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Eisa A. Aleisa
International Monetary Fund

Shawkat Hammoudeh
Drexel University

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Eisa A. Aleisa[a][1]

Shawkat Hammoudeh[b]

Abstract: This paper examines the impacts of external shocks on the countries of the Gulf Cooperation Council's (GCC) prospective monetary union, while focusing on the optimal choice of the exchange rate regime. The results show that output movements in the GCC as a single bloc are driven in the short- and long-run mostly by domestic shocks and by terms of trade in the long run as well. Shocks coming from both the US dollar and the euro zones have small impacts. These results and the weak correlations with those two zones suggest that GCC bloc should peg to a basket of currencies as a transitory step on the way toward a more flexible exchange rate regime.

[a]Middle East and Central Asia Dept. (MCD), International Monetary Fund, Washington, DC 20431. Phone: 202 623 6057, Fax: 202 623 4072, e-mail: ealeisa@imf.org.

[b]Lebow College of Business, Drexel University, Philadelphia, PA 19104. Phone: 215 895 6673, Fax: 215 895 6975, e-mail: hammousm@drexel.edu

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1. Introduction

The six members of the Gulf Cooperation Council (GCC)—Bahrain Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates plan to introduce a single currency in 2010. The plans for monetary integration between these six countries date back to the inception of the GCC in 1981, and the endorsement of the unified economic agreement in 1982. The process toward economic integration had gone slowly but in 2001 it gained momentum, culminating in the ratification of a new economic agreement. The new agreement sets a specified timetable to achieve the requirements of the monetary union. These requirements include the harmonization of all economic policies, particularly fiscal and monetary policies, the standardization of banking regulations and the meeting of the convergence criteria. In January 2003, the GCC countries formed a customs union and applied a common external tariff. On the same date, these countries formally pegged their currencies to the U.S. dollar.

The introduction of the GCC single currency in 2010 will necessitate the creation of a single GCC central bank, a single GCC monetary policy and the choice of a common GCC exchange rate regime. The choice of the type of the exchange rate regime prior to 2010 is one of the key economic policies pending for the GCC countries. Should these countries allow the new currency to be fixed to the U.S. dollar, to a basket of currencies where the dollar and the euro have the largest proportion or to let the currency float subject to possible exchange market interventions from time to time? Each choice has its own merits and drawbacks. In this paper we examine the optimality of making an exchange rate arrangement.

As a forward-looking study, this paper considers the GCC countries as a prospective single monetary union, and thus constructs weighted averages of two key macroeconomic variables, namely real GDP and the price level across the GCC members. The objective is to

assess the impacts of terms-of-trade shocks and the dollar and euro zones' shocks on the GCC economies, by focusing on which exchange rate regime would be optimal for this union.

A growing consensus among economists is that emerging economies should move to a corner solution; that is, they should consider either a fully floating or a rigidly fixed exchange rate regime. Frankel (2000) argues that intermediate exchange rate regimes are vanishing (or should be). Yet the question of what type of regime is appropriate for emerging economies still remains a highly debated issue. As most of the emerging economies lack a well-developed financial market and liquid financial instruments, the role of monetary policy under a flexible regime may be limited. Even if a country satisfies the determinants for a flexible regime, many still argue that the gains from the credibility of tying the local currency to an international anchor can be greater than the benefits of adopting a floating exchange regime. Others, however, endorse a basket peg as a superior alternative to a bilateral, rigidly fixed exchange rate regime. Since basket pegs tend to be more flexible than bilateral pegs, Gudmundsson (2005) argues that the move from a bilateral peg to a basket peg can be an important step on the way to a flexible exchange rate regime. More recently, the importance of pegging the local currency to the price of the major exported commodity began to surface. Frankel (2002, 2003a and 2003b), for example, argues that countries who are specialized in the production and exports of a mineral or agricultural commodity can benefit from pegging their currencies to the price of their exported commodity. He finds that under the Peg Export Price (PEP) proposal, countries that suffered from a declining world market in oil or in other commodities in the 1990s would have automatically experienced currency depreciation, and that would have boosted exports when it was needed. The PEP can simultaneously deliver automatic accommodation to terms-of-trade shocks, while at the same time helping these countries maintain the credibility of pegging their currencies to a nominal anchor such as the dollar or other pegging arrangements.

In an empirical study of the alternative exchange rate arrangements and financial integration for GCC countries, Abed et al. (2003) compare the dollar peg to a dollar-euro basket peg as alternative exchange rate regimes for improving the external stability of the GCC countries. They suggest that the basket peg dominate the dollar peg in improving stability. They

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also suggest that as GCC exports become more diversified, a more flexible exchange rate policy such as pegging the prospective common currency to a dollar/euro basket may become necessary for both competitiveness and stability purposes. In addition to the competitiveness and external stability reasons, Jadresic (2002) focuses on other policy considerations in choosing a currency peg for the GCC. Those considerations include the credibility of the exchange and monetary policy stance, the effects of exchange rate volatility on financial markets, and transaction costs arising from exchange rate volatility. Jadresic finds that these considerations dominate competitiveness and external stability. Fasano and Schaechter (2003) compare the conditions for creating a successful GCC monetary union to other monetary unions already in existence (for example, the euro zone, CFA franc zone. etc). These authors emphasize the need for the GCC members to develop an institutional union framework (such as a decentralized central bank, common monetary instruments, financial crises system…etc) and to set some basic quantitative benchmarks such as the European Union' Maastricht Agreements. Hammoudeh and Aleisa (2004) examine financial integration in the GCC stock markets. They find that these markets are cointegrated in the sense that they have multiple long-run relationships. However, in terms of short-term dynamics, the authors find limited causal relationships among the GCC stock markets.

The primary objective of this paper is to investigate the optimality of tying the proposed common GCC currency to the U.S. dollar or to a basket of currencies, and/or of having a more flexible exchange rate regime. Applying the theory of Optimum Currency Area (OCA) and using a structural VAR model, we investigate the roles played by terms of trade shocks, global shocks (the U.S. dollar zone and euro zone), and regional shocks in affecting the GDP of the GCC countries, by focusing on what the optimal choice of the exchange rate regime is. We consider regional shocks to be the same as domestic shocks, since regional GDP is the weighted average of the GCC countries. To investigate to what extent GDP in the GCC area is influenced by the real oil price, the U.S., and/or European shocks, and domestic shocks, we aggregate two key macroeconomic variables, namely real GDP, and the consumer price index (CPI) to investigate the response of these macroeconomic variables to the aforementioned shocks. Specifically, we

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will try to answer the following two questions: (1) to what extent do the GCC economies influence and to what extent are influenced by real oil prices?; (2) is the business cycle of the GCC area as a bloc related to its trading partners' (particularly the US and the Euro areas) economic activity in such as a way that a monetary policy's move by these partners at a particular time would happen to be the right policy for the GCC area too?

The balance of the paper is organized as follows: section 2 provides an overview of the optimum currency area. Section 3 presents an overview of the GCC economy. Section 4 describes the benchmark model for the GCC as a prospective single bloc and identifies the relative impacts of the domestic and external shocks. Section 5 examines the estimation results of the benchmark model. Section 6 describes an alternative model as a robustness check on data aggregation in the first model and section 7 examines the estimation results of this alternative model. Section 8 provides the main conclusions.

2. The Optimum Currency Area

The literature on the theory of OCA pioneered by Mundell (1961) and subsequently by McKinnon (1963) and Kenen (1969) suggests several criteria that can be used in examining the suitability of a common monetary arrangement. The criteria include symmetry of the underlying macroeconomic shocks, factor mobility, openness, fiscal redistribution schemes and real wage flexibility, among others. More recently, some authors emphasized the need for a supra-national government body to conduct interregional transfers (De Grauwe, 1997). Frankel and Rose (1997, and 1998), Corsetti and Pesenti (2002), and De Grauwe and Mongelli (2005), examine the endogeneity of the optimum currency area. These authors' findings confirm that monetary unions lead to significant increases in trade integration. For example, Frankel and Rose (1997 and 1998) argue that even if a country does not meet the criteria of the OCA ex ante, the increase in trade within the monetary union resulting from the introduction of the common currency may qualify this country to satisfy the OCA criteria ex post.

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The GCC economies seem to be fairly integrated in terms of economic structures and trade. They have a remarkable degree of monetary and fiscal convergence, low inflation in all member states and narrow short-term interest rate movements. These members have highly open economies and a high degree of labor and capital mobility within the GCC region. Furthermore, the GCC countries have over time established a broad range of institutions to support the economic integration process. The aforementioned factors support the view that the GCC is more likely to experience symmetric shocks, thus reducing the likeliness of asymmetric shocks and the need to resort to nominal exchange rate adjustments.

Forming a monetary union among the GCC countries would entail some costs, but membership in a currency union may provide greater potential benefits to these states. There are key benefits that can be achieved from such an arrangement. First, a single currency would eliminate the transaction costs associated with using different currencies among the GCC countries, and this cost elimination would minimize the magnitude of price discrimination between their markets. Second, one can expect some efficiency gains associated with enhanced trade and increased capital flows as a result of abandoning a multiplicity of currencies. Even though each GCC country follows a fixed exchange rate system, a common GCC currency is more credible than just having a fixed rate system for the individual country. Third, a common GCC currency would induce national price convergence and would imply a common real exchange rate for all members. There may be welfare gains from less uncertainty about future real exchange rates. Fourth, a single currency would promote better policy formulation and coordination of national economic policies. A decentralized strategy for economic policies among the six markets will create healthy competition that should promote the best policies. Equally important, the integration of the GCC capital market will deepen the width and breadth of the financial market, enabling domestic investors to diversify their investments and giving firms efficient access to raise capital. However, membership in a common currency union will reduce policy independence, that is, membership in a monetary union prevents member states from implementing country-specific monetary and fiscal policies in response to country-specific disturbances.

3. An Overview of the GCC Economies

Although some of the GCC countries have to some extent been successful in diversifying their production base, oil continues to be the key element of their output **(Table 1**). In this table, the oil sector still accounts for about 31.6% of the GCC's real GDP over the period 1998-2003. It should be noted that much as diversification away from oil is considered to be an important element for the GCC area's economies, diversification of government revenues is also important. As is always the case, falling oil prices exert pressure on the local currencies, making the proposed new currency vulnerable to developments in the world oil market. Thus, policies to diversify governments' revenues are as crucial as the diversification of the GCC economies. In terms of openness, Table 1 shows that the GCC countries have highly open economies as evidenced by the high ratios of imports and exports to GDP. This table also shows that the GCC countries have an average growth rate of about 3.8% over the period 1998-2003, and that their inflation rates are stable over this period. Moreover, Table 2 shows that the GCC countries not only have stable and low inflation, but also the individual country inflation rates have significant correlations averaging around 50%.

The overall intra-trade between the GCC countries is fairly limited. The individual members' exports trade patterns within the GCC region and with other countries and regions are provided in Table 3. This table also shows that, except for Saudi Arabia, GCC exports to the rest of the world are concentrated in Asia. In contrast, GCC imports seem to be concentrated in the European Union, followed by Asia as demonstrated in Table 4.

4. The Benchmark Model and Methodology

Consider a three-variable VAR, open-economy model to examine the optimal choice of an exchange rate regime for the GCC countries as a prospective monetary union. The three variables are global output (real GDP of the US and /or the European Union), real oil price, and regional output (as the geometrically weighted average of the GCC real GDPs). The model can be written as an infinite moving-average process in the shocks,

$$\Delta X_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = A(L)\varepsilon_t \qquad (1)$$

where the vector $\Delta X_t = [\Delta y_t^h \Delta y_t^g \Delta y_t^r]$, (representing rates of change in real oil price or

terms of trade y_t^h, global output y_t^g, and regional output y_t^r) is subject to three mutually

uncorrelated "structural" shocks with finite variances (the terms of trade shocks ε_t^h, the global

shocks (U.S. dollar zone or euro zone) ε_t^g, and the regional shocks ε_t^r, denoted by the

vector $\varepsilon_t = [\Delta \varepsilon_t^h \Delta \varepsilon_t^g \Delta \varepsilon_t^r]$), and $A(L)$ is a matrix whose elements are polynomials in the lag

operator *L.*

We make the following assumptions: (1) only oil price shocks have a long-run impact on

oil prices; (2) global variables are affected only by global shocks in the long run; and (3) regional

shocks have no long-run impact on global output.

4.1. Identification of the shocks

Assume that the covariance-stationary vector ΔX_t can be written as an infinite moving

average process in the structural shocks:

$$\Delta X_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = A(L)\varepsilon_t, \qquad (2)$$

where $A(L)$ is a matrix whose elements are polynomials in the lag operator L., let us denote the

elements of $A(L)$ by $a_{ij}(L)$. The time path of the effects of a shock in ε_j on variable i after

k periods can be denoted by $\omega_{ij}(k)$. Additionally, let $A(1)$ represent a matrix of long-run effects

whose element are $a_{ij}(1)$; each element gives the cumulative effect of a shock in ε_j on

variable i over time. Similarly, A_0 is the matrix of the contemporaneous effects and is consistent

with $\omega_{ij}(0)$. Given the model structure, the long-run effects of the shocks can be summarized in

a matrix form,

$$\begin{vmatrix} \Delta y^{h}_{t} \\ \Delta y^{g}_{t} \\ \Delta y^{r}_{t} \end{vmatrix} = \begin{vmatrix} a_{11}(1) & 0 & 0 \\ a_{21}(1) & a_{22}(1) & 0 \\ a_{31}(1) & a_{32}(1) & a_{33}(1) \end{vmatrix} \begin{vmatrix} \varepsilon^{h}_{t} \\ \varepsilon^{g}_{t} \\ \varepsilon^{r}_{t} \end{vmatrix} \qquad (3)$$

Note that the matrix of the long-run effects is the lower triangular matrix.

5. Empirical Results of Benchmark Model

We estimate the benchmark model for the prospective GCC union as a single bloc using the aggregated quarterly data. The data were collected for the period 1980:01 to 2003:04, from the U.S., the European Union countries, and the six GCC countries. The data are taken from the IMF's International Financial Statistics CD-Rom database. Due to the lack of quarterly data on the GCC GDPs, we use the Ginsburgh method to extract quarterly GDP from annual data[2]. The data for the US includes the real GDP and the price level proxied by the US CPI, for the European Union the real GDP and the price level (proxied by Germany CPI), and for the GCC countries the real oil price, the weighted average of the individual real GDPs and the weighted average of individual price levels. Due to the unavailability of quarterly data on the individual CPIs for all GCC member countries, we use the CPIs for Saudi Arabia, Bahrain, and Kuwait as a proxy for the whole GCC countries's weighted average CPI, constituting approximately 75% of the weight of the GCC. Therefore, we proxy terms of trade by real oil price (crude oil price deflated by the US CPI), the GCC real output by the weighted GCC real GDP, the global output by the U.S. real GDP and/or European Union real GDP, the global price level by the U.S. CPI and/or , the German CPI for the European Union, and the GCC CPI by the weighted average of the CPI's of Bahrain, Kuwait and Saudi Arabia .

To properly specify the empirical model, an important step in constructing the model is to test for unit roots and stationarity of the variables used. The results of Augmented Dickey Fuller (ADF) and KPSS tests are presented in Table 5. The ADF test statistics indicate that the presence of a unit root in the output levels (for the U.S. real GDP, the European Union real GDP,

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[2] Oil production index was used as reference to extract the quarterly GDP.

and the GCC real GDP), the real oil price level, and the price levels (for the U.S. CPI, the German

CPI, and the GCC CPI) cannot be rejected. Similarly, the KPSS test rejects stationarity for all

variables at the conventional significance levels[3]. Hence, it is appropriate to model the variables

in the first differences. Note that the vector $X_t = [\Delta y_t^h \Delta y_t^g \Delta y_t^r]$ makes up the VAR which is

estimated with five lags. The AIC diagnostic tests indicate that five lags are appropriate for

residuals to approximate white noise. The dynamic effects of the innovations can best be

understood by carrying out the variance decompositions (VDC) and impulse response functions

typical for the VAR methods.

      Table 6 reports VDC of forecast errors for only the regional output because the aim of

this paper is to examine the impacts of terms of trade shock and global shock (the US and the

European impacts) on the GCC economies as a single bloc. We do not report the results for the

global output and the real oil price as these two variables are explained by own global and real oil

price shocks, respectively. The VDC results in Table 6 (the dollar zone) demonstrate that

domestic shocks explain the bulk of the regional output movements[4]. Terms-of-trade shocks

seem to have a negligible impact on the regional output in the short run, but in the long run, those

shocks account for over 33 percent of the forecast error variance compared to 55 percent for the

domestic shocks. Global shocks seem to have a modest impact in the long run accounting for

about 11 percent of the forecast error variance. An interesting aspect of the results is that the

impacts of global shocks in the dollar zone are modest despite the dominant role played by the

dollar in the economies of these countries (for example, the bulk of their oil exports is

denominated in dollar terms). But the terms-of-trade shocks seem to explain a sizable proportion

of the GCC regional output movements in the long run, and the business cycles of the GCC

countries as a bloc do not appear to be driven by the output movements in the U.S.

      Similar to the dollar zone, the VDC results for the euro zone in Table 6 show that the

terms-of-trade shocks seem to have negligible impacts in the short run. In contrast, they explain

over 21 percent of regional output movements in the long run, still significantly lower than in the

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[3] The unit root results are available upon request.
[4] We consider regional shocks as domestic shocks since the regional output is the weighted averages of the GCC individual real GDPs.

U.S. dollar zone. As is the case in the dollar zone, global shocks appear to have insignificant impacts on regional output variations in the short run, but they have greater effects in the long run reaching about 15% in six years compared to 11% for the dollar zone. Thus, domestic shocks appear to explain the bulk of regional output movements similar to the dollar zone.

To sum up, the business cycle of the GCC countries as a bloc does not seem to be driven by output movements in their trading partners, specifically the U.S. and the European Union. Furthermore, the terms-of-trade and domestic shocks appear to explain a sizable proportion of the regional output movements in the GCC countries.

Figure 1 provides the results of the impulse response functions (IRF) analysis. The left panel of this figure shows the responses of regional output to the euro zone global and domestic shocks, while the right panel displays the responses of the regional output to the same shocks with the global shocks emanating from the dollar zone. This figure shows that a positive one standard deviation shock to the real oil price (terms of trade) leads to a slight increase in regional output. While the response of the regional output to a positive standard deviation shock to the global shocks (euro zone) leads to a slight increase in regional output, the response to the U.S. shocks seems to be negative. Overall, the responses of regional output to these shocks are insignificant. The responses to both the dollar and euro zones shocks seem to be consistent with the views that tightening money supply in these zones will lead to contraction in global output growth, which then leads to a decrease in oil prices. Positive domestic shocks lead to a slight increase in regional output.

The results from the assessments of both the effects of the dollar and euro zone shocks suggest that the GCC countries seem to be mainly driven by the terms-of-trade and domestic shocks. In fact, continuing to peg the local GCC currencies to the U.S. dollar may be too costly. It could lead to a condition in which the U.S. monetary policy changes may act as a destabilizing force for the GCC economies.

6. The Alternative Model

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We construct an alternative model for each of the six GCC countries and for the dollar and euro zones to be employed as a robustness check on the sensitivity of the results of the benchmark model to the quarterly data generation and selection. We follow the same procedures proposed by Bayoumi and Eichengreen (1994) in which they examined the feasibility of the North American Free Trade Area (NAFTA) as a common currency area. Using a bivariate VAR with a vector of the variables ΔX_t for the first logarithmic differences of output and price for each of the countries and zones, the alternative model can also be expressed as an infinite-moving average process of two types of shocks, demand shocks ε_{dt}, and supply shocks, ε_{st}. The model can be written in the following form:

$$\Delta X_t = A_0 \varepsilon_t + A_1 \varepsilon_{t-1} + A_2 \varepsilon_{t-2} + ... = A(L)\varepsilon_t \tag{1}$$

where $\Delta X_t = [\Delta y_t \ \Delta p_t]$, $A(L)$ is a matrix whose elements are polynomials in the lag operator L, the matrix A_i represents the impulse response functions of the two shocks. Denote that the framework implies that supply shocks have permanent effects on the level of output but demand shocks have temporary effects (Blanchard and Quah (1989), Bayoumi (1992), and Bayoumi and Eichengreen (1994)). If the vector ΔX_t is stationary, then the bivariate model in the structural shocks has the form

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \begin{bmatrix} C_{11}(L) & C_{12}(L) \\ C_{21}(L) & C_{22}(L) \end{bmatrix} \begin{bmatrix} \varepsilon_{dt} \\ \varepsilon_{st} \end{bmatrix} \tag{5}$$

where y_t and p_t represent the logarithms of output and prices as indicated above, ε_{dt} and ε_{st} are mutually uncorrelated demand and supply shocks, respectively, with zero means. The shocks can be identified by imposing the restrictions that supply shocks have permanent effects on the level of output, but demand shocks have only temporary effects. Supply and demand shocks have permanent effects on the price level. These assumptions can be represented by the restriction that the coefficients in $C_{11}(L)$ sum to zero; the restriction is equivalent to

$$\sum_{k=0}^{\infty} \mathrm{C}_{11}(k) = 0 \qquad\qquad (6)$$

Placing this restriction in equation (5) conveys that the cumulative effect of ε_{dt} on $\Delta\mathrm{y}_{\mathrm{t}}$ is zero.

As mentioned above, the two shocks are demand shocks ε_{dt}, and supply shocks ε_{st}. This restricted framework implies that supply shocks have permanent effects on the level of output but demand shocks have temporary effects.

7. Empirical Results of the Alternative Model

Table 7 presents the correlations of supply and demand shocks between each of the six individual GCC countries and the U.S. and the European Union. On the supply side, Bahrain and the United Arab Emirates show moderate correlations with the U.S. Kuwait seems to show insignificant negative correlations, while Qatar displays high correlations with the U.S. Similarly, the results also display low negative correlations between the GCC countries and the European Union. While Oman and the United Arab Emirates show negative correlations with the European Union, Kuwait seems to display positive correlations.

On the demand side, Qatar and Oman show high positive correlations with the U.S., but Bahrain, Kuwait, Saudi Arabia, and UAE display negative correlations with the U.S. Overall, the GCC economies seem to have insignificant correlations with the US, except for Qatar. This result, in conjunction with external shock impacts (or the lack thereof) casts doubts on the suitability of pegging the proposed GCC common currency to a composite basket with the dollar and the euro holding the largest shares.

8. Conclusions

As the GCC countries are taking very important steps towards forming a monetary union and introducing a single currency in 2010, this paper examines the relative impacts of domestic and external shocks on the region's economies hypothesized as a single bloc. We have constructed weighted averages of key macroeconomic variables of the GCC countries to shade

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some light on the structural properties of the GCC area as a single economic system. This study has applied structural VAR methods primarily to investigate the roles of terms of trade, the dollar, and euro zones, and regional (domestic) shocks on the GCC as a prospective single economy, focusing on the optimal choice of exchange rate regime. The results show that domestic shocks explain the bulk of GCC output movements. Equally important, the terms-of-trade shocks particularly in the long run play an important role in explaining GCC output movements. Despite the actual dominant role of the dollar and the strong existing trade between the GCC countries and the European Union, global shocks (the dollar and euro zones) seem to have a modest impact on prospective GCC union's domestic output. The business cycles of these countries as a single bloc do not appear to be driven by output movements in the US and the EMU regions.

Moreover, the correlations between each of the GCC individual countries with the U.S. and the European Union seem to be weak and cast doubt on the optimality of a composite basket of the dollar and the euro as an anchor for the GCC proposed common currency.

To sum up, the results from the assessments of both the effects of the dollar and euro zones suggest that the GCC economies seem to be driven by terms-of-trade and domestic shocks. In that sense, a more flexible exchange rate regime may be more suitable to the GCC area. Yet as these countries are in the process of forming a monetary union and plan to introduce a single currency in 2010, one must initially consider the benefits arising from the credibility and stability of the new currency. In such a case, it might be optimal to construct a basket of currencies where the U.S. dollar and the euro should have the largest shares. In that sense, a peg to a basket of currencies is more flexible than that of a bilateral peg, and it would be an important step on the way towards a more flexible exchange rate regime.

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Table 1. Selected Macroeconomic Indicators for the GCC countries (1998-2003)

Country/Region		Bahrain	Kuwait/1	Oman	Qatar/1	Saudi Arabia	UAE/1
Share of GCC GDP (%)		2.5	10.2	3.3	6.7	56.6	20.7
Real GDP by Sectors (%)	Non-oil	84.2	65.5	52.8	42.4	44.1	77.4
	Oil	15.7	34.5	28.0	57.6	32.7	22.6
	Government	0.1	n/a	19.2	n/a	23.2	n/a
% of Oil In Total Gov. Revenues		15.7	34.5	28.0	57.6	32.7	22.6
Real GDP Growth Rate (%)		4.6	2.5	3.5	9.7	2.5	5.8
Inflation Rate (%)		0.7.	1.7	-0.3	3.2	0.4	2.8
Current Account Balance		0.1	7.7	0.7	2.0	9.7	5.9
Current Account/GDP (%)		0.9	18.6	2.1	3.4	4.0	8.5
Share in World Oil Production (%)		0.06	3.3	1.3	1.1	13.1	3.5
Exports within the GCC/2		6.9	1.4	14.0	4.9	4.4	14.8
Imports within the GCC/3		34.3	9.9	41.3	14.9	3.7	5.0
Exports/GDP (%)		79.1	60.5	71.6	63.8	51.2	n/a
Imports/GDP (%)		63.6	34.3	40.3	23.7	20.3	n/a

Notes:
1/ Non-oil sector includes the government sector.
2/ In % of total exports
3/ In % of total imports within

Sources: IMF DOT, Monetary Agencies and central banks.

Table 2. Correlations of inflation

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Bahrain						
Kuwait	0.51					
Oman	0.25	0.62				
Qatar	0.46	0.56	0.52			
Saudi Arabia	0.56	0.47	0.29	0.50		
UAE	0.52	0.29	0.50	0.43	0.50	

Table 3. Directions of GCC countries exports

Country/Region	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE[5]
Within the GCC	6.9	1.4	14.0	4.9	4.4	14.8
United States	5.7	11.5	4.4	1.7	19.0	4.2
European Union	5.8	10.0	2.8	2.1	14.4	12.4
Japan	2.0	21.2	21.3	46.7	14.2	2.6
Asia (ex. Japan)	13.1	47.4	78.4	37.1	29.6	42.6
Exports/GDP (%)	47.0	48.4	22.1	67.5	31.3	n/a

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[5] Non oil exports for the 2nd quarter, 2004.

Table 4. Directions of GCC countries Imports

Country/Region	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Within the GCC	34.3	9.9	41.3	14.9	3.7	5.0
United States	10.9	14.9	9.3	12.2	13.7	9.3
European Union	23.1	34.4	30.9	35.1	44.9	29.8
Japan	7.4	10.4	25.4	10.5	11.1	10.7
Asia (ex. Japan)	10.2	18.3	23.1	17.2	39.5	33.8
Imports/GDP(%)	37.8	27.5	12.5	25.1	12.4	n/a

Table 5. Unit Root and Stationarity Tests

Test	p	y^{GCC}	y^{US}	y^{Euro}	h
ADF Statistic	-1.07	-2.47	-2.59	-1.16	
KPSS Statistic	1.53	1.55	1.60	0.9	1.10

Table 6. Variance décompositions

	ε_t^h	ε_t^g	ε_t^r
	Percent of forecast error variance attributed to shocks		
Horizon (quarters)	Regional output		
	Dollar zone		
1	6.6	11.3	82.1
4	21.0	5.5	73.5
8	26.8	6.5	66.7
16	33.7	9.8	56.5
24	36.7	11.3	52.1
	Euro zone		
1	5.4	0.4	94.3
4	21.1	8.0	70.9
8	22.6	10.8	66.5
16	21.6	13.8	64.6
24	21.4	14.6	64.0

Figure 1. Response of regional output
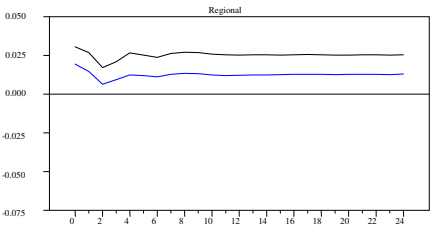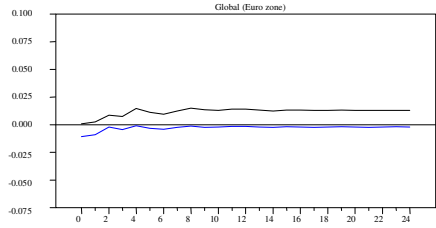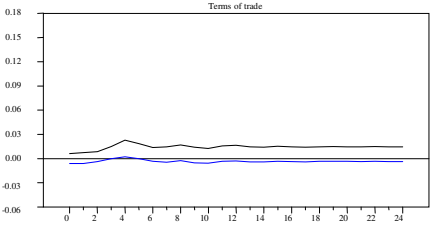
(*Euro zone*)   (*Dollar zone*)
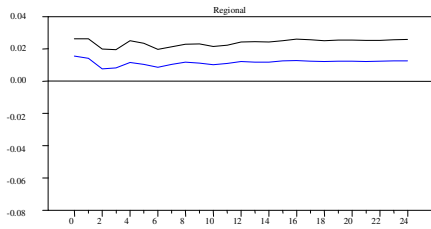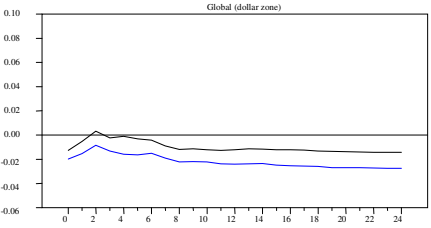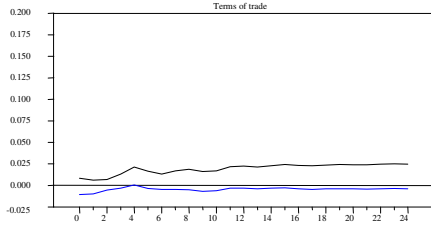
Table 7. Correlations of supply shocks: the GCC countries with the US and the European Union

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Correlations of supply shocks

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Country/Region	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
The US	0.10	-0.03	0.05	0.41	0.04	0.1
EMU	0.14	0.03	-0.23	0.08	-0.17	-0.13
Correlations of demand shocks						
The US	-0.86	-0.57	0.44	0.78	-0.61	-0.48
EMU	0.65	0.66	-0.92	-0.74	0.89	-0.19