.295)	0.189 (2.344)**	0.137 (0.945)
$LGDPOP_{ij,t}$	0.378 (2.952)***	0.521 (3.407)***	0.401 (3.313)***	0.392 (2.554)**
$LERVP_{ij,t}$	−15.487 (−1.852)*	−20.454 (−2.001)**	–	–
$LERVT_{ij,t}$	–	–	−25.072 (−2.105)**	−28.864 (−1.672)*
	SE = 0.429	SE = 0.447	SE = 0.430	SE = 0.475
Cross-Section Fixed Effects	First Differences	First Differences	First Differences	First Differences
Time-Period Fixed Effects	No	Yes	No	Yes
Total panel (balanced) observations	285	285	285	285

Note: *LERVP* and *LERVT* are exchange rate volatility measures using equations (4.3) and (4.4), respectively, in the text. Numbers in parentheses are t-statistics. ***, ** and * indicate 1 percent, 5 percent and 10 percent level of significance, respectively.

overall trade flows as shown below.

To compare the results of the exchange rate variability using *LERVP* (models 1 and 2) and *LERVT* (models 3 and 4) as well as with other results in the literature, the estimated coefficients are multiplied by one standard deviation (from table 4.1) of each volatility measure which are then multiplied by 100 to convert to percent. This calculation gives figures of 6.2% (model 1) and 7.2% (model 2) for *LERVP* and 7.5%

(model 3) and 8.7% (model 4) for *LERVT*. A result of 7.5% (model 3, for example) means an increase of 7.5% intra-trade flows of the GCC countries with the elimination exchange rate volatility. In other words, trade flows among the GCC countries will increase about 6 – 8.7% if these countries form a monetary union.

We compare our results with others results in literature summarized in table 4.5.

Table 4.5: Impact on Trade Flows of Eliminating Exchange Rate Volatility

Present Study	Clark et al. (2004)	Baldwin (2006)	Melitz (2006)	Tenreyro (2007)	Berger & Nitsch (2008)	Kelejian et al. (2011)
6.2 – 8.7%	9%	5 – 10%	5 – 7%	0%	8%	6.4 – 9%

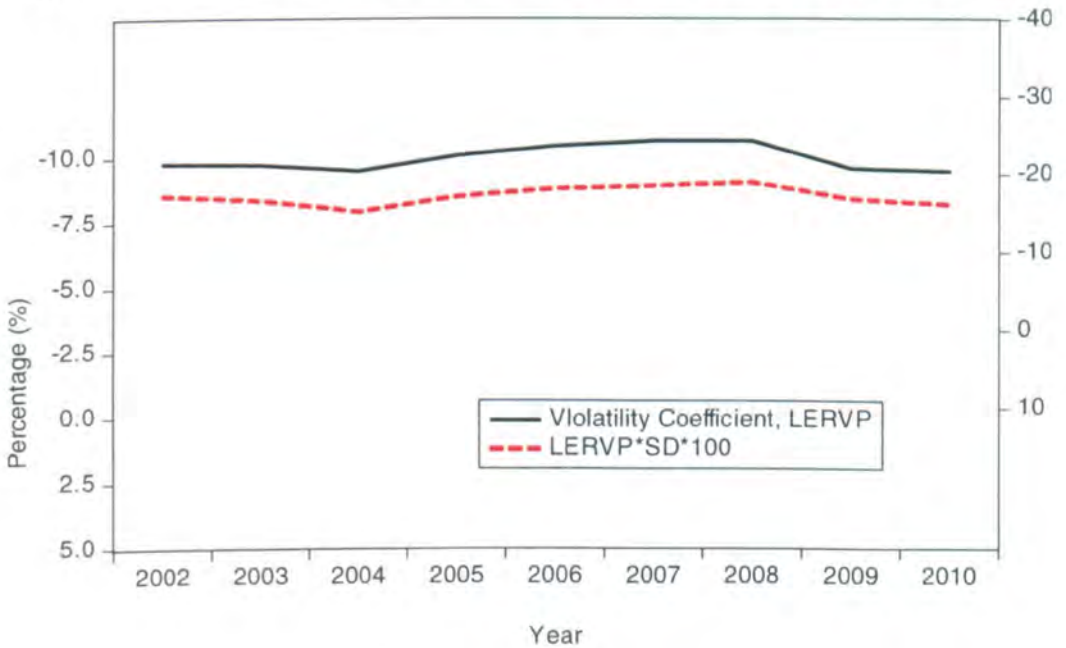
As we can see from table 4.5 that the results we have obtained are quite comparable and consistent with the results found in literature and discussed above in details. For the GCC region, an increase of 8.7% will imply an increase of only few millions (about $22 million) as the average trade flows (discussed in section 4.4.4 above) among these countries is about $250 million during the period 1989 – 2010. Though compared to their combined GDP this is quite small, it will open new opportunities that may enhance much needed industrial sectors in the GCC region.

4.2.4.3 Stability of the Volatility Coefficient

We consider model (2) in table 4.4 is our preferred specification for the estimation of the impact of the exchange rate volatility on GCC bilateral trade. This is because the LERVP is the standard measure of exchange rate volatility used by many researchers (see, for example, Frankel and Wei, 1993) and the model 2 includes the time-period fixed effects. Moreover, the impact coefficient of –8.2% (–20.45 multiplied by one standard

deviation) of the estimated coefficient is comparable to other studies mentioned in table 4.5. However, the point estimate of –20.45 for LERVP is the average over the sample period. We would like to test whether the estimate and its impact has changed over time, that is, we would like to test the stability of LERVP coefficient. To perform this test, we use recursive methodology that involves adding one data point to the sample in the GMM estimation and rerun the regression. Such type of stability test is performed in relation to the exchange rate pass-through literature (see, for example, Ghosh and Rajan, 2009). We have used this recursive estimation to plot the dynamic coefficient of LERVP and its impact on trade in figure 4.3. Note that the last data point in the recursive estimation plots exactly the value of the point estimate reported in model 2 in table 4.4. Because of our short time period, we present recursive plot from 2002. In figure 4.3 the LERVP coefficient estimates are presented using right hand scale (solid line) and its impacts on trade (coefficient times one standard deviation) are presented using left hand scale (dotted

Figure 4.3: Recursive GMM Estimation of Volatility and Its Impact on Trade



line). It shows that the recursive coefficient estimates were more or less stable around the starting value of about –21, though there was a little upward trend that ended in 2008 and started to revert to the starting value of about –21. The impacts of eliminating the exchange rate volatility (shown by the dotted line in figure 4.3) on trade are about 8% and these impacts were also stable.

Smith and Fuertes (2010, section 3.3.1) have raised the useful question whether econometric modeling should be undertaken separately for each unit of cross-section if panels are not short and wide. This question is about the fundamental assumption of panel methods that at least some of the model's parameters can be treated as unvarying in the cross-sectional dimension. This implicit assumption might be labeled as *cross-sectional stability*. They note that, whilst there are not yet any well established procedures for formal testing of cross-sectional stability, it can be useful (when the time dimension of the panel is sufficiently large) to examine the variability of key parameter estimates when the model is estimated separately for each-sectional unit.

As we have mentioned above (because of non-availability of data for some important variables), the time period of observation is not sufficient for reliable country by country estimation of the model in the present study. This has motivated the use of panel data. Nevertheless, following the advice in Smith and Fuertes (2010) it would be interesting to estimate the model of bilateral trade for each country pair by the ordinary least squares (OLS) and focus on the coefficient of LERVP (main variable of interest). Application of OLS to bilateral trade model (model 2, table 4.4) for country pairs produces the set of parameter estimates and estimated standard errors for LERVP coefficient that are presented in the following table 4.6.

Table 4.6: OLS estimates of LERVP coefficient (1992 – 2010)

Country-Pair	Coefficient	Standard error
Bahrain-Kuwait	-0.886	37.502
Bahrain-Oman	39.068	57.639
Bahrain-Qatar	-4.487	48.762
Bahrain-Saudi Arabia	-25.620	27.261
Bahrain-UAE	2.913	16.217
Kuwait-Oman	-6.384	39.227
Kuwait-Qatar	-34.919	33.857
Kuwait-Saudi Arabia	-42.309	44.844
Kuwait-UAE	-40.270	24.778
Oman-Qatar	20.845	30.821
Oman-Saudi Arabia	-6.437	17.662
Oman-UAE	-5.950	15.567
Qatar-Saudi Arabia	21.586	28.467
Qatar-UAE	22.556	40.971
Saudi Arabia-UAE	14.707	22.739
Average	-3.039	32.421
Maximum	39.07	
Minimum	-42.31	
Range	81.38	
+/2*avg s.e.	129.68	

As we from table 4.6 that the range of variation of parameter estimates (for LERVP) is less than four times the average estimated standard error. This is not a formal criterion for stability but arguably reflects the asymptotic normality of OLS estimates – where 95% coverage is obtained by approximately two standard errors each side of the mean. On the basis of this criterion it would seem that we cannot confidently rule out the *cross-sectional stability* of the LERVP coefficient.

4.3 IMPACT OF TRADE ON ECONOMIC GROWTH

We have noted that the GCC monetary union will eliminate exchange rate volatility and have presented evidence that this would increase intra-GCC trade. Our next focus is to understand how the increased trade would enhance GCC economic growth.

The relationship between trade and growth has long been a subject of considerable debate among economists. Edwards (1993, 1998) and Rodriguez and Rodrik (1999) among others have thoroughly reviewed the literature, especially linking between trade orientation of a country and economic performance of a country. Edwards (1993) has pointed out that during 1950s, 1960s and 1970s a large number of development economists advocated protectionist view based on import substitution ideas of protecting domestic infant industries. However, even during this time historical and statistical evidence suggest that outward oriented economies outperformed those countries that embraced protectionism. In the 1980s economists dealing with developing countries started to recommend development strategies based on reducing trade barriers and opening to international trade (Edwards, 1993). However, Rodriguez and Rodrik (1999) questioned whether the voluminous research had convincingly demonstrated the negative relationship between trade restrictions and economic growth.

Though the topic trade and economic performance (growth) is a very old one, the theoretical link was not well established for a long time (Edwards, 1993). Here we are mainly interested in those studies linking monetary union to trade and economic growth. We review some of these studies. We also review some of the voluminous empirical findings. The empirical literature is separated into three groups of studies: the first group of studies employed cross-country correlation coefficients to test the export-led growth (ELG) hypothesis; these were followed by (typically least squares) regression applications that were again based on cross-country evidence; thirdly, recent group of works that have applied various time series techniques to examine the exports-growth nexus. Potential problems with the cross-country methods are well documented in the

literature and some problems with the later time series studies are also noted by Giles and Williams (2000).

4.3.1 Literature Review

4.3.1.1 Theoretical Foundations

Trade is a determinant of economic growth. Theories of international trade for a long time provide strong justifications for believing that increased openness can increase productivity and hence real output and incomes. As mentioned above, with the advent of endogenous growth theories and endogenous technological change there are good theoretical arguments linking increased trade with higher productivity and economic growth. While the traditional trade theories emphasized on efficiency gains through specialization based on comparative advantage or economies of scale, the newer theories of trade and growth suggest that increased openness may boost longer-run growth through technological spillovers.

Theories are developed from trade to complete economic integration. Rivera-Batiz and Romer (1990) provide one of the most interesting examples of the economic integration theories. They argued that under the endogenous technology design integration can promote economic growth and help maintain economic cohesion between countries. If economic integration lets two economies exploit increasing returns to scale, integration will raise the long run rate of growth purely because it increases the extent of the market. Thus, a complete economic integration, due to free trade and free flows of ideas, would benefit all countries of integration. Simkins (2008) mentioned another economic theory in line with the international trade model of Heckscher-Ohlin. Given the model's assumptions of zero transaction costs, perfect competition, and no barriers to

trade, monetary union is expected to promote economic growth.

Following the endogenous growth theories, we have witnessed the endogenous optimum currency area theory following the works of Frankel and Rose (1998, 2002). Dellas and Tavlas (2009) have summarized the intuition behind the endogenous optimum currency area and have reviewed the literature. The introduction of a single currency eliminates exchange rate risk, lowers transaction costs and encourages competition. Therefore, as they maintain, a common currency promotes economic and financial integration, accumulation of knowledge and trade. There is a direct relationship between trade integration and income correlation because trade integration leads to high business cycles correlation and a greater intra-industry trade. They also distinguish between inter-industry pattern of trade and intra-industry trade. The standard trade theory predicts a higher inter-industry pattern of trade with specialized production when an economy becomes more open to trade. On the other hand, if intra-industry dominates trade (a prediction of a monetary integration), one may witness a higher business cycle correlation with industry specific shocks. Analytically, therefore, as they contend there is an ambiguous relationship between trade intensity and the co-movement of output.

As mentioned above trade integration leads to a greater intra-industry trade and growth. Leitao (2012), though in an empirical study, constructs a theoretical measure of intra-industry trade index and shows that intra-industry trade promotes the economic growth.

4.3.1.2 Empirical Evidence

Frankel and Romer (1999) recognize that trade itself is an endogenous variable.

They also recognize that geographic characteristics of a country have important effects on its trade pattern. Therefore they construct the measures of the geographic component of countries' trade and use the instrumental variables estimates of the effect of trade on income. They conclude: "The results of the experiment are consistent across the samples and specifications we consider: trade raises income. The relation between the geographic component of trade and income suggests that a rise of one percentage point in the ratio of trade to GDP increases income per person by at least one-half percent. Trade appears to raise income by spurring the accumulation of physical and human capital and by increasing output for given levels of income" (Frankel and Romer, 1999, p. 394). Their empirical work also has important implications for regional integration. They find that the larger countries have more opportunities for trade within their borders. The point estimates they obtain suggest when a country's size and area is increased by one percent, income of the country increases by one-tenth of a percent or more. The reason for such within-country trade increases income is again is as follows: With the increase in country's size and area, trade within the country increases which in turn stimulates capital accumulation (physical and human capital) and increase in income. Though they point out limitations of their estimated results, one may still be tempted to conclude from these results that regional integration would work like a larger country and thereby would increase trade and income of the region.

Estimated results over a twenty year period obtained by Frankel and Rose (2002, p. 23) indicate "that every one percent increase in total trade (relative to GDP) raises income per capita by at least one third of a percent over a twenty-year period, and possibly by much more over the long run."

De Grauwe (2003) concluded that the econometric evidence initiated by Rose (2000) has detected a strong and positive empirical relation between monetary unions and trade flows, and through this channel, a positive effect of monetary unions on the income levels of participating countries. Debrun et al. (2005) provide quantitative assessment of the costs and benefits of monetary integration pursued in Africa. They find correlations between terms of trade and real output are low and sometimes negative.

Lejour et al. (2006) stated the EU membership may have improved the quality of their institutions and contributed to trade. They find that the shared EU membership increased trade between two of its member states about 34 percent. According to them, trade increases by another 22 percent if institutions improve, yielding a total increase in trade by 56 percent. According to their estimates, improved openness increases income by 37.5 percent. The total income effect of EU membership is 39 percent for the ten members when a small direct effect of improved institutions on income is added. They derive the implications of their results by pointing out that the effects on trade and institutions of the EU membership could lead to large economic gains for the new member states. Schadler *et al.* (2006) study the effects of European integration on growth using European data. They estimated equations based on simple growth and current account framework. They find that European integration has a direct effect on growth ranging between 2 to 3 percent of GDP a year.

Eicher and Henn (2011), in an extended dataset originally used by Rose (2000) and addressing the critiques regarding the proper specifications of the gravity model, find a robust average currency union trade effect of 45 percent, though the trade impacts of individual currency unions vary substantially. Bhattacharya and Wolde (2010) have

argued that there is considerable evidence in the academic literature that openness to trade impacts positively on economic growth. Their empirical results from the augmented growth model indicate that openness has a statistical significant positive impact on growth.

Leitao (2012) has investigated the impact of marginal intra-industry trade (MIIT) on economic growth. The paper tests the hypotheses whether intra-industry trade, FDI and globalization promote growth in the line of endogenous growth model. In a dynamic specification based on the GMM system estimator and using the US data, the author obtains positive impact of MIIT, FDI and globalization on economic growth.

4.3.2 Empirical Methodology and Model Specification

4.3.2.1 The Growth Model

As mentioned above, Edwards (1993) has reviewed some empirical cross countries studies that have found that the increase in exports of a country increases economic growth of the country. However, he is critical about these studies and concluded as follows (Edwards, 1993, p. 1389): "The theoretical framework used have been increasingly simplistic, failing to address important questions such as the exact mechanism through which exports expansion affects GDP growth, and ignoring important potential determinants of growth such as educational attainment. Also, many papers have been characterized by a lack of care in dealing with issues related to endogeneity and measurement errors. All of this has resulted in many cases, in unconvincing results whose fragility has been exposed by subsequent work." Rodrik (1994) also finds them quite misleading and argues for the reverse or backward causality

in recognizing that an exogenous increase in investment in developing countries that have a comparative disadvantage in capital goods would necessarily increase imports of such goods. This is turn would increase exports to pay for the imports. Bradford and Chakwin (1993) similarly argue that causality runs from investment to growth and exports not the other way around. Helpman (1989) asked whether growth drives trade, or whether there is a reserve link from trade to growth. Harrison (1995) concluded that the issue of causality in the existing literature is still unresolved.

Here are some plausible explanations for reverse causality. The simultaneity problem is understandable when in a regression equation with GDP as the regressand and exports or the rate of change of export as a regressor. Correlation between them may arise because exports are a component of GDP rather than because of any extra contribution that trade makes to growth. Similarly imports (trade) may rise with income because agents may perceive foreign goods are superior in consumption. Many studies in search of exogeneity have sought for direct measures of trade policies. However, as Sala-i-Martin (1991) has pointed out that the fundamental conceptual problem of simultaneity remains besides difficulties in measuring trade policies. Free market domestic policies may be more important to growth than the free market trade policies which tend to be with them. In this case openness will be observed to be correlated with growth which does not mean trade causes growth. A final possible mechanism is through tariffs. Poor countries tend to depend fiscally on tariff revenue as they continue to develop but reduce tariffs as they become more developed.

Some studies have used Granger-causality tests to cope with the challenge posed by simultaneity [e.g. Jung and Marshall, 1985; Hutchison and Singh, 1987, 1992; and

Bradford and Chakwin, 1993; among others]. Esfahani (1991) attempted a simultaneous equations approach. Frankel and Rose (2002) have argued for good instrumental variables techniques. According to them instrumental variables have to be truly exogenous and are highly correlated with trade. Their paper offers tests with such instruments: trade shares as predicted by the gravity model of bilateral trade which include variables such as GDP, trade, distances, common borders and languages and populations (or per capita GDP). An intuitive way to implement the idea is to use the values predicted by the gravity model to instrument for the trade variable in the growth equation. With this correction if the trade variable still appears to be a significant determinant of growth, one can conclude that the effect is causal and not spurious.

Some endogenous growth models, using the ideas of fixed cost and increasing returns, have studied the effects on the long-run rate of growth [for example see the theoretical papers by Feenstra, 1990 ; Grossman and Helpman, 1989a, 1989b, 1989c, 1989d, 1990 ; Krugman, 1990 ; Lucas, 1988 ; Romer, 1990 ; and Young,1991]. Backus *et al.* (1992) present both theoretical models and cross country empirical evidence of the implications of these models. These models permit a distinction between a one shot gain (level effect) and a permanent change in the growth rate (growth effect) that is extremely important in making an estimate of the magnitude of the benefits of economic integration. Integration is found to be much more important in the context of the endogenous growth model compared to the conventional attempts to quantity the effects of integration using the neoclassical growth model where the gains from integration are small. However, these papers have demonstrated that the growth effects of trade restrictions are very complicated in the most general case. Grossman and Helpman (1989a, 1989b, 1989c, and

1990) have been particularly explicit about the fact that no universally applicable conclusions can be drawn.

Henrekson *et al.* (1997) have examined the role of trade and institutional integration on economic growth using a purely empirical approach on European Community and European free Trade Area (EFTA) countries along with a sample of OECD countries. They find that joining the EU or EFTA enhances growth. Crespo-Cuaresma et al. (2002), using a panel regression, examine the impact of European integration on economic growth of the current EU members. They find that the length of EU membership has a significant and positive effect on economic growth. Martin and Velazquez (2001), Wagner and Hlouskova (2002), and Boldrin and Canova (2001) provide a description analysis of how different experiences of convergence of the recent EU members affected economic growth after joining the EU and derive lessons from these countries' experience for the candidate countries.

Yigit and Kutan (2004), by combining the ideas in Rivera-Batiz and Romer (1990) and Lee et al. (1997), in the context of a stochastic endogenous growth model, investigate the impact of the new members to the European Union on convergence and productivity growth. They claim to deviate from the general strand of literature by not only deriving a theoretical model for the effects on integration on the rate of economic growth, they formulate and test a stochastic endogenous growth model that investigates the impact of EU integration on convergence and productivity growth. They have used a battery of structural break and panel data tests to find that the EU integration enhances productivity growth. Finally, the evidence of positive impact of integration on growth

rates and productivity reported in these papers suggests that benefits over time will be more than outweigh the expected short-run costs to the new members.

Yigit and Kutan (2004) used a panel covering the period 1960 – 2000 which they divide it into eight five-year intervals. With the exception of the initial income which is given the value at the beginning of each five-year period, the variables are averaged over these five-year intervals. The random error term u_{it} is less influenced by business cycle fluctuations and less likely to be serially correlated than it would be with yearly data. Their specification slightly differs from Frankel and Rose (2002) as follows. First, they have replaced GDP per capita at the beginning of the sample period with GDP per capita in the first year of every five-year period following Islam (1995). Second, they have included openness in quadratic form as well as population size. Edwards (1998) also includes quadratic terms for openness indicators to test for nonlinearities between openness and growth. In some cases the coefficient is significant indicating a positive effect of openness on growth which is possibly due to economies of scale.

Lejour et al. (2006) used regression analysis to gauge the overall effect of EU membership on income (growth). They implicitly take account the dynamic gains of trade such as better integrated capital markets, larger FDI flows or the dynamic effects of integrated product markets. International trade in goods and services may also facilitate the transfer of ideas and technologies and in this way contribute to higher productivity (growth). Following Frankel and Rose (2002), they reconsider the effect of the EU membership on economic growth by employing a two-step procedure. First, they estimate a gravity equation for bilateral trade and find that the EU membership for the member states contributes to trade. Second, in line with the results of a vast empirical literature on

the link between trade openness and growth, they estimate trade openness to contribute to production (growth). The gravity model allows them to estimate the variation across bilateral trade flows and the growth equation allows them to identify the link from EU membership via trade openness to growth. Thus, the two-step procedure has the important advantage that it allows them to empirically identify the effect of EU membership.

Wang et al. (2007) studied the countries in the Common Monetary Area (CMA) in Africa. They suggest that though the CMA is not a full monetary union, the CMA arrangements have delivered many benefits of a full monetary union. Using the available data through the end of 2005, they find the real GDP growth in the CMA as a whole has accelerated over the last two decades.

4.3.2.2 Model Specification

This section estimates the effect of trade on economic growth and output in the GCC countries. Classical and new trade theory suggests that trade and openness have a positive effect on the economic growth and income. Lejour *et al.* (2006) follow a two-step procedure in which a gravity equation for bilateral trade shows the trade effect of EU membership and a growth regression yields the income effect of trade.

Simkins (2008) used a Solow (1956) theoretical model that could account for the potential effects of economic integration over time. She develops two hypotheses drawing mainly from the stochastic heterogeneous growth approach of Lee et al. (1997) combined with the economic integration-growth theory of Rivera-Batiz and Romer (1990). First, economic integration, ceteris paribus, positively affects the speed of real

income in a union and second, the longer the country is a member of a union, ceteris paribus, the greater are the cumulative income gains from economic integration. Her empirical results largely confirm the validity of these hypotheses and suggest that economic integration increases output of the union.

Here we follow Mankiw et al. (1992), Frankel and Romer (1999) and Frankel and Rose (2002) for our empirical analysis. Trade flows may not be considered as exogenous; thus the panel least squares estimates may suffer from simultaneity problem. To avoid this problem, studies have used the panel two-stage least squares (instrumental variable) method. Tests based on this idea are provided in a number of papers which may be somewhat relevant here. DeLong and Summers (1991) tested for spatial correlation of residuals in their growth regression and failed to find any correlation based on physical proximity. Chua (1993), on the other hand, finds strong evidence for positive regional spillovers on a country's growth rate. Elliott (1993) finds spatial correlation in growth among the East Asian countries. These papers, however, do not focus specifically on trade. They measure spatial proximity by simple dummy variables for common border or common regions, rather than using the full set of variables known to be useful in the gravity literature. As a result, the regional spillover effects found by Chua (1993) and Elliott (1993) could be due to many possible channels, whereas ours can be specifically identified with trade links.

Our main interest is to understand whether trade flows within the GCC countries have any influence on economic growth of the region and ignoring the spatial interaction factor. A cross-section empirical growth equation can be written as (Mankiw et al., 1992, Frankel and Romer, 1999, Frankel and Rose, 2002, Durlauf et al.,2006):

$$\ln\left(\frac{y_{i,t}}{y_{i,0}}\right) = \alpha + \beta \ln y_{i,0} + \sum_k \gamma_k X_{k,i} + u_i \qquad (4.5)$$

The growth equation (4.4) states that per capita GDP (y) growth depends on the initial per capita GDP level (y_0) and other conditioning variables X that includes trade effect. This is also known as the β - convergence model. β in equation (4.5) is the convergence coefficient. The expected sign of β is negative which implies that the growth rate of per capita income of a country is negatively related to its initial level of per capita income. The idea is that regions or countries converge to different steady state income levels because of their different structural characteristics. A country converges at a faster rate if it is further from its own steady state.

We have avoided time series data to study the effect of trade on economic growth of each GCC country because most of the relevant data for each country are not available for a meaningful long period and even if some series are available, their reliability is questionable (especially data form 1970s and the most part of 1980s). Thus, we are interested in the panel estimation of the trade effect on the growth rates of the GCC countries. Islam (1995), Durlauf et al. (2006), among others, have specified the dynamic panel data specification that follows from the beta-convergence model (4.5). Following them we specify the following equation for our estimation:

$$\ln\left(\frac{Y_{it}}{pop_{it}}\right) = \alpha + \gamma \ln\left(\frac{Y_{it-1}}{pop_{it-1}}\right) + \theta \ln\left(\frac{T}{GDP}\right)_{it} + \phi\left(\frac{I}{GDP}\right)_{it} + \lambda \ln(n)_{it} + \sigma \ln SCH_{it} + v_{it} \qquad (4.6)$$

Here the dependent variable is the natural logarithm of real GDP (Y) of a country i

divided by its total population (pop), (T/GDP) is the total trade (exports plus imports) as a share of GDP, (I/GDP) is the gross investment as a share of GDP, n is the rate of growth of population plus an allowance of 0.07 for technological growth plus depreciation of the capital stock, and SCH is an estimate of per capita human capital investment based on schooling. The error term v_{it} in equation (4.6) contains time-invariant unobserved country-specific effects η_i that we explain below. An allowance of 0.07 for technological growth plus depreciation of the capital stock is a bit high (standard value is 0.05), but we are forced to do it. Population growth rates of Kuwait for some years were close to (not equal to) – 7%. If we do not allow 0.07, the log of n on negative numbers will end up with missing valuable observations. However, the use of 0.07 instead of 0.05 has no consequence for estimated results. The definitions and measures of the variables in equation (4.6) are provided in table 4.6 below. The coefficient of lagged dependent variable γ in equation (4.6) is now related to the speed of convergence β in equation (4.5) as follows: $\gamma = \exp(-\beta\tau)$ where τ is the time interval (Lee et al., 1998). Since the expected sign of β is negative, we expect the sign of γ in equation (4.6) is to be positive. Following the norm in the growth literature, we measure openness as the ratio of exports plus imports to GDP. The coefficient θ, which measures the effect of openness on output, is one of our main interest. Econometric problem in estimating equation (4.6) along with econometric methods used are discussed below in section 4.3.2.5.

4.3.2.3 Data Sources and Summary Statistics

The dataset includes annual time series from 1989 to 2010 for six countries which

amounts to 132 observations. Trade data are compiled from the *International Monetary Fund Direction of Trade Statistics* (IMF DOTS). They are expressed in billions of US dollars. Nominal GDP (in billion US dollars) and GDP deflator are taken from *World Economic Outlook (WEO)* Database. Nominal GDP is deflated by the GDP deflator to get real GDP. The data on gross investment as a share of GDP is taken from the *WEO.* Population data come from the *United Nation's National Account Statistics* (UN NAS). Finally, the data on human capital investment came from the United Nations Educational,

Table 4.7: Definitions of Variables and Sources

Variables	Symbols	Definitions	Sources
$\ln\left(\frac{Y}{Pop}\right)$	**LGDPP**	Log of real GDP (Y) divided by total population (POP).	WEO, UN NAS
$\ln\left(\frac{T}{GDP}\right)$	**LTG**	Log of total trade as a share of GDP.	IMF DOTS, WEO
$\ln\left(\frac{I}{GDP}\right)$	**LIG**	Log of gross investment as a share of GDP.	WEO
$\ln(n)$	**LPGR**	Log of population growth rate plus 7 percent.	UN NAS
$\ln(SCH)$	**LSCHP**	Log of human capital investment (based on schooling) divided by total population (POP).	UNESCO

Scientific and Cultural Organization (UNESCO). Data sources and the definitions of the variables used in our empirical estimation are summarized in table 4.7.

Summary statistics of variables for the aggregate panel data (six cross sections times 22 time periods) are presented in table 4.8. We have divided the sample in four periods, especially to see the developments (both in level and growth terms) of per capita real GDP and the share of total trade to GDP. We have 22 periods and divided by four

Table 4.8: Sample Mean of Main Variables for the Aggregate Panel Data
(Six cross-sections and 22 time periods, 1989 - 2010)

Variables	LGDPP	LTG	LIG	LPGR	LSCHP
1989 – 2010	9.6731	4.5932	3.0476	2.2771	6.6426
	(0.5436)	(0.3178)	(0.2935)	(0.4023)	(0.6956)
1989 – 1994	9.5131	4.5931	3.0180	2.0866	6.2041
	(0.5232)	(0.4058)	(0.2377)	(0.7056)	(0.5314)
1995 – 2000	9.6305	4.5612	2.9453	2.3125	6.3996
	(0.5248)	(0.3365)	(0.3504)	(0.1996)	(0.5326)
2001 – 2005	9.6943	4.5669	3.0544	2.3548	6.7001
	(0.5351)	(0.2568)	(0.2489)	(0.1771)	(0.5909)
2006 – 2010	9.8630	4.6733	3.1931	2.3475	7.3153
	(0.5609)	(0.2571)	(0.2628)	(0.2643)	(0.6064)
Growth Rates (%)					
1989 – 2000	1.23	–0.69	–2.41	10.83	3.15
2001 – 2010	1.74	2.33	4.54	–0.31	9.18

Note: Standard deviation in parentheses.

periods allowing six year periods in nineties (1989 – 1994 and 1995 – 2000) and five year periods in the later decade. Sample means of the variables and their standard deviations in parentheses are provided in table 4.8. Growth rates are also shown in table 4.8.

As we know everything in this region evolves around the oil sector or on oil price. Oil prices were relatively suppressed in the 90s compared to the last decade which had seen unprecedented oil price hike in 2007. It has not been possible to acquire data for the share of oil in each GCC country's total trade but, since oil price changes are constant across the cross-section, their impact can be at least partially represented within the model's period effects. Table 4.8 shows that the sample means of GDP per capita during the period 1989 – 2000 increased from 9.51 to 9.63 which represent a meager growth rate

of 1.23% and it increased from 9.69 to 9.86 during the period 2001 – 2010 which represents a growth rate of only 1.74%. The increased standard deviation in the last decade indicates that the disparities of the GDP per capita have increased across time. As our main emphasis is to understand the impact of trade on per capita income (economic growth), we would like to see how trade evolved in last two decades. We measure trade as total trade (exports plus imports) as a share of GDP. For these countries exports and imports both increase or decrease with oil price increase or decrease. Oil price declined in the first half of 90s and there was a sharp decline at the end of the 90s to the early 2000. Thus, it is not surprising to see that the sample means of trade during the period 1989 – 2000 decreased from 4.59 to 4.56 which represent a negative growth rate of –0.69%. Note that the variable LTG in table 4.8 is the natural logarithm of total trade to GDP. The natural log of 100 is approximately 4.605. The means of LTG for the periods 1989 – 1994, 1995 – 2000, and 2001 – 2005 were all less than 4.605 which imply total trade was less but close to GDP during these periods. It shows how open these countries are. On the other hand during the period 2006 – 2010 when oil price was very high the sample mean of LTG is 4.67 which implies during this period total trade was higher than GDP. During this period trade increased so much that it surpassed the GDP.

The GDP per capita and trade are both dependent on exogenous oil price. During the period 1989 – 2000 the GCC countries as a whole had a positive growth rate (1.23%) but had a negative growth rate of trade (–0.69%); on the other hand during the period 2001 – 2010 the growth rates of both GDP per capita and trade were positive. The period 1989 – 2000 includes the Kuwait war in the early 1990s when the macroeconomic variables of Kuwait had gone through abnormal changes (figures 4.3 and 4.4 below).

4.3.2.4 Trend of Main Variables

To understand more about the relationship of these two variables, we look at their trend for each individual country presented in figures 4.4 and 4.5. As mentioned above we have avoided econometric estimates of the time-series data for each country. Here we provide a cursory view involving main variables for the time-period under study. In figure 4.4 per capita GDP (LGDPP) is shown in the left hand scale and trade as a share of GDP (LTG) on the right hand scale. Though the per capita GDP for these countries have trended upward (figure 4.4), it trended downward during the 90s for Saudi Arabia and UAE probably mainly due to the influx of huge expatriate population to these two countries during the period. However, from figure 4.4 it is not immediately clear about the positive link between these two variables for most of the countries except probably Oman. However, figure 4.5 shows that the growth rates of per capita income and trade share seems to be moving the same direction for most cases. Figures 4.4 and 4.5 show the abnormal swings of Kuwait data till 1993. Thus, we present estimates based on the whole sample period and for the period 1994 – 2010 which we call a normal period.

4.3.2.5 Estimation Issues

There are some econometric issues in estimating equation (4.6). One problem is the trade or openness variable in equation (4.6); it cannot safely be assumed exogenous variable. As we reviewed in section 4.3.2.1 above, the issue of whether growth drives trade or trade drives growth is not resolved. However, as discussed in section 4.3.2.1 reverse causality (from growth to trade) is plausible. In this case trade variable in equation (4.6) will be correlated with the error term and the ordinary least squares (OLS)

Figure 4.4: Logarithm of Per Capita GDP (LGDPP) and Trade share of GDP (LTG)

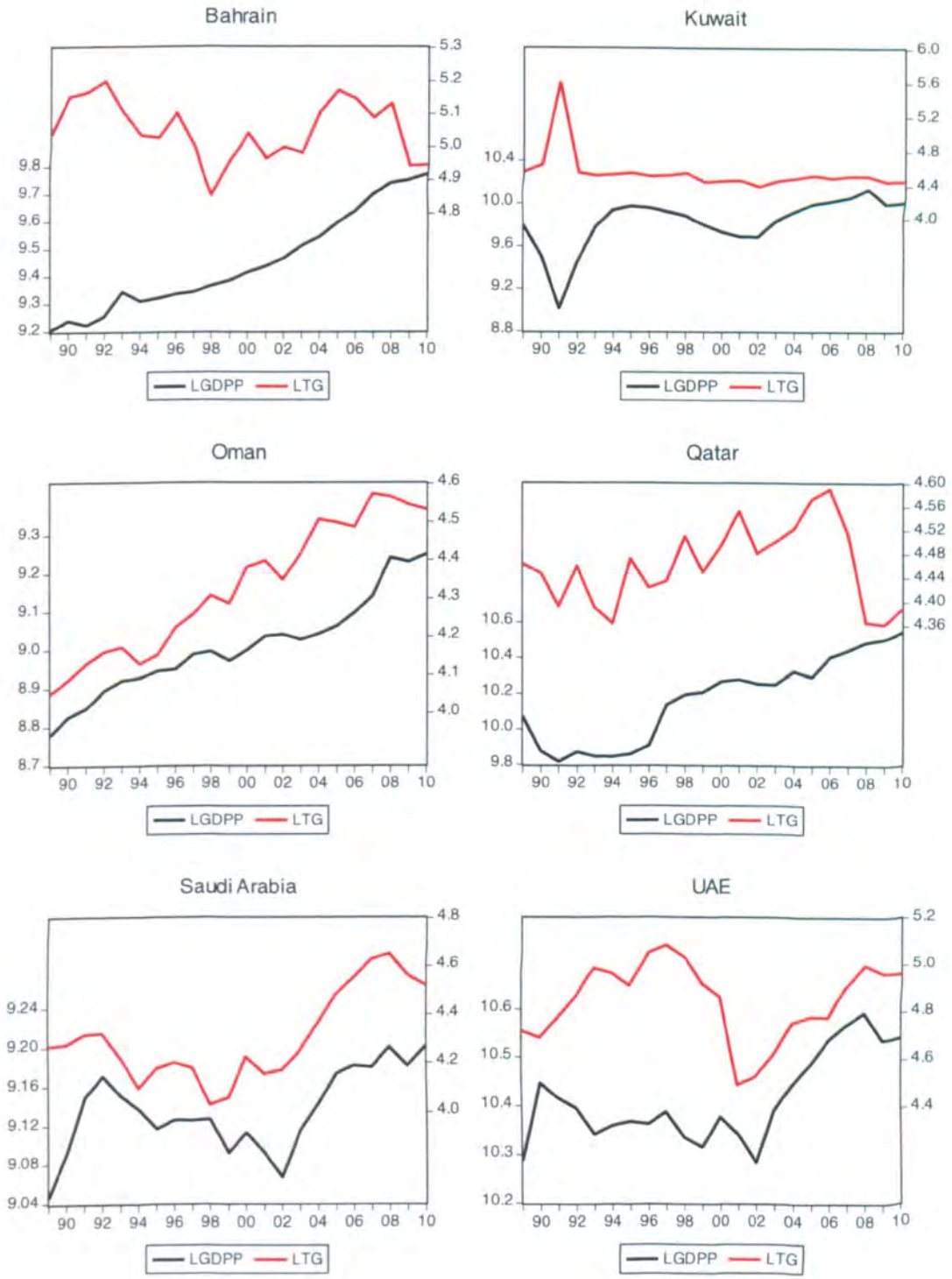
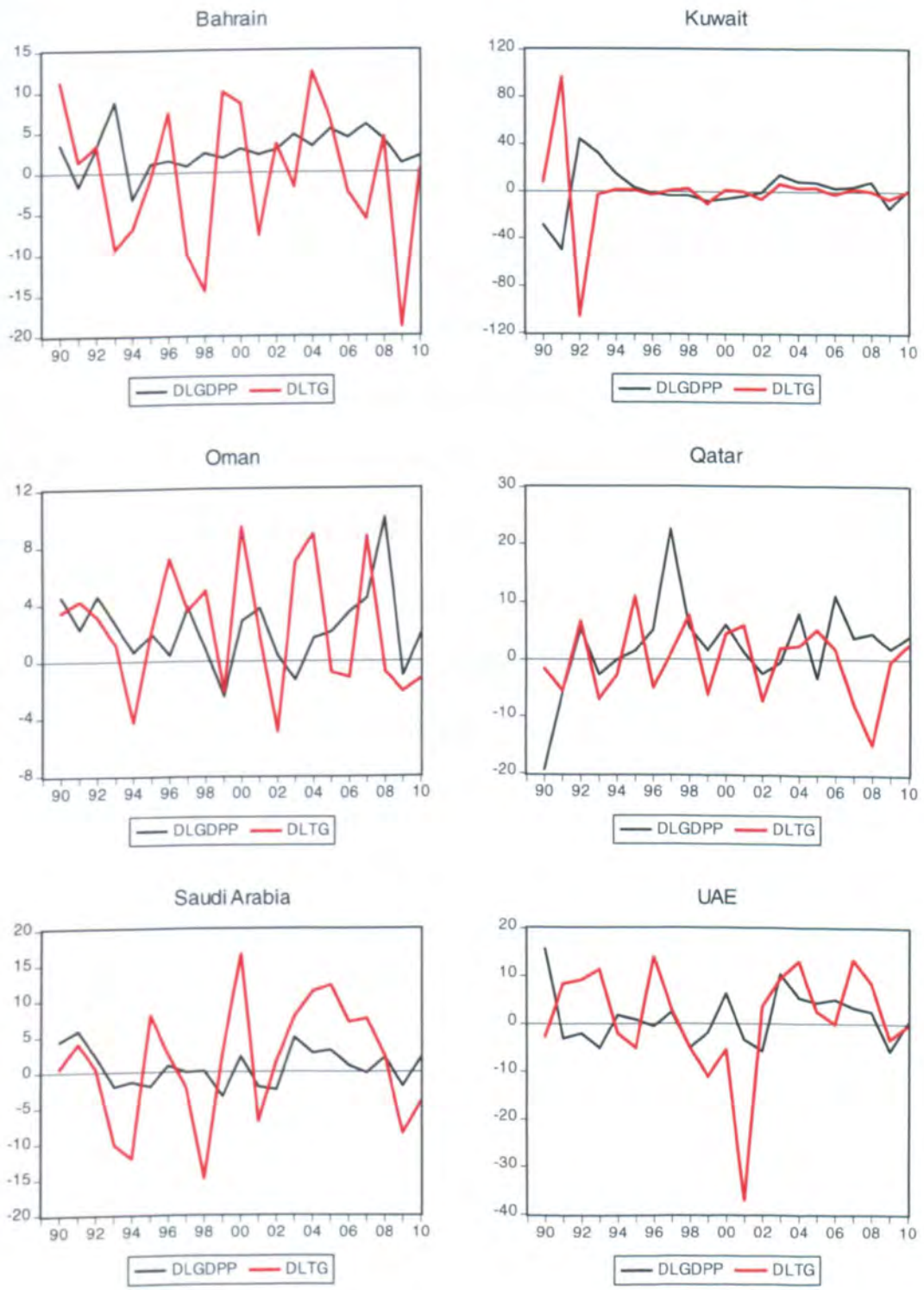


Figure 4.5: Growth Rates of LGDPP (DLGDPP) and LTG (DLTG)



effects are contained in the error term in equation (4.6) as follows:

$$v_{it} = \eta_i + \varepsilon_{it} \tag{4.7}$$

will provide inconsistent estimates. Another problem is the time-invariant country characteristics (fixed effects) may also be correlated with the error term. That is, the fixed where η_i in equation (4.7) is time-invariant unobserved country-specific effects and ε_{it} is the observation specific error term. That is, ε_{it} is considered as the usual disturbance term in the regression and it varies with individual countries and time.

Yet, another problem, as in the estimation of the impact of exchange rate volatility on trade, is the presence of lagged dependent variable (Y_{it-1} / pop_{it-1}) as a regressor in equation (4.6). Since the dependent variable (Y_{it} / pop_{it}) is a function of the error term in equation (4.6), its lagged value used as an regressor in equation (4.6) will also be correlated with the error term. This will give rise to autocorrelation. This again makes OLS estimators biased and inconsistent.

Suppose we write equation (4.6) in a first difference more general form as:

$$\Delta y_{it} = a\Delta y_{it-1} + \Delta x_{it}' b + \Delta v_{it} \tag{4.8}$$

The two stage least squares (2SLS) estimation with first difference form (4.8) would remove country specific effect ($\Delta\eta_i = 0$ in equation 4.7). However, Baltagi (2001) has suggested that such estimation will be consistent but not necessarily efficient. The most efficient and consistent estimator is the first difference generalized method of moments (GMM) suggested by Arellano and Bond (1991). Thus, here we use the most widely used GMM method of Arellano and Bond. This method differences the model (4.6) as shown in equation (4.8) to eliminate the fixed effects and then apply GMM by using a set of

appropriate instruments to fix the correlation between the differenced lagged dependent variable and the error term.

4.3.3 **Empirical Results**

As we have discussed that the panel least squares such as the fixed effects or least squares dummy variable (LSDV) or 2SLS estimates will not be consistent. However, we start with the results obtained using LSDV and 2SLS in table 4.9 to compare with the results in table 4.10 using the consistent and efficient estimator the first-differenced GMM estimator.

Results presented in table 4.9 under LSDV (model 1) and 2SLS (model 3) with only cross section fixed effect are obtained with first order serial correlation correction. Such correction is not allowed with time-period fixed effects which are reflected in low D-W statistics in table 4.9. Lagged dependent variable in all specifications has expected positive sign and it is highly statistically significant. Population growth rate and human capital investment also have correct negative and positive sign, respectively and they are also highly statistically significant. Investment as a share of GDP (LIG) has mostly expected positive sign but in all cases they are insignificant.

The most surprising result is obtained with regard to the trade variable (LTG). We expect trade would have positive impact on per capital income. However, in all cases the sign of LTG variable in negative. We also see from table 4.9 that estimates change when we treat this as an endogenous variable and estimated with 2SLS. It still has negative sign but it is insignificant either with only cross-section fixed effect or with both cross-section and time-period fixed effects.

Table 4.9: Panel Least Squares Estimates

Dependent variable: log of real GDP divided by total population (**LGDPP**)				
	LSDV		2SLS	
	1	2	3	4
Constant	5.128***	2.338***	4.066***	2.309***
	(0.477)	(0.378)	(1.106)	(0.393)
LGDPP$_{-1}$	0.303***	0.454***	0.399***	0.431***
	(0.055)	(0.051)	(0.112)	(0.054)
LIG	0.006	0.014	0.143	–0.013
	(0.021)	(0.021)	(0.121)	(0.027)
LTG	–0.252***	–0.098***	–0.756	–0.007
	(0.032)	(0.034)	(0.418)	(0.061)
LPGR	–0.058***	–0.091***	–0.049	–0.090***
	(0.019)	(0.013)	(0.034)	(0.014)
LSCHP	0.261***	0.469***	0.215***	0.518***
	(0.023)	(0.039)	(0.049)	(0.049)
Fixed Effects				
Cross -Section	Yes	Yes	Yes	Yes
Period	No	Yes	No	Yes
Adjusted R^2	0.994	0.994	0.980	0.993
S. E.	0.042	0.043	0.076	0.044
D-W	1.964	1.158	1.836	1.144

Note: Numbers in parentheses are the standard errors of the estimates; *** indicates significant at the 1% level. $LIG \equiv \ln(I/GDP)$, $LTG \equiv \ln(T/GDP)$ where T is total trade (exports plus imports), $LPGR$ = ln(population growth rate + 7%), $LSCHP$ = ln(human capital investment divided by population).

The GMM – first difference estimates are presented in table 4.10. The sample starts from 1989, but lost one year due to calculating population growth rate and another year due to differencing. Thus our adjusted sample period is 1991 – 2010. Data related to Kuwait poses another problem. As discussed above in reference to figures 4.4 and 4.5,

Table 4.10: Panel GMM Estimates

Dependent variable: log of real GDP divided by total population (**LGDPP**)				
	1991 – 2010 (1)	1994 – 2010 (2)	1991 – 2010 (3)	1994 – 2010 (4)
$LGDPP_{-1}$	0.412*** (0.049)	0.463*** (0.054)	0.276** (0.119)	0.251*** (0.078)
LIG	0.010 (0.028)	0.012 (0.017)	–0.018 (0.028)	–0.013 (0.022)
LTG	–0.361*** (0.095)	0.072* (0.041)	0.072 (0.197)	0.105*** (0.039)
LPGR	–0.064*** (0.022)	–0.043*** (0.012)	–0.071* (0.028)	–0.041*** (0.012)
LSCHP	0.224*** (0.023)	0.142*** (0.016)	0.693*** (0.204)	0.522*** (0.084)
Fixed Effects				
Cross-Section	First Differences	First Differences	First Differences	First Differences
Time-Period	No	No	Yes	Yes
S. E.	0.050	0.040	0.078	0.035
Speed of Convergence	4.43%	4.53%	6.44%	8.13%

Note: Numbers in parentheses are the standard errors of the estimates; ***, **, and * indicate significant at the 1%, 5%, and 10% levels. $LIG \equiv \ln(I/GDP)$, $LTG \equiv \ln(T/GDP)$ where T is total trade (exports plus imports), $LPGR = \ln($ population growth rate + 7%), $LSCHP = \ln($ human capital investment divided by population).

macroeconomic variables of Kuwait had gone through abnormal changes till 1993. They started to become normal from 1994. Thus, we also present estimates for a more normal sample period of 1994 – 2010. Results presented in the first two columns in table 4.10 are with only cross-section fixed effects and in the next two columns with both cross-section and period fixed effects.

We see a marked difference in results presented in tables 4.9 and 4.10. The estimated coefficient of the openness variable (LTG) is negative in all specifications in table 4.9. In table 4.10 it is positive except for the period 1991 – 2010 with only cross-section fixed effect (column 1). For the reason explained above, we emphasis on results based on the sample period 1994 – 2010. We see from results presented in column 2 that the estimated coefficients of all variables have expected sign and all of them are significant except the investment as a share of GDP (LIG). In fact, it is surprisingly insignificant in all cases though has expected positive sign with only cross-section fixed effects. One plausible explanation of its insignificance is our using of aggregate GDP data rather than separating it as non-oil and oil GDP which is not readily available. All GCC countries for last three decades have been investing heavily on non-oil sector especially on infrastructure and construction which is expected to increase non-oil income per capita. Measures of population growth rate (LPGR) and human capital investment per capita (LSCHP) have also their expected negative and positive sign and they are highly statistically significant.

Trade as a share of GDP (LTG) is used as a common measure of openness and it is one of our main variable of interest. Estimated coefficients of this variable is 0.072 (column 2, with only cross-section fixed effect) and 0.105 (column 4, with both cross section and period fixed effects). They are also significant at the 10% and 1% levels of significance, respectively. Because of our short sample period, we put more emphasis on the qualitative than quantitative effect. That is, we may claim that the openness plays a significant positive role in the growth of the per capita income of the GCC countries. These estimates are small if we compare them with the results obtained by Frankel and

Romer (1999). Frankel and Romer (1999) in a cross-section study found that a one percent increase in the ratio of trade to GDP would increase income per person by at least one-half percent. However, our estimates are much higher than the estimates obtained by Barro and Sala-i-Martin (2004). Their point estimates based on cross-section study implies that a one-standard deviation increase in the openness ratio would increase the growth rate per capita on impact by .002. Our point estimates of 0.072 and 0.105 implies that a one-standard deviation increase in the openness ratio (0.2935 in 1994 – 2010) would increase the growth rate per capita on impact by .021 and 0.031, respectively.

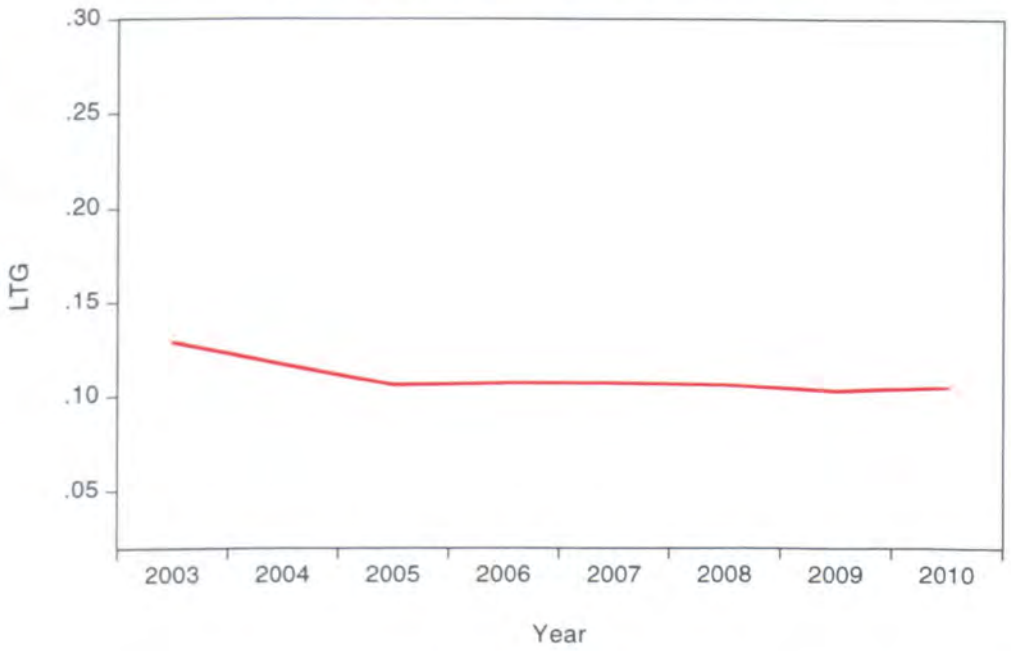
The results in table 4.10 show that the estimated autoregressive (lagged dependent variable) coefficient has expected positive sign in all cases and they are highly significant. This implies there is a significant conditional GCC regional convergence and the convergence is conditional to openness ratio, population growth rate and human investment per capita. The estimated speed of convergence is about 2% per year from cross sections or panel data without fixed effects (Barro and Sala-i-Martin, 2004). However, the estimated speed of convergence is about 5% from panel data with fixed effects (Islam, 1995) and could range from 12% to 20% per year (Barro and Sala-i-Martin, 2004). Thus our estimated speed of convergence (4.5% and 8%) reported in table 4.10 is in line with other literature.

4.3.4 **Stability of the LTG Coefficient**

The main variable of interest of this section is the variable LTG that captures the impact of trade or openness on economic growth of the GCC countries. The point estimate of 0.105 for LTG is the average over the sample period. As like volatility

coefficient LERVP, we would like to test the stability of LTG coefficient. We perform the recursive GMM estimation and plot the dynamic LTG coefficient in figure 4.6. We consider model (4) in table 4.10 is our preferred specification for the estimation of the

Figure 4.6: Recursive GMM Estimation of LTG



impact of trade on economic growth. This is because it avoids the abnormal period in Kuwait and includes the time-period fixed effects. Our total panel observations are 102 for the preferred model for the entire period of 1994 – 2010 which is reasonably short and if we start the recursive estimation from 2003, total panel observations become even much shorter to 60. Nonetheless, we present recursive plots from 2003. Again, the last data point in the recursive estimation plots exactly the value of the point estimate reported in table 4.10. Figure 4.6 shows clearly that the LTG coefficient (estimated value about 0.11) was remarkably stable, especially from 2004 onward, in the last decade.

Again, following Smith and Fuertes (2010), we have done the similar cross-sectional stability test for the growth model as we have done for bilateral trade model

above. Application of OLS country by country for the growth model (model 4, table 4.10) produces the following set of parameter estimates and estimated standard errors for the variable LTG (the variable of our interest). The results are presented in table 4.11. In table 4.11 we see that the coefficient estimate of Kuwait unusually large. As noted above Kuwait data pose a problem. Following the Gulf (Kuwait) war in 1990-1991, Kuwait had undergone many abnormal changes after the war that reflected in Kuwait macroeconomic data that continued many years following the war. Thus, in table 4.11, we reported averages and ranges by including (panel A) and excluding (Panel B) Kuwait.

Table 4.11: OLS Estimates of LTG Coefficient (1994 – 2010)

	Coefficient	Standard error
Bahrain	-0.112	0.062
Kuwait	0.702	0.159
Oman	-0.02	0.108
Qatar	0.239	0.232
Saudi Arabia	0.008	0.045
UAE	0.052	0.079
Panel A		
Average	0.145	0.114
Max	0.702	
Min	-0.112	
Range	0.814	
+/- 2 * Avg s.e.	0.46	
Panel B		
Average excluding Kuwait	0.033	0.105
Max excluding Kuwait	0.239	
Range excluding Kuwait	0.351	
+/- 2 * Avg s.e. excluding Kuwait	0.421	

We see that the range of variation of the parameter estimates (including Kuwait, Panel A) greatly exceeds four times the average estimated standard error. On the basis of the criterion mentioned above that 95% coverage is obtained by approximately two standard errors each side of the mean it would seem that we cannot be confident of cross-sectional stability. However, as we see from table 4.11 that a large part of the cross-sectional variation in parameter estimates is due to the very high value obtained for Kuwait. We therefore repeat the above informal investigation of cross-sectional stability without Kuwait. Now we see that the cross-sectional range of variation in the parameter estimates is less than four times the average of the estimated standard errors. It would seem that when Kuwait is excluded then there is less reason to query cross-sectional stability of the influence of LTG. The reasons for the apparently unusual behaviour of Kuwait and modifications of the standard panel approach employed here have been left as a matter for later research.

4.4 CONCLUSION

In this chapter we have considered the potential trade benefits of GCC monetary union and the possibility of consequent growth effects. We have discussed and reviewed the literature regarding the role of the exchange rate variability on trade flows. We have seen both the theoretical and empirical connection between them. Authors employing the gravity model have found significant empirical evidence of a negative relationship between exchange rate variability and trade.

We have applied the gravity model to the GCC countries to see whether the empirical evidence from other areas carry to the GCC countries. Results obtained using the panel GMM/DPD method indicates that there is a negative effect of exchange rate

volatility on bilateral trade of the GCC countries. The estimated coefficient of the exchange rate volatility variable is highly statistically significant and has the implication that the bilateral trade among the GCC countries will increase about 6.2 to 8.7 percent with the elimination of the exchange rate variability. We also find that the impact of the elimination of the exchange rate volatility remained stable (time series as well as cross-sectional sense) in the last decade.

The GCC monetary union, by eliminating exchange rate volatility, will increase trade which will enhance growth of the GCC countries. Trade is the engine of growth goes back at least to Adam Smith. It is now theoretically and empirically established that trade raise income by spurring the accumulation of physical and human capital. We have seen that the regional integration increases trade. Adding to this a credible empirical evidence (mentioned above) indicates that when a country's size and area is increased by one percent, income of the country increases by one-tenth of a percent or more. Following the same reasoning, the purpose of this chapter has been to test empirically whether trade (or openness) increases the income o f the GCC countries.

The GMM results show that the estimated coefficients of all explanatory variables in the growth model have expected sign and all of them are significant except the investment as a share of GDP. The coefficient of investment as a share of GDP is insignificant in all cases though has expected positive sign with only cross-section fixed effects. One plausible explanation of its insignificance is our using of aggregate GDP data rather than separating it as non-oil and oil GDP which is not readily available. Our empirical results indicate that openness measured by trade as a share of GDP has significant positive impact on the growth rate of per capita income of the GCC countries.

Our point estimates indicate that a one-standard deviation increase in the openness ratio would increase the growth rate per capita on impact by 2 – 3%. A stability test shows that the estimated openness coefficient remained stable for the period 2004 – 2010. We cannot also rule out the cross-sectional stability if we exclude Kuwait. Results also indicate there is a significant conditional GCC regional convergence and it is conditional to openness ratio, population growth rate and human investment per capita.

These results are indeed encouraging to the policy makers of the GCC countries and for the proposed monetary union in the GCC. It is now a recognized fact that monetary integration enhances trade and hence growth. Thus, we expect that the proposed monetary union would foster trade and growth in these countries.

CHAPTER 5

CONCLUSION AND SUMMARY OF THE MAIN FINDINGS

The seminal empirical analysis of the optimum currency area (OCA) was published in 2000 by Rose (2000). That is, it took about forty years to provide meaningful quantitative benefits of the OCA envisioned by its originators in the early 1960s. The contributor of the empirical study in 2000 identified two important parameters in his study: one measuring the impact of a currency union on bilateral trade flows and the other (of a lesser interest) measuring the impact of nominal exchange rate volatility on bilateral trade flows. The estimate of the first parameter found to be very large (countries with common currency trade three times more than countries with their own currencies). The estimate of the second parameter indicates that countries trade less with volatile exchange rates. Though the subsequent studies found much smaller impact of currency union on trade, there is a general consensus that currency (monetary) union fosters trade significantly. There is also more or less consensus that countries with volatile exchange rates trade less.

These two empirical findings form the basis of this dissertation in the context of the GCC countries and as such provide a significant contribution and information to the policy makers who have been working to the realization of the GCC monetary union. Researchers on the GCC monetary union have hitherto been mostly busy in analyzing the viability of the GCC monetary union and focus on convergence criteria. In addition to convergence criteria, in this study we provide concrete empirical evidence that intra-regional GCC trade will be increased by eliminating exchange rate volatility by forming

Gulf monetary union. This study also provides concrete empirical evidence that intra-regional GCC trade enhances economic growth of the GCC countries. Since monetary union fosters trade, our result has the implication that proposed Gulf monetary union will increase trade that will, in turn, enhance economic growth of the GCC countries.

This concluding chapter reviews and summarizes the study. Different econometric procedures and methods have been used to assess the economic integration, business cycle synchronization and convergence of the GCC countries. The study then proceeds to review, reassess and use some of the most influential empirical works in determining the effect of exchange rate volatility on bilateral GCC trade and the impact of trade on economic growth in the GCC countries.

Chapter 2 reviews the OCA literature (both theoretical and empirical) starting with the theory (along with its criteria and extension) advocated by the pioneers of the theory. The literature on optimum currency areas and monetary union, both theoretical and empirical, has produced results that are more or less accepted worldwide. Countries joined monetary union may not be motivated only by the cost-benefit analysis proposed by this literature. In other words, countries have often been motivated by other factors than those stressed by the theory of optimum currency areas. Three such motivations seem to have been important in this respect. First, many countries have been motivated to enter into a monetary union primarily because this would allow them to achieve macroeconomic stability. Second, some countries have entered monetary union due to political reason. Finally, some countries have entered a monetary union with hope that such a move would help in negotiating favorable trading arrangements, either globally in the World Trade Organization or bilaterally.

The traditional theories and empirical studies of the OCA and monetary unions, as reviewed in chapter 2, provide us with a checklist of economic conditions a country should look at before entering a monetary union. The chapter then proceeds to review the developments of macroeconomic (monetary) theories such as rational expectations, time inconsistency and credibility problems and how they are incorporated in 1990s with the traditional OCA theory. Endogeneities of OCA have also been discussed starting from the beginning of the last decade. Endogeneities of OCA focus on *ex post* changes in economic structure (incentive structure) and performance after joining a monetary union.

Chapter 2 also reviews the empirical research including the seminal work of Rose (2000) in details. Empirical research on the EMU countries is now plenty and there is a consensus that a currency union increases trade. Monetary unions and integration from the African countries such as The Central African Economic and Monetary Union (CAEMC), the Common Monetary Area (CMA) and the West African Economic and Monetary Union (WAEMU) do not in general meet the criteria of a monetary union. It is argued that monetary union is not a solution to the economic problems that the Latin American countries have been facing. Relatively less research has been undertaken on the possibilities of forming monetary unions for the Asian countries. However, the main problem of a successful currency union in Asia seems to be on the agreement on Asian currency unit. Finally, opinions are divided on the issue of forming (or viability of) the GCC monetary union based on empirical results. However, there is one consensus that the US dollar in the beginning would be the appropriate anchor currency to the GCC common currency.

In Chapter 3 different procedures are used to assess the economic integration and convergence in the areas of exchange rates, inflation rates, interest rates, fiscal convergence and growth rates in the GCC countries. Four convergence criteria of low inflation, low interest rates, stable exchange rates and sound public finances, laid down in the Maastricht Treaty as essential benchmark for a successful economic integration and monetary union have been used to analyze the situation in the GCC countries. These criteria are consistent with the five convergence criteria of inflation, interest rates, reserves, fiscal balance, and public debt that are agreed by the members of the GCC countries to be used to form a monetary union. Chapter 3 discusses these criteria in details and presents relevant empirical evidence. One of the most remarkable features of this region however, is the exchange rate stability. It supports the IMF research papers (Jadresic, 2002, Schaechter, 2003 and Espinoza et al.,2010) that there is no other comparable group of countries in recent history that has managed to keep their exchange rates as stable vis-a-vis each other as the GCC countries for such a long period of time. The common peg to the US dollar has not only limited intra-GCC currency fluctuations, but also has significantly contributed to inflation and interest rate convergence. Exchange rate stability among the GCC countries is remarkable as it evolved in an environment of relatively open capital accounts, and withstood severe external shocks. Interest rates have also been relatively low and have been moving broadly in parallel with US interest rates. In other word, because of the exchange rates arrangement and the free capital movements, the convergence of the exchange rates and interest rates is not really an issue. So, the formal tests for convergence are presented for inflation rates and growth rates.

The economic data of the GCC countries for the period 1980 – 2010 reveal that the other two main criteria of inflation rates and growth rates convergence do not seem to constitute any serious problem for the GCC countries. Inflation in all six countries has been low, and this has been the case for more than two decades; Qatar and the UAE experienced inflation spikes in 2008, they did not persist though. The per capita real GDP growth rates of the GCC countries have moved closely together and have shown a high degree of commonality across the GCC countries. A formal econometric test for convergence for inflation rates and the per capita growth rates indicate convergence especially for the period 1994 – 2010. However, the magnitude of the deficit/GDP ratios differed among the member countries of the GCC member states. Not surprisingly, public finances are strongly influenced by oil price developments, and thus show a significant degree of co-movement.

Chapter 3 also provides econometric evidence regarding business cycle synchronization of the aspirant member countries and the structural shocks synchronization. Business cycle synchronization increases over time with the level of integration within a monetary union or prospective union. Results for the period 1993 – 2010 indicate that the cyclical components of the GCC member countries are positively correlated and most of them are significant except Oman who withdrew from the proposed union anyway. That is, results are now more favorable to the formation of the GCC monetary union. The other evidence is provided by computing structural demand and supply shocks from a SVAR model. We find positive correlation (synchronized shocks) among the countries except Qatar and explain why we believe Qatar is running away from other GCC countries in its economic growth.

Chapter 4 empirically investigates the potential trade benefits of GCC monetary union and the possibility of consequent growth effects. It begins with the review of the literature regarding the role of the exchange rate regime (or exchange rate variability) on trade flows. The theoretical and empirical connection between them have been discussed and reviewed. Researchers employing the gravity model have found significant empirical evidence of a negative relationship between exchange rate volatility and trade. Thus, one of the main emphases of chapter 4 has been to estimate the impact of exchange rate volatility on bilateral trade between the GCC countries and whether the GCC countries with a common currency would trade more. Fifteen bilateral trade routes (15 cross sections) among the GCC countries are used across 22 years from 1989 to 2010. Two measures of nominal exchange rate volatility are constructed both of which are used in empirical literature. The first measure is calculated as follows: we take the percentage change in the nominal exchange rate from one month to its preceding month and the standard deviation of this percentage change over a year is taken as the volatility measure for that year. This measure has been used extensively in the literature. The second measure is the standard error of the regression of a quadratic trend equation of bilateral exchange rate over a twelve months period. The reported results in chapter 4 are based on different versions of the standard gravity model. Estimation problems arise with the use of panel least squares (LS) and panel two stage least squares (2SLS) are discussed. Results based on LS and 2SLS are compared with the results obtained with the most efficient estimator - the panel generalized method of moments (GMM). Models were estimated either excluding or including cross-section and time specific fixed effects. Results obtained using the consistent and the most efficient estimator, namely, panel

GMM, indicates that there is a negative effect of exchange rate volatility on bilateral trade of the GCC countries. The estimated coefficient of the exchange rate volatility variable is statistically significant and has the implication that the bilateral trade among the GCC countries will increase about 6.2 – 8.7 percent (depending on the volatility measure used) with the elimination of the exchange rate variability. With the preferred first measure of volatility mentioned above, the bilateral trade among the GCC countries will increase by about 8 percent with the elimination of the exchange rate volatility. This result is also quite comparable to other similar studies applied to different regions. We also find that the impact of the elimination of the exchange rate volatility remained stable (time series as well as cross-sectional sense) in the last decade.

The second part of chapter 4 discusses the role of trade on economic growth (income) of a country. This part first reviews the theoretical issues that link trade to economic growth. Advocates of endogenous technological change postulate that with trade countries are allowed to specialize in the production and the availability of a larger number of intermediate inputs. With free trade a larger number of intermediate inputs are available at a lower cost which means there is higher equilibrium growth. This part of chapter 4 also reviews (mainly empirical) how the regional integration increases trade and then trade to economic growth. Some researchers (referenced) have found credible empirical evidence that when a country's size and area is increased by one percent, income of the country increases by one-tenth of a percent or more. This implies that regional integration would increase income of the region.

However, the main emphasis of the second part of chapter 4 has been to analyse empirically the implication of the proposed GCC monetary union on economic growth of

the GCC countries. Basic idea is that the monetary (currency) union would increase trade which in turn would promote economic growth. The dataset includes annual time series from 1989 to 2010 for six countries. Trade as a share of GDP is one of the regressors. Trade flows may not be considered as exogenous. Other problem is that in the panel specification of per capita income, the lagged dependent variable enters as a regressor. In the presence of these problems, the panel GMM is the most efficient estimator. For comparison purposes we have reported estimates using least squares dummy variable (LSDV), panel 2SLS (a consistent estimator) and the panel GMM.

Data related to Kuwait pose another problem. Due to the Kuwait war in early 90s, macroeconomic variables of Kuwait in early 90s had gone through huge abnormal changes and started to become normal from 1994. Thus our preferred sample period is 1994 – 2010. Results based on the preferred sample period and using the panel GMM indicate that openness measured by trade as a share of GDP has significant positive impact on the growth rate of per capita income of the GCC countries. Results indicate that a one-standard deviation increase in the trade (or openness) ratio would increase the growth rate per capita on impact by 2 – 3%. A stability test based on our preferred model indicates that the positive trade impact on economic growth rates remained stable in the last decade. However, we could not be confident of cross-sectional stability of such impact if we include Kuwait as a cross-sectional unit. Results also show that the estimated autoregressive (lagged dependent variable) coefficient has expected positive sign in all cases and they are highly significant. This implies that there is a significant conditional GCC regional convergence and the convergence is conditional to openness ratio, population growth rate and human investment per capita. Based on these results we

may conclude that the monetary union of the GCC countries would enhance trade which in turn would promote economic growth of the region.

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