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The Appropriate Monetary Policy Coordination for the GCC Monetary Union

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Introduction

In the MENA region, the idea of regional Arab integration started more than 60 years ago without real achievements until 1998, when the foundations of the Great Arab Free Trade Area (GAFTA) were settled. Nevertheless, the agreement represents only a shallow integration, and the low levels of MENA countries' intra-regional trade will not enhance the expected dynamic effects of this integration.

Within the region, the countries from the Gulf Cooperation Council (GCC) represent a unique case of advanced deep cooperation, committed to enhance their economic integration, moving from a free trade area in 1981, to a full customs union by the end of 2005. The announcement of the creation of a common currency by 2010 reflects the real engagement to achieve an economic union among the six countries.

This experience might become the heart of a larger Arab movement towards real deep integration. Therefore, the success of the project has to be ensured and enhanced, basically through robust and committed research on its feasibility.

The aim of our paper is to investigate on the monetary policy coordination among the GCC countries that is required to make the common currency a success and to allow all its members to take full benefit of it. For the purpose of our investigation, we are going to call the new currency the Gulf Currency (GC).

The paper will be organized as follow: in the first section we will present the theoretical basis of a monetary union with a summary of the existing literature on the region's

experience, including a brief overview of exchange rates in the GCC countries. In the second section, we present the model that we use to illustrate the impact of the major variables on the real exchange rate behavior in each country and the appropriateness of the Engle-Granger « two steps single equation cointegration » approach, applied on developing countries by Ibrahim Elbadawi (1994 & 1997). In the third section, we present our econometric test and expose its results, and in the last section we conclude and draw some policy implications.

1- Overview of currency unions

Regional economic integration has been a notable trend in the global economy in recent years. Several levels of regional economic integration are possible. From least integrated to most integrated, they are a free trade area, a customs union, a common market, an economic union, and, finally, a full political union.

Economic theories of international trade predict that unrestricted free trade will allow countries to specialize in the production of goods and services that they can produce most efficiently. Also, opening a country to free trade stimulates economic growth in the country, and creates dynamic gains from foreign direct investment (FDI) inflows, through the transfer of technological, marketing, and managerial know-how to host nations. Therefore, a growing number of countries are moving toward regional integration at different levels, like the EU, the NAFTA, the MERCOSUR, and the ASEAN, among others.

Nevertheless, regional integration leads to increasing interdependence of the partners' economies. The deeper the integration, the higher would be that interdependence. This is one of the main reasons for crisis contagion, as observed in many cases, like in the European Union in 1992, Latin America in 1994, and South East Asia in 1997. Therefore, the members of a regional partnership should start working on exchange rate policy coordination projects, in order to avoid or at least limit the risks of exchange rate crisis, where the most advanced example of such a project is the Euro common currency.

The literature on common currencies is relatively recent, initiated by Robert Mundell in the 50s who presented different steps of monetary cooperation, starting with Currency Areas where currencies are freely exchanged at a constant rate, to Monetary Union in which there is one currency and one exchange rate vis-à-vis the outside world, unification of monetary markets, and free movement of currencies and deposits at constant rates, which is also called an Optimum Currency Area (OCA).

The monetary union involves not only a unified currency among member states, but also common monetary and banking policies, a pool of foreign exchange reserves dealt with by one central bank, financial market integration (liberal capital transactions, harmonization of national financial regulations, structures and institutions) and reasonable economic convergence.

The only successful example of monetary union is the Euro area that came into effect in 2002. Nevertheless, the process to create the Euro was long (started in 1970 with the Werner Report), and not without turmoil, like we noticed during the 1992 crisis. To cope with the crisis and pursue the common currency objective, the EU countries had to establish strict rules to be followed and accomplished by the countries willing to join the common currency, known as the Maastricht convergence criteria, and reinforced by the implementation of the Stability and Growth pact in 1998. Still, when the Euro was launched, the EU did not have yet the required criteria suggested by OCA theory, but it is recognized that the launch of the Euro enhanced the European integration.

The MERCOSUR agreement ratified in 1991 by Argentina, Brazil, Paraguay and Uruguay, had the objective of creating a common currency, after a period of macroeconomic policies' harmonization. However, none of the options has proven politically feasible as of yet. Moreover, the lack of real exchange rate and macroeconomic policies coordination has led to a sharp Argentinean crisis in 2001, accentuated by the Brazilian devaluation. This example illustrates how essential the exchange rate and macroeconomic policy cooperation becomes within any regional integration framework.

For these reasons, the ASEAN member countries have included the macroeconomic policy coordination on their agenda since the crisis in 1997, and established as well an Economic Review and Policy Dialogue, including Japan, China and Korea, in November 1999. Moreover, the Japanese Vice-Minister of Finance advanced a proposal for an Asian monetary fund in 1997, but the idea was strongly opposed by the United States and the IMF, and subsequently abandoned.

On May 6, 2000, the Finance Ministers of 12 countries signed a multilateral financial cooperation agreement called the “Chiang Mai Initiative” (CMI). The principal tools, on which the agreement relies, are the ASEAN Swap Arrangement, the Bilateral Swap Arrangements and the Repo Arrangements. This network of swap agreements is designed to provide immediate liquidity support for any member country that experiences short-run balance of payment deficits, in order to prevent a systemic failure and subsequent regional contagion.

A later proposal, which remains on the drawing board, is the Asian Monetary System (AMS), reviving the Asian monetary fund idea. The main features of such an arrangement would be some version of bilaterally fixed but adjustable exchange rates, with adjustments (realignments) decided on jointly, flexible arrangements with respect to convertibility and capital controls, and an Asian monetary fund to support the currency band system.

Literature review on the GCC Monetary Union

The recent economic literature provides only a few researches oriented towards the analysis of the perspective GC. The study by Laabas and Limam (2002) addresses the question whether the GCC represents the characteristics of an Optimum Currency Area.

The authors apply a Generalized Purchasing Power Parity test that shows that the GCC real exchange rates are closely related and share the same stochastic trend. The authors argue that once the GC is established, it could expand intra-industry trade despite the present lack of diversification. Finally, they conclude that the GC will lead to more convergence in economic structures and economic policies and synchronized business cycles.

Another relevant research on the subject is the paper presented by Ibrahim Badr-El-Din (2004), who identifies some potential costs and benefits of the Monetary Union among the GCC countries. He applies for his investigation the five tests that are guiding the UK policy decision on joining a Monetary Union - convergence, flexibility, investment, financial services and growth, stability and employment. The author concludes that the structural convergence does not seem to be an impediment to create, sustain and benefit from the GC. He argues that the fiscal policies remain the least coordinated. The high contribution of oil and gas to total government revenues severely affects budget balances via oil price volatility, leading to the variation of the level of deficits and surplus and public debts among countries. He argues as well that there might not be a notable increase in the dynamic effects in terms of FDI inflows, and concludes that the GCC countries will incur some costs of having a joint Monetary Union, with less significant potential economic benefits.

Two more papers, written by IMF experts, on the potential gains of the GC and its appropriate exchange rate policy seemed highly interesting for our study. Jadresic (2002) concludes that a properly implemented currency union may contribute to enhance economic efficiency in the GCC region, deepen regional integration and develop its non-oil economy. However, it cautions that a currency union should be seen as only one component of a much broader integration effort.

Abed, Erbas and Guerami (2003) investigate on the appropriate exchange rate regime, and on the choice for the GC to be pegged to the US dollar or to a basket of both dollar and Euro. They conclude that a peg to the dollar leads to a similar impact on economic stability as a peg to a basket would, and therefore there is no need to change the already existing practices of pegging to the dollar, since the GCC economies are heavily dependent on oil production. The authors argue as well that the more diversified these economies become, the more flexible their exchange rate shall be, and then a basket would be required for transition.

Nevertheless, the choice of a fixed exchange rate seems too risky from our point of view. The recent exchange rate crises in Latin America, East Asia, Eastern Europe, Turkey and Egypt have proven that fixed exchange rates are unsustainable in the growing financial globalization context. The globalization of free capital flows leads to balance of payment crises and exchange rate fluctuations. Rapid financial market liberalization in emerging markets can lead to banking crises, usually followed by exchange rate crises.

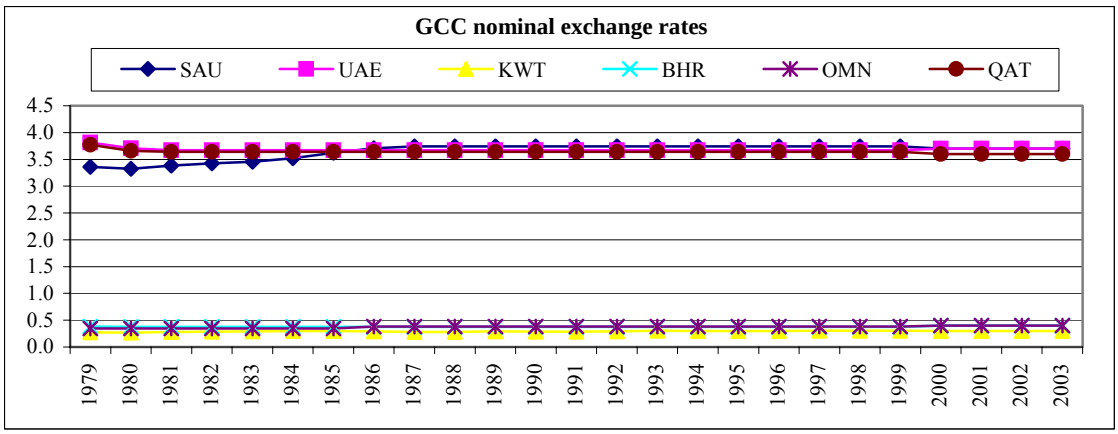
On the other side, free float makes economies subject to higher fluctuations. Calvo and Reinhart (2000) demonstrate that most of the emerging market countries with rates described as floating had more volatility than the fixed-rate ones.

Taking into account the relative scarcity of the researches on the subject, we believe that there is reasonable scope for both qualitative and quantitative investigations into the perspectives for a common Gulf currency. Instead of applying the usual tests on whether the GCC is an Optimum Currency Area or not, or just addressing the costs and benefits of the GC, we would rather investigate on the appropriate policy harmonization that has to accompany the common currency for it to succeed fully.

Exchange rate policy evolution and classification in the GCC countries

Since the beginning of the Bretton Woods system, the Arab countries witnessed a certain will in creating exchange rate policy cooperation, when Twenty-two Arab countries planned to launch a united currency called "Arab Dinnar" in 1945. Sixty years later, only the Gulf Cooperation Council (GCC) countries – Saudi Arabia, Kuwait Oman, Qatar, the UAE and Bahrain – are still pursuing these efforts.

Figure 1: Nominal exchange rates towards the US dollar, 1979-2003.



Source: World Bank Data Base and World Markets Research Centre, 2002-2003.

As we can see from the graph, the GCC countries have always guaranteed an important stability of their exchange rates. The large oil-export revenues have allowed those countries to accumulate huge foreign exchange reserves of around US$50bn in order to counter any currency fluctuation[1].

[1] For example, the constitution of Kuwait stipulates that 10 percent of oil revenues are diverted into a fund established to counter balance swings in the volatile business cycle. That fund now stands at around US$100bn. The Saudi Arabia Monetary Agency (SAMA) manages at least part of Saudi Arabia's net foreign assets, estimated at over US$180 billion.

On December 31, 2002, Kuwait pegged its currency exclusively to the US dollar, rather than to the currency basket it was previously attached to for more than 25 years. The other five members of the GCC already tie their currencies to the US dollar. We could conclude that the *de facto* exchange rate policy in these countries is the same as the *de jure* one, namely a fixed exchange rate policy toward a single currency, the US dollar.

2. The Theoretical and Econometric Methodology to Identify Exchange Rate Behavior Determinants

Theoretically, real exchange rate behavior is subject to many influences, such as the monetary policy, the government expenditure, the terms of trade, the degree of openness and the capital flows. In fact, the exchange rate is the heart of the economic activities: it affects and is affected by the other policies. That is why a policy coordination and harmonization is essential for the success of a common currency.

In this section, we will identify the determinants of the real exchange behavior in each country, in order to flesh out the similarities or differences of the impact that each determinant has.

The theoretical background

The theoretical basis of our approach relies on the Robert Mundell's (1967) economic trilemma triangle (Appendix n°1). In our analysis we consider that the three corner points of the triangle (A, B and C) are extreme cases, and that in reality a country's policy mix is always somewhere *inside* the triangle, at least concerning emerging markets' economies in the actual globalized system[2].

Economic theory and practice have proven that exchange rate stability is incompatible with an activist monetary policy directed toward output stabilization. As the quantity theory of money puts it, the price level is directly related to the stock of money or monetary base (Fisher, 1911). Knowing that the real exchange rate is a relationship between national and international prices, this implies that any variation in the monetary base that induces a price level change different from the international price level change will provoke a variation in the real exchange rate. Therefore, we consider the AB side of the Trilemma triangle as practically unsustainable in the long run.

The BC side of the triangle implies a complete sacrifice of the monetary policy that can no longer be used for any domestic economic purposes such as output or employment dynamization. Policy makers are in general rather reluctant to the idea of abandoning one of the major tools for economic adjustment to external and internal shocks, not to mention the threat for the domestic financial system in the absence of a lender of last resort.

[2] For more in-depth explanation of the theoretical foundation of our methodology, please refer to Kamar and Bakardzhieva (2005).

The remaining AC side of the triangle implies a clean float of the exchange rate, which means high fluctuations of the nominal exchange rate – the equivalent to high volatility of relative prices. This volatility is costly either directly, or because it provokes output fluctuations and damages the financial system's health (Velasco, 2000). In order to mitigate this volatility the policymakers practice floating with varying degrees of management. Even the US, usually regarded as the cleanest of floaters, intervenes occasionally in the foreign exchange market.

Within this configuration, we introduce the intermediate exchange rate policy on the Trilemma Triangle, on the median axis (BF) between the fixed exchange rate policy and the floating regimes, inside the *spot* area on Appendix n°1, which groups our idea of a "managed band" with different degrees and types of management restrictions. (The primary benefit of an intermediate regime is that it allows policy to be directed to limit misalignments, which is something that cannot be claimed by either of the corner solutions[3]. As defined in the economic literature, exchange rate overvaluations are damaging because they lower the competitive power of the tradable goods industry, whereas an undervalued currency can provoke stagflation (Williamson, 2000). Therefore, when examining particular country cases, we should better analyze in detail the exchange rate behavior and its determinants in order to establish the *de facto* exchange rate policy applied by the government and its position inside the Trilemma triangle.

We use the liquidity to GDP ratio (M2 to GDP) as a proxy of the monetary policy in defining point A[4]. An increase in the liquidity ratio (LIQ) will lead to an increase in prices and an appreciation of RER (increase in the value of RER). We use the GCON variable to represent an important part of the demand for both tradable and non-tradable goods. If that consumption was biased in favor of the non-tradables, an increase in GCON will lead to increase in the prices of non-tradable goods and an appreciation of the RER (an increase in the value of RER). If the government consumption is dominated by tradables, the effect of an increase in GCON on the RER is likely to be in the direction of depreciation. We also consider that both variables LIQ and GCON represent point A in the Trilemma triangle.

Next, we need indicators to determine the capital flows, or point C in the Trilemma triangle. Capital mobility and capital controls are hard to measure, as pointed out by many authors (see for example Obstfeld, Shambaugh and Taylor, 2003, or Edwards, 1992). The general literature takes the terms of trade, which represent the relative price of exports to the price of imports. For the particular case of the GCC countries, data for the terms of trade is only available for Kuwait. Therefore, we have decided to use the oil prices (OIL), since all these economies are highly oil dependant, and moreover the OIL series turned out to be highly correlated with the terms of trade series for Kuwait. We can use the OIL variable as an additional indicator of capital flows fluctuations, since an increase in the international price of a country's exports, in this case an increase in oil prices, will lead to an increase in capital inflows.

[3] Perfectly free float or a fixed exchange rate.
[4] Notations and detailed description of the initial set of variables are available in Appendix n°2.

The growing degree of openness is consistent with decreasing capital controls, which in return creates higher possibilities for capital flows fluctuations and a movement towards point C in the Trilemma triangle. Therefore, to measure the degree of the country's trade openness we use the variable OPEN (total trade as percentage of GDP). The increase of openness will lead to higher capital flows, both for import, export and investment concerns. Yet, the economic theory is rather ambiguous concerning the exact effect of a commercial liberalization, so there is not an *a priori* sign given to that variable (Edwards, 1992).

We also calculate and test alternatively a measure of capital flows, called CAPF, which represents the current account to GDP ratio, and a measure of the net capital flows (NKF), calculated as the balance of goods and services minus the change in reserves as percentage of GDP. For the purpose of our study we will consider that central bank interventions through change in international reserves neutralize the impact of net capital flows fluctuations on the exchange rate behavior. Therefore, we use alternatively two proxies of total reserves to GDP ratio (RES) and reserves minus gold (RESN) to capture the impact of the reserves on the exchange rate behavior. If our net capital inflow proxy is not significant, this will be due to central bank interventions and a situation closer in effect to point D (without meaning that the country has really imposed capital controls).

We will use our variables as criteria that determine the degree of integration among the exchange rate policies of our sample, which will then measure the *a priori* likeliness for success of a regional exchange rate and monetary cooperation. The similarity of policy attitudes is an important indicator for the probability that the governments of the GCC countries will achieve to design an efficient policy coordination framework.

The Econometric methodology

From a methodological point of view, we will follow the methodology of Ibrahim Elbadawi (1994, 1997). We start the analysis by the standard ADF unit root tests for each variable, which allow us to fulfill the appropriate condition for applying the cointegration technique of the Engle-Granger (1987) two-step cointegration methodology with a unique equation, including a long-term static OLS regression and an Error Correction Model for the short-term dynamics.

The theoretical formula defining our model is as follows:

$$RER = f\,(LIQ, OIL, GCON, OPEN, CAPF, RES)$$

For the RER index we have used 2000 as the base year. We have used directly the "real effective exchange rate" series from the WDI or the EIU database whenever these were provided (namely for Saudi Arabia and Kuwait). Elsewhere, the RER was calculated following the methodology of Elbadawi (1994) as the ratio of non-tradables to tradables.

As expected, and in concordance with the methodology requirements, the sample variables that will be included in the respective models are I(1) in level and I(0) in the first difference (see Appendix n°3). The first step in the Engle-Granger cointegration method is applying Ordinary Least Squares (OLS) to a static regression relating the levels of the real exchange rate and the variable that determine its behavior.

The time series start in 1980, whenever available. The data has annual frequency and comes mainly from the World Development Indicators (WDI) of the World Bank, completed whenever needed with data from the IFS database (2005 edition) of the International Monetary Fund, the Economist Intelligence Unit database (2002) and the statistical reports of the Arab Monetary Fund.

We have used the logarithmic transformation for most data, except for the NKF and CAPF variables due to the presence of negative observations.

$$logRER_t = C + \beta_1 * logGCON_t + \beta_2 * logLIQ_t + \beta_3 * logOIL_t + \beta_4 * logOPEN_t + \beta_5 * CAPF_t + \beta_6 * logRES_t + \beta_7 * DUM91_t + RESIDUAL_t$$

As we already noted, we test subsequently two proxies of capital flows (CAPF and NKF). We also use alternatively the total reserves and the reserves net of gold (RES and RESN). To finalize this first step of the cointegration test, we shall test the RESIDUAL from the above regression for stationarity. If the residual term is stationary, then we could conclude that our variables are cointegrated. The unit root tests of the RESIDUAL term from the above equation, provided in the last row of Appendix n°4, imply that the real exchange rate and the variables from our models are cointegrated.

The last step estimates a dynamic version of our model in order to verify the short-run effects of our variables on the RER. We confirm once again the validity of the cointegration relationship by the negative sign of the significant and less than one coefficient of the error-correction term. The results of the dynamic ECM are given in Appendix n°5. Finally, we use the coefficient of the error-correction term to calculate the speed of adjustment of the system towards the long-run equilibrium. That calculation will help us as well to identify the correct moving averages for each country in order to calculate the misalignment of the long run equilibrium real exchange rate.

3. Interpretation of the econometric results

In this section we will comment on the results obtained country by country.

We were unfortunately unable to perform the required tests on the cases of Oman and the United Arab Emirates due to lack of data. In effect, CPI data for these two countries is only available since 1990, which allows us to calculate the Real Exchange Rate for a period of only 13 years. With most of the real data (GDP, government expenditure, exports, imports etc.) unavailable on quarterly basis, we were forced to exclude those countries from the analysis at the current stage of the research.

Commentary on the results for Saudi Arabia

In the case of Saudi Arabia the variables that enter the system with statistically significant coefficients are LLIQ, LOIL, LOPEN, LCAPF and LRESN. The model specification requires the inclusion of a constant, as well as an impulse dummy to take into account the effects from the first Gulf war (DUM91). The model is statistically acceptable, as can be judged from the R^2, adjusted R^2 and Durbin-Watson statistics.

The liquidity has the most important effect on the exchange rate behavior, but here it bears a negative sign, opposite to the one we expected. This could be explained by the fact that for Saudi Arabia we used the real effective exchange rate series provided directly in the WDI database, so its mode of calculation (tradables to non-tradables) might allow for the opposite interpretation of an appreciation (depreciation). The trade openness has also a negative impact on the long-run system, and the same effect is observed for the capital flows, while the reserves have the expectedly opposite positive effect on the behavior of the real exchange rate. The dummy is also significant and bears the expected negative sign, indicating that the Saudi economy is sensitive to the regional turmoil.

The ADF test applied to the residual series from this long-run regression proves the existence of a cointegration relation between our variables in the long run. The error-correction model illustrates that the lagged residual has a significant and negative sign, with a coefficient lower than 1, which indicates that the RER is auto-correcting toward its long-run equilibrium (which is the case for our four countries). More details on the speed of this adjustment will be given at the end of this section.

In the short run, the variable that is no longer in the system is the liquidity (as will be seen in the other three countries), but here the NER variable enters the estimation, which is simply the percentage change of the official nominal exchange rate (local currency unit per US dollar, period average). That variable has a statistically significant, negative but small effect on the dynamics of the real exchange rate. This can mean that the authorities have adjusted the nominal exchange rate from time to time in order to maintain the real exchange rate close to its equilibrium.

The reserves are positively and to a small extent related to the real exchange rate in the short run, while the capital flows CAPF are negatively and again almost insignificantly entering the dynamic system. The changes in the oil prices have the most relevant positive impact in the ECM, while the trade openness has the most important negative impact, meaning that the Saudi real exchange rate is adjusting to the changes of the volumes and prices of the main exports and imports of the country.

In order to place Saudi Arabia in the trilemma triangle, we consider all the results from the long-term and the short-term analysis, and situate it slightly to the left from the very center of the figure (see Appendix n°1).

Commentary on the results for Bahrain

The variables that enter the long-run model with statistically significant coefficients are the liquidity, the openness and the total reserves. The NKF and CAPF variables are level stationary and cannot be included in the long-run model. The government consumption does not enter the long-run system significantly, nor do the oil prices. The specification requires the inclusion of a constant and a dummy variable. The dummy is again significant and bears the expected negative sign, indicating that the Bahraini economy has been affected by the Gulf war and is therefore sensitive to the regional turmoil. The model is statistically acceptable, as can be judged from the R^2, adjusted R^2 and Durbin-Watson statistics.

When interpreting the short-run model results, we shall notice that the government consumption, that did not enter the long-run system, affects the dynamics of the real exchange rate, whereas the total reserves prove to be only a long-run determinant, but their variation as percentage of GDP (VRES) enters the system statistically significantly but with an infinitely small coefficient.

As we can see from the coefficient estimations, the fluctuations of the capital flows provoked by the trade openness are almost exactly countered by the changes in the reserves. Therefore, the monetary policy plays the major role in the determination of the Bahraini long-run real exchange rate behavior over the analyzed period. Thus, we can conclude that Bahrain is not situated in points C or D of the Trilemma triangle, but rather along the CD axis, and is as well in none of the other corners, but somewhere between points A and B (see Appendix n°1).

Commentary on the results for Qatar

In the case of Qatar, the variables that enter the long-run system with statistically significant coefficients are LLIQ and LOIL, plus NKF and LRES. The model specification requires only the inclusion of a constant, as well as an impulse dummy to take into account the turmoil of 1991 with the First Gulf War. The model is statistically acceptable, as can be judged from the R^2, adjusted R^2 and Durbin-Watson statistics.

The Qatari long-run real exchange rate behavior is influenced positively and most significantly by the liquidity of the monetary system, as in the case of Saudi Arabia, while the evolution of oil prices happens to have a negative impact on it. LRES and NKF have the same sign, which might seem peculiar at first, but the coefficient of NKF is so insignificant, that we can accept the hypothesis that the central bank has countered the capital flows with changes in the reserves. The impulse dummy variable is not significant either.

In the short run, the only variable that no longer pertains to the system is the liquidity, which is actually present in none of the four Error-correction models. We can interpret this finding as assuming that the transmission mechanisms of the monetary policy do not allow it to exercise an immediate effect on the real exchange rate. The NKF are again

statistically significant and have a negative but very negligible impact on the short-run system, where as the reserves have the expected opposite sign.

When looking at the coefficient of the lagged residual and comparing it to the other sample countries, we observe the slowest return to equilibrium after a shock to the system.

In the framework of the Mundell Triangle, we position Qatar's economy inside the triangle, close to the center of the triangle and closer to point D than to point C on the CD axis (see Appendix n°1).

Commentary on the results for Kuwait

In the case of Kuwait, the variables that enter the system with statistically significant coefficients are LOPEN, LGCON and LRESN. The model specification requires the inclusion of a constant. We were unable the include the LLIQ, NKF and CAPF variables since they turned out to be level stationary, which is inappropriate in the Engle-Granger methodology. As well, even though we were able to calculate the RER, it was impossible to use it for the models since it was also level stationary (around a trend). Therefore, we used the real effective exchange rate as provided by the EIU database. The model is statistically acceptable, as can be judged from the R^2, adjusted R^2 and Durbin-Watson statistics.

The first important difference in the Kuwaiti case, as compared to the other three countries, is the statistical significance and negative sign for the coefficients of GCON. Actually, this is the only country where the government expenditures influence the long-run behavior of the real exchange rate. This might be due to the Gulf War, when the public expenditures increased from around 28 to 78% of GDP.

The trade openness (OPEN) and the net reserves (LRESN) have positive and statistically significant coefficients, which mean that Kuwait's position in the trilemma triangle is also along the CD axis.

In the short run, only the changes in the openness and the reserves have a significant positive impact on the RER, which adjusts towards its equilibrium at an average speed compared to the other countries.

With those characteristics, the Kuwaiti exchange rate policy finds its place within the trilemma triangle, slightly to the right from the center.

The appendix figure n°1 summarizes the results for our four countries. We can see that they are all close to the area of the intermediary exchange rate policies. We cannot classify any of them neither as a *de facto* hard fixed nor as a completely floating exchange rate policy.

Calculation and commentary on the equilibrium exchange rates and their misalignments

As suggested by Elbadawi (1997), we use the coefficients of the lagged residual term in the error-correction model in order to calculate the speed of adjustment of each system back to the long run equilibrium. Actually, we use the following formula:

$$T = \frac{\log(1-\alpha)}{\log(1-\beta \text{ estimated})},$$

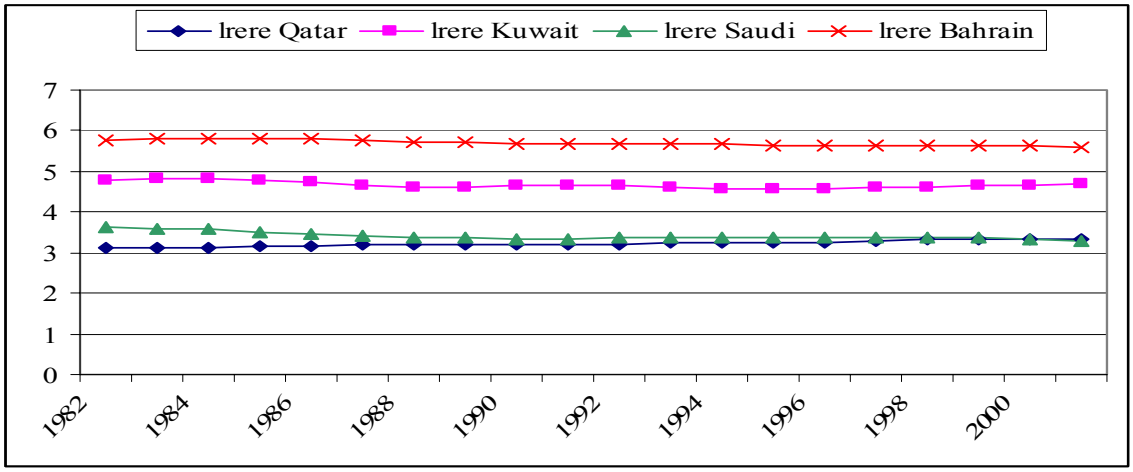
where T = the number of periods needed to return to equilibrium ; α = the rate of dissipation of the shock (here we use α: 95 %) ; and β estimated = the coefficient of the error-correction term. The results from this calculation for our four sample countries are as follows:

Table 1: Speed of return towards the equilibrium

	Log (1- 95%) = -1,3	Moving average of
Qatar Log(1 - 0.470849) = -0.276	4.71	4 years
Kuwait Log(1 - 0.679084) = -0.493	2.63	3 years
Bahrain Log(1- 0.486317) = -0.289	4.49	4 years
S. Arabia Log(1- 0.861356) = -0.858	1.51	2 years

In order to calculate the long run equilibrium exchange rate, we first use the parameters (the estimated coefficients) from the four long-run regressions (whose results are presented in Appendix n°4). Next, we use the above calculated speed of adjustment to estimate the number of periods to include in the calculation of the moving averages. The series obtained from these two operations are presented in figure 2.

Figure 2: Long run equilibrium real exchange rates (in logarithm), 1982-2002.



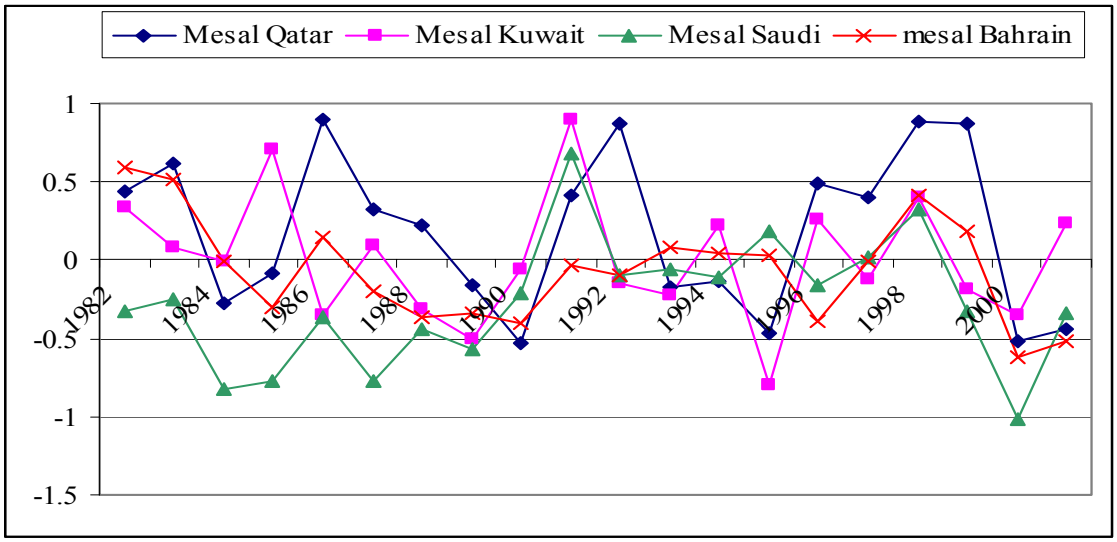
As we can see, the equilibrium paths of the four real exchange rates seem perfectly compatible with the maintained nominal fixed exchange rate regimes.

Finally, we calculate the misalignment between the real exchange rate that we used as independent variable in the long-run regressions and the above calculated long run equilibrium exchange rate through the following formula:

$$\text{Misalignment} = 100 * (\text{RER} - \text{LRERE}) / \text{LRERE}$$

The four series are presented in figure 3.

Figure 3: Misalignments of the exchange rates, 1982-2002.



What we can see from the graph is that the misalignments of each of the four exchange rates are really small, ranging from +1 to -1%. Moreover, the misalignments seem to behave similarly, with the misalignments of Qatar and Bahrain being highly correlated (0.577), which means that the two systems respond in a similar way to different shocks.

4. Conclusion and policy recommendation

The GCC multilateral cooperation agreement with its customs union and free trade area allows these economies to enlarge their markets, and benefit from the dynamic effects of a deep regional integration. Nevertheless, a deep cooperation increases the economic interdependence leading to contagion phenomena when a crisis occurs. This has been noticed clearly during the Gulf War.

As we can notice from the econometric results in our research, exchange rate behavior determinants are different in our four countries, meaning that each country adopts a different macroeconomic mix. The policy harmonization that we could have expected *a priori* was not observed, even though the convergence of public expenditures, government deficit and monetary policy is essential to the success of a monetary union, as can be seen from the Maastricht criteria that govern the Euro zone.

The second conclusion is related to the finding of very few misalignments for the four countries, which are due to the use of the central bank reserves in order to neutralize the fluctuations in the oil prices and in any other elements related to the capital flows.

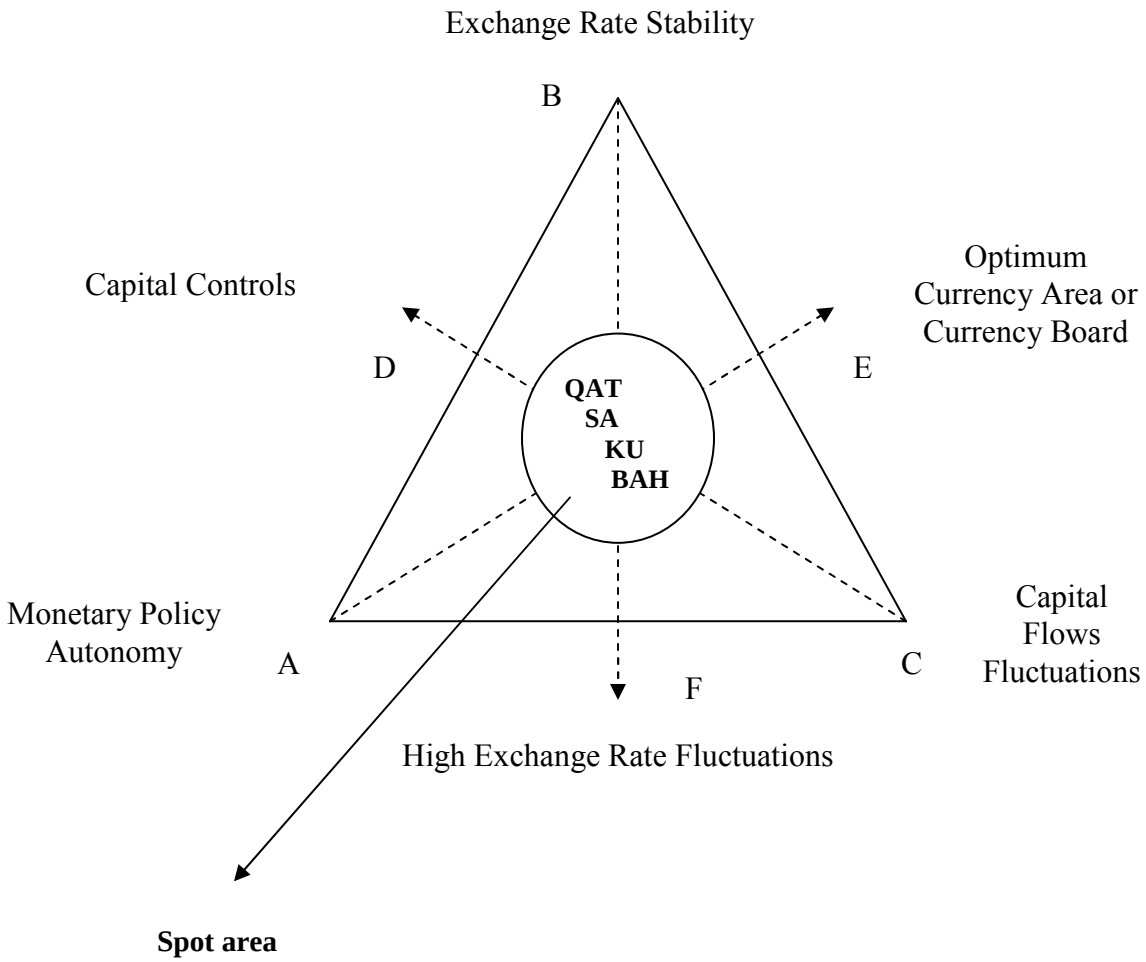
By the way, it is the massive use of the important reserves that guarantees the fixed nominal exchange rates in these countries. This implies that the central bank systematically sterilizes the impact of the fluctuations in the reserves on the money supply. This can be a feasible policy within one single country, but within a monetary union framework the sterilization measures will have to be common and synchronized; otherwise, the evolution of the money supply in each country will be different, giving way to diverse inflationary pressures and also to divergent behaviors of the real exchange rates.

The last point concerns the exchange rate policy. Since the real exchange rates in our sample countries turn out to be situated close to the center of the Trilemma triangle instead of being in any of its corners, we find it interesting for those economies to consider the application of an intermediary exchange rate policy for their future common currency. In this framework they shall target an equilibrium real exchange rate composed of a basket of international currencies that will guarantee the internal and external equilibrium of the monetary zone. This type of policy, applied successfully in Chile, is gaining credibility since authors like Williamson suggest it as alternative to the highly volatile flexible exchange rate regimes and to the fixed exchange rates that impose important macroeconomic constraints and require giving up the autonomous monetary policy.

We would also like to signal, that this paper is part of a much larger research project, whose next steps will be to test the hypothesis that the GCC countries' real exchange rate (RER) behaviors are cointegrated and that they share a common trend. We will perform a multivariate VAR cointegration analysis, following the Johansen and Juselius methodology (2004), aiming to identify the common driving trends shared by the six RER. If we are unable to solve our data problems, we will use panel cointegration techniques over a shorter time span. We will try to examine which currencies' exchange rates have a transitory effect on the cointegration system, and which ones have a permanent impact on it. Finally, we will also use these tests to investigate on the effects that an external shock on one of the currencies has on the others. All these results could then be interpreted in terms of identifying who among Kuwait, Bahrain, Qatar, UAE, Oman and Saudi Arabia constitutes the economic driving force of the GC project, as for example Germany in the framework of the European Economic and Monetary Union.

A closely related question that we intend to address is what should be the nature of the monetary policy after the GC is implemented? Since the Inflation Targeting is actually gaining popularity, we are going to assess the pros and cons of this monetary policy and determine if it is recommended for the GC.

Appendix n°1: The economic Trilemma triangle



Appendix n°2: Our variables are defined and constructed as follows:

Variable	Definition
RER	Real Exchange Rate Index = The ratio of the foreign (US) wholesale price index, multiplied by the nominal exchange rate (NER), to the domestic consumer price index 2000 = 100 for the index.
GCON	Government Consumption = General Government Consumption / GDP
LIQ	Liquidity = M3 / GDP
OIL	Prices of oil
OPEN	Degree of Openness = (Imports + Exports) / GDP
CAPF	[- (Exports – Imports) / GDP]
NKF	Net Capital Flows = Balance of goods and services [- (Exports – Imports) / GDP] – Change in Gross international reserves (including gold, in current US Dollars) / GDP
RES	Total Reserves (Including Gold) / GDP
RESN	Reserves excluding gold / GDP
DUM91	Gulf War (= 1 in 1991, = 0 elsewhere)
NER	Fluctuations in the nominal exchange rate
VRES	Variation in reserves as a percentage of GDP

Appendix n°3: Results from the Unit Root Tests:

Variable	**Bahrain**	**Qatar**	**Saudi Arabia**	**Kuwait**
LRER	I(1), Trend	I(1), Trend	I(1)	I(1)
D(LRER)	I(0)**	I(0)**, Intercept	I(0)**	I(0)**
LGCON	I(1), Intercept	I(1), Trend	I(1)	I(1), Intercept
D(LGCON)	I(0)**	I(0)**, Trend	I(0)**	I(0)**
LLIQ	I(1)	I(1), Intercept	I(1), Intercept	I(0), Intercept
D(LLIQ)	I(0)**	I(0)**	I(0)**	
LOIL	I(1), Intercept	I(1), Intercept	I(1), Intercept	I(1), Intercept
D(LOIL)	I(0)**	I(0)**	I(0)**	I(0)**
LOPEN	I(1), Trend	I(1) , Intercept	I(1)	I(1), Intercept
D(LOPEN)	I(0)**	I(0)**	I(0)**	I(0)**
CAPF	I(0), None	I(1)	I(1)	I(0), Intercept
D(CAPF)		I(0)**	I(0)**	
NKF	I(0), None	I(1)	I(0), None	I(0), Intercept
D(NKF)		I(0)**		
LRES	I(1), Trend	I(1), Trend	I(1)	I(1), Intercept
D(LRES)	I(0)**	I(0)**	I(0)*	I(0)**
LRESN	I(1), Trend	I(1), Intercept	I(1)	I(1), Intercept
D(LRESN)	I(0)**	I(0)**	I(0)**	I(0)**

Notes:
** denotes significance at 1 percent level according to Augmented Dickey-Fuller stationarity statistic.
* denotes significance at 5 percent level according to Augmented Dickey-Fuller stationarity statistic.
Lags were automatically chosen according to the Schwartz Information Criterion.

Appendix n°4: OLS estimations of the long-run determinants of the real exchange rate behavior. The dependant variable is LRER.

	Bahrain	Qatar	Saudi Arabia	Kuwait
Sample	**1980 2002**	**1980 2002**	**1980 2003**	**1980 2002**
Observations	**23**	**23**	**24**	**23**
LLIQ	**-0.203715**	**0.212104**	**-0.730742**	
	(-3.379596)	**(4.998516)**	**(-11.28041)**	
LOIL		**-0.101057**	**0.326621**	
		(-2.117493)	**(5.038158)**	
LOPEN	**-0.284443**		**-0.562983**	**0.275864**
	(-2.961633)		**(-3.04917)**	**(3.08242)**
CAPF			**-0.013813**	
			(-9.505655)	
NKF		**-0.003366**		
		(-3.733051)		
LRES	**0.287416**	**-0.169885**		
	(6.703501)	**(-4.908203)**		
LRESN			**0.223484**	**0.155566**
			(9.559881)	**(5.845403)**
LGCON				**-0.141292**
				(-5.795899)
C	**7.038707**	**3.045178**	**8.279083**	**3.429156**
	(11.72523)	**(10.16044)**	**(9.194749)**	**(8.651811)**
DUM91	**-0.08051**	0.013181	**-0.222957**	
	(-2.335)	(0.369875)	**(-3.73932)**	
R^2	**0.840606**	**0.862089**	**0.976214**	**0.798892**
Adjusted R^2	**0.805185**	**0.821527**	**0.967819**	**0.767138**
DW	**1.868877**	**1.606354**	**2.117633**	**1.688694**
ADF	**-4.290718**	**-4.899054**	**-5.054422**	**-4.081822**

Note: The ADF test refers to the T-statistic of the residual series from each regression. Other T-statistics in parentheses.

Appendix n°5: OLS estimations of the short-run determinants of the Real exchange rate behavior. The dependant variable is D(LRER).

ECM	Bahrain	Qatar	Saudi Arabia	Kuwait
RESID (-1)	-0.486317	-0.470849	-0.861356	-0.679084
	(-3.751175)	(-2.285085)	(-3.648982)	(-3.666995)
D(LGCON)	0.146098			
	(3.39041)			
D(LLIQ)				
D(LOIL)		-0.054486	0.254206	
		(-2.432068)	(4.729988)	
D(LOPEN)	-0.13933		-0.472654	0.129918
	(-3.199628)		(-3.426886)	(2.049958)
D(CAPF)			-0.004666	
			(-3.727224)	
D(NKF)		-0.001839		
		(-2.31439)		
D(LRES)		0.056559		
		(2.243204)		
D(LRESN)			0.080286	0.079189
			(2.142478)	(3.594638)
NER			-0.032067	
			(-2.795862)	
VRES	0.001623			
	(2.229659)			
C	-0.012025	0.010066	-0.021493	
	(-3.237719)	(2.522345)	(-2.082085)	
DUM91				
R^2	0.750247	0.53399	0.775096	0.60157
Adjusted R^2	0.691482	0.42434	0.690758	0.55963
DW	1.915021	1.688589	1.736739	1.60706

Note : T-statistics in parentheses.

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