INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ECONOMICS & MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 3, Issue 5, (2014) E-ISSN: 2226-3624

Modeling A Potential GCC Single Currency

Dr. Ghada Gomaa A. Mohamed

University of Ottawa & Saint Paul University Ottawa, ON, Canada

Email: gabdelat@uottawa.ca

Prof. Manuchehr Irandoust

Halmstad University, School of Business and Engineering, P.O. Box 823, SE-301 18 Halmstad, Sweden

Email: manuch.dost@gmail.com

To Link this Article: http://dx.doi.org/10.6007/IJAREMS/v3-i5/1140 DOI:10.6007/IJAREMS/v3-i5/1140

Published Online: 04 September, 2014

Abstract

The paper explores different views of regime choice and investigates theoretically and empirically the feasibility of a potential monetary union among the six members of the Gulf Cooperation Council- the United Arab Emirates, the State of Bahrain, the Kingdom of Saudi Arabia, the Sultanate of Oman, the State of Qatar, and the State of Kuwait. The theoretical model suggests that the optimum foreign regime needs to maximize oil revenues under the assumptions of internal and external balances. This is proved to occur at the possible maximum expected foreign-exchange rate or at the minimal level of uncertainty and volatility in foreign-exchange rate markets. Calculations using a calibrated model show that the proposed monetary union is likely to yield economic benefits for the GCC countries if they adopt a foreign regime pegged to SDR.

Keywords: Single currency, GCC, regime, Convergence, Moving-average test

Introduction

The idea of launching a single common currency among six Gulf countries (the United Arab Emirates, the State of Bahrain, the Kingdom of Saudi Arabia, the Sultanate of Oman, the State of Qatar, and the State of Kuwait) started with the establishment of the Gulf Cooperation Council (GCC) in May 1981. In December 2000, the Supreme Council has decided to adopt the US dollar as a common peg currency for the currencies of the GCC states. In December 2001, the council approved the timetable for establishing the GCC Monetary Union and adopting a single currency by January 2010. The non-feasibility of monetary union by 2010 should not be taken as evidence that the objectives will not be achieved in due course since economic and monetary union is a difficult and lengthy process. In fact, many measures have been taken to coordinate their monetary, financial and economic policies as a prelude to a common currency. Although the customs union and common markets set up in 2003 and 2005, respectively, are not yet completely realized, the GCC member states adopted the EU convergence criteria regarding budget deficit, public debt, currency reserves, interest rates, and inflation. Progress has been made towards the fulfillment of these criteria except

inflation. However, Hebous (2006) points out the significant progress that the GCC members have achieved in terms of convergence if the European convergence criteria are taken as a reference.

However, all GCC members are committed to the peg to the U.S dollar for the time being except for Kuwait that abandoned the dollar peg and has switched to pegging to a currency basket in May 2007 when in a bid to reduce inflationary pressures. It is supposed that after the introduction of the new currency, the GCC Common Monetary Authority will decide which regime to adopt. There are four regime-options: sticking to the current pegging to the U.S. dollar, switching to managed floating, switching to pegging to an undisclosed currency basket, such as an SDR currency basket, or a (U.S. Dollar–Euro) currency basket, and switching to pegging to the export price of oil (PEP) regime. Researchers suggest that the tradeoff amongst those regime-options depends on some main criteria, namely; the ability of the adopted regime to maintain both macroeconomic and financial stabilities in the face of real or nominal shocks. Most IMF's economists and observers claim that the tradeoff amongst the first three regime-options are more feasible than the last one because of the experienced high volatility of the oil price which will not help to create such balances in the economy. The GCC has already experienced the first regime-option with all its advantages and disadvantages. This paper discusses competing views on regime choice determinants and suggests an optimal exchange rate-regime for the GCC to adopt after creating a common currency (if feasible) that meets criteria of maintaining internal and external balances.

The paper is structured as follows: Section 2 provides a survey of the previous studies that deals with the GCC region. Section 3 summarizes competing views on regime choice determinants. Section 4 presents the theoretical model and its calibration. Section 5 tests the feasibility of adopting a common currency via a stochastic convergence test to the calibrated model. Section 6 presents a moving average test that assesses and discusses the uncertainty and volatility in the foreign exchange-rate markets under various selected exchange-rate regimes. Finally, conclusions are offered in Section 7.

Previous Empirical Studies

Existing empirical studies attempt to assess the potential of a GCC monetary union and examine the readiness of the GCC to create a currency union. Zaidi (1990) suggests that extensive coordination of monetary policies is necessary in order to avoid the observed variations in macroeconomic variables. Dar and Presley (2001) argue that the low level of integration among GCC members (as shown by the insignificant volume of intra-regional trade), the similarity of oil-based economic structures, lack of adequate production diversification, lack of enough flexible rules for foreign direct investment and privatization efforts, make it difficult to create a monetary union. Jadresic (2002) asserts that the success of the GCC monetary union is conditional on a set of measures including the removal of domestic and cross-border obstacles that hinder trade and foreign investments, coordinating policies that generate macroeconomic stability, and enhancing the process of political stability.

Fasano and Schaechter (2003) conclude that the GCC monetary union will improve efficiency of financial services, lower transaction costs, increase transparency in prices of goods and services, and promote the allocation of resources within the region. Using cointegration analysis among GCC countries' GDP, inflation, exchange rates, money stock and monetary base, Darrat and Al Shamsi (2005) find that the member states share a common long-run trend linking their GDP, financial markets, and monetary policies. This does not imply that the

short-run business cycles are synchronized. However, they conclude that the failure of the GCC countries to create full economic and financial integration is likely the outcome of socio-political differences rather than economic and financial incompatibility among the member states.

Abu-Qarn and Abu-Bader (2008) examine the extent to which the member states of the GCC meet the criteria for an optimal monetary union by investigating the symmetry of the external shocks that the economies are subject to and the degree of synchronization in long-run economic activity and in short-run business cycles. Their structural VAR model and cointegration analysis show that external shocks are asymmetric and the economic activities of the GCC members states are not linked. Thus, the results lend no support for the readiness of the GCC countries to create a viable currency union. Rutledge (2008) performs a cost-benefit analysis of having a monetary union among the GCC states. She concludes that all GCC states can expect to accrue net economic benefits from entering a monetary union and the GCC single currency would be a great achievement and providing the world with a currency that central banks and other institutions might want to hold as a reserve that could be used to hedge oil pricing risks. She also concludes that the socio-political differences might hinder the progress towards a viable common block.

Finally, Buiter (2008) reviews the argument for and against monetary union among the GCC members. He concludes that although there is an economic case for the GCC monetary union, it is not overwhelming. The lack of economic and political integration and the absence of effective supranational political institutions encompassing the six GCC members imply that there could be no effective political accountability of the GCC central bank. Furthermore, he asserts that monetary union among the GCC member states will take place only as a part of a broad based movement towards far-reaching political integration.

Optimum Exchange Rate Regime and Selection Criteria[i]

The theory of optimum-currency-area asserts that the regime that a country chooses should consider key welfare criteria, such as growth performance, output volatility, and inflation. This implies that different country characteristics are associated with different optimal regimes. In the presence of nominal price and/ or wage rigidities, the effects of monetary policy and optimal choice of the regime are studied by open-economy extensions of the New Keynesian model which uses stochastic general equilibrium models and welfare criteria that are in line with the agents' objectives (Obstfeld and Rogoff, 1995). The main empirical conclusion from analyzing this model is consistent with the traditional Mundell-Fleming model, namely that flexible system tends to perform better in terms of welfare than regimes that restrains fluctuations and creates independent national monetary policy (e.g., Mundell, 1961; McKinnon, 1963; Stockman and Ohanian, 1997; Obstfeld and Rogoff, 2000; Pappa, 2004; Canzoneri, et al. 2005). Furthermore, Obstfeld and Rogoff (1995) show that floating exchange-rate regime prevents fiscal irresponsibility on the grounds that it cannot be floated off by depreciation. It is also argued that flexible exchange-rate regimes act as shock absorber and mitigate the effects of external shocks more effectively than fixed exchange-rate regimes (Hoffmann, 2007). The superiority of the flexible exchange-rate regime has been subject to some critics during the recent years (Tavlas et al., 2008; Dellas and Tavlas, 2009).

First, it is generally assumed that the monetary authorities have complete information about the structure of the economy and its shocks. Second, monetary policy is conducted optimally, i.e., it maximizes the utility of the agents and it creates the efficient and flexible price or wage

equilibrium. These two assumptions together imply that when monetary policy is very powerful it cannot be easily constrained to target the nominal exchange rate especially if domestic and foreign goods are poor substitutes (Pappa, 2004). Third, as it is well known, in the presence of nominal-price rigidities, fixed exchange-rate regimes hinder desired relative price changes. Although this argument supports the case for flexible exchange-rate regime and its adjustment mechanism, it cannot be effective due to the fact that nominal wage-rigidity is transferred into nominal-price rigidity under the assumptions of imperfect competition (Obstfeld and Rogoff, 2000). However, Dellas (2006) indicates that nominal-wage rigidity and incomplete information is in favor of a passive, fixed exchange-rate regime. Fourth, the model assumes that prices are fixed in terms of the sellers' currency. Devereux and Engle (2003), and Corsetti and Pesenti (2005) reveal that the exchange rate becomes an inefficient policy instrument for managing demand since fixing prices in terms of the buyers' currency decreases the magnitude of the cost-switching effect relative to that of fixing prices in terms of producers' currency. Fifth, Meese and Rogoff (1983) show the shortcomings of the flexible exchange rate regime particularly in light of the prospect of lengthy periods of disequilibria.

Furthermore, if prices are expressed in the buyers' currency, unanticipated fluctuations in the nominal exchange rate do not influence the price of imported goods. This leads to very low pass-through of exchange-rate changes to consumer prices in the short run which implies that the nominal exchange rate does not react to country-specific shocks. As a result, the comparison of alternative regimes should take into consideration substantial asymmetries across countries. Dellas and Tavlas (2005a, b) explore that economies with relatively flexible wages lose in terms of macroeconomic performance when they establish a monetary union with countries with relatively rigid wages. They also point out that symmetries among economic structures are important in determining the extent to which the elimination of uncertainty appears elsewhere in the global financial system.

On the other fronts, several authors discuss that capital flows and balance sheet effects are one of the key determinants of a country' choice of exchange rate regime (e.g., Eichengreen, 2001; Hausman et al., 2001; Calvo and Reinhart, 2002; Aghion et al., 2004). The creditability view assets that liability dollarization makes an announced peg strong by raising the cost of reneging on it. This approach supports fixed-exchange rates when high inflation rates undermine the creditability of the monetary authority and alternative stabilization rules. While the consistency view suggests that liability dollarization and exchange-rate commitment creates lock-in effects (Velasco and Nuet, 2004), i.e., when adverse shocks lead to unsustainable peg, the delayed devaluation is amplified and this may generate a financial crisis.

Furthermore, an announced peg would make worse financial fragility as the implicit insurance offered against exchange-rate movements could encourage domestic agents to increase their share of foreign currency denominated liabilities (Eichengreen and Hausmann, 1999). The consistency approach also claims that high inflation countries should be cautious in adopting a peg as the decline in external competitiveness would weaken the sustainability and creditability of the peg. However, the literature on the performance of alternative exchange-rate regimes shows that there is some positive correlation between pegs and growth for developing countries. Pegged regimes tend to be associated with lower inflation than other types of regimes, although many high inflation economies have had floating rates due to frequent adjustments of exchange rates.

An IMF study (2008) summarizes the advantages and disadvantages of each exchange-rate regime for GCC member states as follows: the most important advantage of single currency peg is that it is already experienced and it proved its ability to stabilize the economy for more than two decades in addition to its straightforward as a unit account for both current and future transactions. While the most important disadvantage for this regime is that it creates a dependency toward the US economy which can import economic instability. While the most important advantage of managed-floating regime is that it can automatically adjust and smooth the business cycle of GCC countries and it can break its dependency toward the US economy. The most important disadvantage of this regime is that the immaturity in using the monetary policy especially within incomplete financial and capital markets in GCC member states, in addition to the lack of experiences in dealing with simultaneous internal and external changes.

The third alternative is pegging to a basket of currencies – with the following alternatives: an un-disclosed basket peg, such as an SDR peg, and a U.S. Dollar–Euro basket peg. This regime is much more feasible in the current time especially after Kuwait switched to a basket peg regime. Pegging to a basket of currencies gives advantages of both a currency peg regime and a managed floating regime because it relatively promotes flexibility in market adjustment like the managed- floating regime and it limits, at the same time, the increasingly exposure to risk with uncertain global fluctuations. It also distributes the risk of fluctuations in one peg currency to a basket of currencies so that the opposite movements in currencies' values can eliminate each other and create a relative stability in the economy.

The fourth option is pegging to the export price of oil. This regime has been experienced by countries specialize in the production and the export of a main product. Pro-adopting this regime argues that the GCC states can be considered as a big country that can alter the price of oil to be a domestic matter and hence pegging to the export price of oil can stabilize the local currency as long as the export price of oil can be controlled by those states. However, history proved that the export price is vulnerable to many political and economic factors especially at times of hostilities and it cannot be determined domestically even by powerful states. In addition, such regime can create a big instability in all sectors of the economy if export price of oil faces a series of sudden shocks. Add to this, the current global uncertainties turn out this alternative regime option.

In order for the GCC to adopt any of the above alternative regimes, some selection criteria for the optimum regime must be taken into considerations. Some of those criteria are pure economic ones and some can be related to the existing environment of the GCC states. Studies by IMF and others found a convergence amongst the GCC states in many economic and non-economic variables and indicators. However, differences still exist amongst those states in addition to variances in the transmission mechanism of the monetary and financial policies.

Literature on the performance of alternative exchange-rate regimes shows that the choice of optimal exchange-rate regime should satisfy a country's internal balance and external balance. The definition of the internal balance here is closing the gap between the potential and the actual real GDP and hence targeting the inflation and the recession domestically. The GCC states depend, heavily in their domestic adjustments, on the fiscal policy because the complete transmission inside GCC states is not completely visible which can put a great constraint on selecting a free floating or even a managed-floating regimes in the near future which is still can be seen as a future option with a much more mature monetary and financial development stage. On the other side, the external stability can be achieved with the balance

between cash inflows and cash outflows to and from the states and in order to maintain a balance in international transactions, the exposure to international financial and economic risks is also a great matter while selecting an optimum regime.

Theoretical Framework and Calibration

A general equilibrium model based on the Keynes/ Mundel-Flaming framework is used here.[ii] The main assumptions are:

-The government is not dependent of collecting taxes to accumulate its revenues, yet, it accumulates revenues from oil exporting.

-The quantity of oil exporting is determined by an international quota.

-The oil export is positively related to the expected value of the nominal foreign exchange rate (Assuming all exports are only oil exports).

-Agents' consumption is a proportional of the national income less oil exports revenues.[iii]

- Import depends positively on the national income and it is neutral to the foreign exchange rate.

-The supply of real money is exogenous and the demand for money depends positively on the national income and negatively on the domestic interest rate.

-The interest rate parity, the PPP relationship, and the external balance hold.

The optimal exchange-rate regime is the regime that maximizes the present value of the total profit from oil exports and preserves both the external balance and the internal balance.

$$Max: \pi_{Xt} = \int_0^{\infty} e^{-it} (X_t - C(X)_0).dt, \qquad (1)$$

Subject to:

(i) $Y_t = k_1X_t + k_2A_0 + k_3 M_0 = Yn$, *The internal balance*[iv]

(ii) $Y_t = (1/m)X_t + (a/m)(i-i^*)$, *The external balance*

(iii) $P_t = P^*.R_t$, *PPP relationship*

(iv) $X_t = P_t . Q_{X0}$, X_t *is the oil export revenue.*

(v) *Oil exports revenues are positively related to expected foreign exchange rate.*

(vi) $i = i^*$, *Interest rate parity, (perfect capital mobility)*

(vii) *The transversality condition holds,*

(viii) *Assuming also a sunk cost of oil exports* $C(X)_0$*, and hence the marginal cost equals zero,* $C'(X)_0=0$.

Where, t denotes to time, π_{Xt} = total profits from oil exports (or total revenues from exporting oil assuming costs are zero), P is the price of oil export, Q_X is the quantity of oil exports, Y is the actual GDP, Yn is the GDP at the natural rate of unemployment, A captures both the exogenous investment and the exogenous government spending, M is the real money supply, m is the marginal propensity to import out of Y, a is the degree of capital mobility, i is the domestic interest rate, and i^* is the foreign interest rate. With holding the PPP relationship, $P = P^*.R$, where, P^* is the international price and R is the nominal foreign exchange rate.

By substituting the second constraint into the first one and with assuming $i=i^*$, and with PPP relationship, the following problem arises:

$$Max: \pi_{Xt} = \int_0^{\infty} e^{-it}(P^*. R_t.Q_X^0 - C(X)_0).dt, , \qquad (2)$$

0

Subject to:

$Y_t = p_1X_t + p_2A_0 + p_3 M_0 = Yn,$ [v]

And the transversality condition holds.

With applying the rational expectation theory; $E(R_t) = R_t + \varepsilon_t$, where ε_t is an error term and it can represent the uncertainty level of nominal foreign exchange-rate movements. Different assumptions on ε_t could be applied here. For example ε_t could be a pure temporary shock and, then, the uncertainty is a white noise, *or* a pure permanent shock and, then, the uncertainty is a geometric Brownian motion.

Thus, $P_t = P^*. E(R_t) - \varepsilon_t$, $X_t = Q_X^0 .P^*. E(R_t) - \varepsilon_t$, and Q_X^0 is determined by a determined quota and P^* is constant to the economy due to the smallness assumption, then,

$X_t = (\delta.E(R_t) - C(X)_0) - \varepsilon_t$, where $\delta = Q_X.P^*$.

Thus, the optimal foreign exchange rate is determined by the following maximization:

$$Max: \pi_{Xt} = \int_0^\infty e^{-it} [(\delta.E(R_t) - C(X)_0) - \varepsilon_t].dt, \qquad (3)$$

Subject to:

$(Y^*-Yn) = p_1 d((\delta.E(R_t) - C(X)_0) - \varepsilon_t)/dt + p_2 dA_0/dt + p_3\, d(M/P)_0/dt = 0$, *and the transversality condition holds.*

Where, *d* denotes to the change over time. At the full employment level of *Y*, the change of the fiscal and monetary policies equal zero, then the above problem becomes:

$$Max: \pi_{Xt} = \int_0^\infty e^{-it} [(\delta.E(R_t) - C(X)_0) - \varepsilon_t].dt, \qquad (4)$$

Subject to:

$dE(R_t)/dt = (1/\beta)(d\varepsilon_t/dt)$, [vi] *and the transversality condition holds.*

Where $dE(R_t)/dt$ is the movement of the expected nominal foreign exchange rate over time, β equals $(1/\delta p_1)$, and $(1/\beta)<0$. Over time and with the large return to scale, the sunk cost of oil export production is assumed to be zero, and by substituting the constraint into the objective function, the above problem can be taken the following form:

$$Max: \pi_{Xt} = \int_0^\infty e^{-it} [(\delta.E(R_{t+1}) - (1- (\delta/\beta))\varepsilon_t - (\delta/\beta)\varepsilon_{t+1}].dt, \qquad (5)$$

According to the above objective function, the maximization of the oil export revenues can happen at the maximum expected foreign exchange rate at a specific level of volatility or when uncertainty is minimized at a specific expected foreign exchange rate.

The GCC common currency can then be estimated under different elected exchange-rate regimes in order to determine its potential value, while the lowest possible uncertainty level can be assessed by a moving-average test for each selected exchange-rate regime.

Common Currency and Stochastic Convergence Test

In this section, the calculation of the GCC potential common currency depends on the SDR weights criterion adopted by the IMF which is function of the foreign trade proportion of each GCC state to the total foreign trade of all GCC states. Another weighted criterion has been adopted in this section which depends on the GDP proportion of each state to the total GDP of all GCC members. The notation used for the first and second weighted criteria are Ω_1 and Ω_2, respectively. Table 1 illustrates both weighted criteria:

Table 1:
Weighted criteria Ω_1& Ω_2.

	Bahrain	Oman	Saudi Arabia	Qatar	UAE	Kuwait
$\boldsymbol{\Omega_1}$	0.005686	0.006504	0.614780	0.051225	0.308910	0.012895
$\boldsymbol{\Omega_2}$	0.002761	0.006660	0.715385	0.051316	0.212863	0.011016

Notes: Annual data are from 1981 to 2009 and taken from IMF, *International Financial Statistics Yearbook*
(2009). The mean is calculated for all weights.

It is obvious from Table 1 that both weights are very close to each other. The potential GCC common currency can then be calculated as:

$$GCC\ common\ currency\ foreign\ exchange\ rate = [(\Omega_{1Bahrain} * \mu_{R\ Bahrain}) + (\Omega_{1Oman} * \mu_{R\ Oman}) + (\Omega_{1Saudi} * \mu_{R\ Saudi}) + (\Omega_{1Qatar} * \mu_{R\ Qatar}) + (\Omega_{1UAE} * \mu_{R\ UAE}) + (\Omega_{1Kuwait} * \mu_{R\ Kuwait})]/6.$$ Or,

$$GCC\ common\ currency\ foreign\ exchange\ rate = [(\Omega_{2Bahrain} * \mu_{R\ Bahrain}) + (\Omega_{2Oman} * \mu_{R\ Oman}) + (\Omega_{2Saudi} * \mu_{R\ Saudi}) + (\Omega_{2Qatar} * \mu_{R\ Qatar}) + (\Omega_{2UAE} * \mu_{R\ UAE}) + (\Omega_{2Kuwait} * \mu_{R\ Kuwait})]/6. \quad (6)$$

Where, μ_R is the mean of the foreign exchange rate. The determination of the potential common GCC currency can be determined by assuming three suggested potential foreign exchange-rate regimes:[vii] a peg to the Dollar (the existing foreign exchange-rate regime), a peg to a Dollar-Euro Basket (55% for the US dollar & 45% for the Euro),[viii] and a peg to the SDR basket.[ix] Table 2 shows the GCC potential common currency under those suggested regimes.

Table 2:
The calculation of the GCC potential common currency under the suggested regimes:

The value of the potential GCC common currency	Under the peg to the Dollar	Under the peg to the Dollar-Euro basket	Under the peg to the SDR
With Ω_1	0.270133816	0.286861485	0.235169
With Ω_2	0.269259455	0.288894853	0.226067

Notes:

- *The Dollar-Euro baskets are calculated according to the 55% Dollar – 45% Euro weights. View IMF SDR's weights.*
- *All calculations depend on quarterly data from 2001:Q1 to 2009:Q1: IMF: International Financial Statistics Yearbook (2009)*

Table 2 shows that the smallest value of the potential GCC common currency is determined under the peg to the SDR regime.[x] Now, we perform convergence test amongst the GCC member states with respect to the foreign exchange rates, under the three suggested regimes. The methodology used here stems from Bernard and Dulauf (1995)'s long-run convergence test.[xi] According to them, stochastic convergence exists if,

$$\lim_{t\to\infty} (x_{it} - x_t) = \vartheta_i, \qquad (7)$$

where x is the variable that we test its convergence, i is the 1st, the 2nd, the 3rd, the 4th, the 5th, and the 6th GCC state, t is the time, ϑ_i are finite parameters, and

$\bar{x}_t = N^{-1} \sum_{i=1}^{6} x_{i,}$ $\bar{x}_t$ is the benchmark economy. (8)

According to Carrion-i-Silvestre & German-Soto (2008), "stochastic convergence happens when x_t in one economy relative to the benchmark economy is stationary, and hence stochastic convergence implies that differences in economies are not persistent." In other words, differences series cannot contain unit roots or time trends and should be a zero-mean stationary process. Philips-Perron test is used here to test for stationarity.

$$d(x_{i,t})^* = C_i + \vartheta i\, x^*_{i,t-1} + \sum_{k=1}^{p} \eta_{i,k}\, dx^{*i}_{,t-k} + \varepsilon_{i,t}, \qquad (9)$$

where x^* is the difference between x and the benchmark economy $x\,par$, C_i is the deterministic parameter, and $\varepsilon_{i,t}$ is independently distributed across i and t, $i = 1,2,3,4,5,6$, $t = 1,\ldots, T$. [xii]

Table 3 shows the stochastic convergence to the potential common currency under various selected exchange rate regimes. A weighted average illustrated in Table 2 is used instead of a simple average as a benchmark common exchange rate. Here, the movement of the foreign exchange rate of each currency is compared to the weighted average common exchange rate under the 3-elected exchange rate regimes.

Table 3:
The stochastic convergence test under suggested exchange rate regimes

	$\vartheta_{Bahrain}$	ϑ_{Oman}	$\vartheta_{Saudi\ Arabia}$	ϑ_{Qatar}	ϑ_{UAE}	ϑ_{Kuwait}
Under the peg to the dollar ϑ_1	-4.629849 (0.0052)**	-4.629849 (0.0052)**	-4.629849 (0.0052)**	-4.629849 (0.0052)**	-4.629849 (0.0052)**	-4.773364 (0.0037)**
Under the peg to the dollar/Euro basket ϑ_2	-4.645829 (0.0050)**	-4.645829 (0.0050)**	-4.645829 (0.0050)**	-4.645829 (0.0050)**	-4.645829 (0.0050)**	-4.788643 (0.0036)**
Under the peg to the SDR ϑ_3	-14.11568 (0.0000)**	-7.123913 (0.0000)**	-4.115254 (0.0152)**	-4.426047 (0.0074)**	-3.466830 (0.0615)*	-3.803135 (0.0304)**

Notes:
First numbers are the adj. t-stat. The numbers within parentheses are p-values. (**) and (*) mean significant at 5% and 10% levels, respectively. Quarterly data (2001-Q3 to 2009-Q1) are from IMF: *The International Financial Statistics Yearbook.*

It is obvious from Table 3 that all selected exchange-rate regimes show evidence of stochastic convergence to the GCC potential common currency under those suggested exchange-rate regimes. Furthermore, we perform a moving-average test for each suggested exchange rate regime. Table 4 shows the results of the moving-average test for each selected exchange-rate regime:

Table 4:
Moving-Average Test Under Selected Foreign Exchange Rates

	The peg to the dollar	The peg to the dollar/Euro basket	The peg to the SDR
Correlogram Test (Q-stat. 16 lags)	No evidence	Shows slight evidence at upper lags	No evidence
MA test	No evidence	Shows evidence of moving average	No evidence

Notes:
Method used for MA test is: ML–ARCH. Residual test for best fit-moving-average tests shows no autocorrelation in any cases. The variance equation used for this method is: $GARCH_t = C_2 + C_3\ Residual_{(t-1)}^2 + C_4 GARCH_{(t-1)}$, Where C_2, C_3, and C_4 are constants.
Philips-Perron test shows that series in the three cases are stationary.

According to Table 4, the best fit-moving-average tests for the three suggested foreign exchange rate regimes are in the favor of both the peg to the Dollar and the peg to the SDR. The peg to the Dollar/Euro basket is failed to minimize the uncertainty of its movement over time. As a result, the peg to the Dollar/Euro basket is not the optimum regime for the GCC member states. Thus, both the peg to the Dollar and the peg to the SDR succeeded to minimize the uncertainty of the movement over time. As Table 2 shows the foreign exchange rate of the potential common currency is the highest under the peg to the SDR regime, hence the peg to the SDR basket is nominated to be the optimum exchange rate-regime for the GCC.

As we discussed earlier, we have to assure that the optimal exchange-rate regime satisfies internal and external balances. To insure this, we use the best fit regression models that relate the GCC's average growth rate to the US's growth rate. Table 5 shows that the GCC's average economic growth rate is significantly related to the US economic growth rate at 0.0000 *p-value*, while this significant relationship is broken under the peg to the SDR regime which creates more independency to the GCC member states.

Table 5:
Best fit-regression model on US economic growth rates:

	(GCC growth rate) Under the peg to the dollar	(GCC growth rate) Under the peg to the SDR
USA growth rate	1.163855 (0.0000)**	1.978869 (0.2325)

Notes:
Annual data (1982- 2006) are taken from IMF: International Financial Statistics Yearbook (2009).
Economic growth rate = ln(per capita GDP$_t$) – ln(Per capita real GDP$_{t-1}$)[xiii]
Method used for the regression: ML-ARCH for both regressions. [xiv]

On the other hand, Table 6 illustrates the evidence of possible stochastic convergence between the growth of each GCC member state denominated by each GCC member state's local currency and the average growth of the GCC denominated by the common GCC currency under both the peg to the Dollar and the peg to the SDR regimes as a benchmark common economy. This examines the ability of each regime in creating an internal balance amongst the GCC states.

Table 6:
The Stochastic Convergence Test Under The Peg To The Dollar And The Peg To The Sdr

	$\lambda_{Bahrain}$	λ_{Oman}	$\lambda_{Saudi\ Arabia}$	λ_{Qatar}	λ_{UAE}	λ_{Kuwait}
Under the peg to the dollar (λ_1)	-3.909739 (0.0269)**	-3.501636 (0.0610)*	-5.491812 (0.0008)**	-3.790746 (0.0343)**	-3.916639 (0.0265)**	-4.458137 (0.0083)**
Under the peg to the SDR (λ_2)	-4.491203 (0.0077)**	-4.168270 (0.0156)**	-3.474600 (0.0642)*	-3.546558 (0.0559)*	-4.590980 (0.0062)**	-4.175625 (0.0154)**

Notes:
Variable 1 (λ_1): (Economic growth rate of each state denominated by the local currency – the GCC's average economic growth rate denominated by the dollar)
Variable 2 (λ_2): (Economic growth rate of each state denominated by the local currency – the GCC's average economic growth rate denominated by the SDR) – Annual data: 1982 – 2006, IMF: IFS (2009).[xv]

Table 6 shows stochastic convergence in all GCC states under both regimes. Because of the lack of observations during the period of the analysis (2001 – 2006), a panel unit root test was applied for the period 2001-2006 and the test results show an evidence of stochastic convergence amongst the GCC states under both regimes which implies that all GCC states can adopt the SDR as an optimum exchange-rate regime.[xvi]

Thus, the peg to the SDR is succeeded to achieve all theoretical and empirical tests in this paper which can claim that UAE should switch to the peg to the SDR basket. If also all GCC states look for a common regime, the SDR is the plausible optimum regime that maintains both the external independency and the internal balances. In addition, it gives higher oil values denominated by the common GCC currency under the peg to the SDR rather than under the peg to the Dollar. [xvii]

Conclusion

The paper considers different views of exchange rate regime choice and investigates theoretically and empirically the feasibility of a potential monetary union among the six members of the Gulf Cooperation Council- the United Arab Emirates, the State of Bahrain, the Kingdom of Saudi Arabia, the Sultanate of Oman, the State of Qatar, and the State of Kuwait. The theoretical model indicates that the optimum foreign exchange-rate regime needs to maximize oil revenues under the assumptions of internal and external balances. This occurs at the possible maximum expected foreign exchange rate or at the minimal level of uncertainty and volatility in foreign exchange-rate markets. Our estimations show that the proposed monetary union is likely to yield economic benefits for the GCC countries if they adopt a foreign exchange-rate regime pegged to SDR.

---

[i] Tavlas et al. (2005) and Dellas and Tavlas (2009) survey the literature on the performance of alternative exchange rate-regimes.

[ii] Assumptions on oil exports have been taken from Cherkaoui & Jalaili-Naini (2002).

[iii] This is a strong assumption in the model. The model considers all oil revenues go to the government's budget as its main revenues.

[i] $k_1 = h(1-c)/[h(1-c+m)+kb]$, $k_2=1/[h(1-c+m)+kb]$, $k_3=b/[h(1-c+m)+kb]$.

[v] $p_1 = -c[h/(h+bk)]$, $p_2 = h/[(1-c)(h+bk)]$, $p_3 = [b/(h+bk)]$.

This is an ARMA series and it could be written as: $R_t = R_{t+1} + (1/\beta)(\varepsilon_t - \varepsilon_{t+1})$. [vi]

[vii] Both the free floating and the peg to export oil prices regimes are turned out from the analysis because of their infeasibility in terms of the current status of the GCC monetary authority and variability of oil prices.

[viii] The basket weight depends on the IMF SDR weight with giving 11% more for the Euro and 11% more for the Dollar in the suggested Euro-Dollar basket so the weight of the suggested basket is 55% for US Dollar and 45% for the Euro.

[ix] "With effect from January 1, 2006, the IMF has determined that the four currencies that meet both selection criteria for inclusion in the SDR valuation basket will be assigned the following weights based on their roles in international trade and finance: U.S. dollar (44 percent), euro (34 percent), Japanese yen (11 percent), and pound sterling (11 percent)." IMF Completes Review of SDR Valuation:
http://www.imf.org/external/np/sec/pr/2005/pr05265.htm

[x] View equation 6. Thus, the peg to the SDR satisfies the first term of the right hand side of the equation. The calibrated potential common currency in average does not appear to differ significantly across the different elected foreign exchange rate regimes, however, the criterion of selection we carry here is the criterion of the smallness of the value of the local currency.

[xi] See Carrion-i-Silvestre and German-Soto (2008).

[xii] Ibid.

[xiii] GDP deflator series for UAE is not available in the same report. In order to maintain consistency in the data, a convergence test for many macroeconomic variables found that the convergence is most likely to happen amongst UAE, Saudi Arabia, and Qatar so the series of the GDP deflator of UAE is calculated by taking the average of both series of GDP deflators of both Saudi Arabia and Qatar.

[xiv] The best fit model of the regression of the GCC average growth rate on the US growth rate controls for AR(1) and the best fit model of the regression of the GCC average growth on the US growth rate controls for ARMA (1,2). Best fit ARMA models take into considerations ARMA models criteria of selection and the satisfaction of the diagnostic checks. Both models control for the period 1982–2001 to overcome the problem of the lack of observations during the period of the analysis (2001-2006)

[xv] Quarterly data are not available.

[xvi] Method used for the panel unit root test: Levin, Lin & Chu t* - Newly-West bandwidth selection using Bartlett Kernel and Modified Schwarz is used for the lag length. Total (balanced) observations: 36

[xvii] The real oil value is discounted by the world SDR interest rate in order to calculate equation (6) in the theoretical model. The result found that the highest possible real value of oil exports can be attained under the peg to the SDR regime for UAE because consistent data were available only for UAE.

References

Abu-Qarn, A., Abu-Bader, S. (2008), On the optimality of a GCC monetary union: Structural VAR, common Trends, and common cycles evidence, *The World Economy* 31 (5), 612-630.

Aghion, P., Bacchetta, P., Banerjee, A.(2004), A corporate balance-sheet approach to currency crises, *Journal of Economic Theory* 119, 6–30.

Bernard, A., Durlauf, S. N. (1995), Convergence of international output movements, *Journal of Applied Econometrics 1*0, 97-108.

Buiter, W. (2008), Economic, political, and institutional prerequisites for monetary union among the members of the Gulf cooperation council, *Open Economies Review* 19, 579–612.

Calvo, G., Reinhart, C. (2002), Fear of floating, *Quarterly Journal of Economics* 117 (2), 379–408.

Canzoneri, M., Cumby, R., Diba, B. (2005), The need for international policy coordination: What' old, what's new, what is yet to come? *Journal of International Economics* 66 (2), 363-384.

Carrion-i-Silvestre, J. and German–Soto, V. (2008), Panel data stochastic convergence analysis of the Mexican regions: Research Institute of Applied Economics, WP: 2008/ 05, University of Barcelona.

Cherkaoui, M., Jalali-Naini, A. (2002), Trade liberalization, real exchange rate, and export diversification in selected North African Economies, Economic Development, Technological Change: Economic Diversification in the Arab World: Arab Planning Institute (API).

Corsetti, G., Pesenti, P (2005), International dimensions of optimal monetary policy, *Journal of Monetary Economics* 52 (2), 281–305.

Dar, H. A., Presley, J.R. (2001), The Gulf co-operation council: A slow path to integration*? World Economy* 24, 1161-1178.

Darrat, A., Al Shamsi, F. (2005), On the path of integration in the Gulf region, *Applied Economics* 37, 1055-1062.

Dellas, H. (2006), Monetary policy in open economies, *European Economic Review* 50 (6), 1471–1486.

Dellas, H., Tavlas, G.S. (2005a), Mixed exchange rate systems. *Journal of International Money and Finance* 24 (2), 243–245.

Dellas, H., Tavlas, G.S. (2005b), Wage rigidity and monetary union, *Economic Journal* 115 (506), 907–927.

Dellas, H., Tavlas, G.S. (2009), An optimum-currency-area odyssey, *Journal of International Money and Finance,* 28, 1117-1137.

Devereux, M., Engel, C. (2003), Monetary policy in the open economy revisited: price setting and exchange-rate flexibility, *Review of Economic Studies* 70 (4), 765–783.

Eichengreen, B. (2001), Capital account liberalization: what do the cross-country studies tell us? *The World Bank Economic Review* 15, 341–365.

Eichengreen, B., Hausmann, R. (1999), Exchange rates and financial fragility, NBER Working Paper No.7418.

Fasano, U., Schaechter, A. (2003), Monetary union among member countries of the Gulf cooperation council, IMF Occasional Papers 223.

Hausmann, R., Panizza, U., Stein, E. (2001), Why do countries float the way they float?, *Journal of Development Economics* 66, 387–414.

Hebous, S. (2006), On the monetary union of the Gulf states, Working Paper 431 (Kiel Institute for the World Economy).

Hoffmann, M. (2007), Fixed versus flexible exchange rates: Evidence from developing countries, *Economica*, 74, 425-449.

IMF (2009), The GCC monetary union: The choice of exchange rate regime: WP: 09-1.

Jadresic, E. (2002), On a common currency for the GCC countries. IMF Policy Discussion

Papers 02/12.
McKinnon, R.I. (1963), Optimum currency areas, *American Economic Review* 53, 717-725.
Meese, R. and Rogoff, k. (1983), Empirical exchange rate models of the seventies: Do they fit out of sample? *Journal of International Economics* 14, 3-14.
Mundell, R. (1961), A theory of optimum currency areas, *American Economic Review* 51, 657-665.
Obstfeld, M., Rogoff, K. (1995), Exchange rate dynamics redux, *Journal of Political Economy* 103 (3), 624–660.
Obstfeld, M., Rogoff, K. (2000), New directions for stochastic open economy models, *Journal of International Economics* 50 (1), 117–153.
Pappa, E. (2004), Do the ECB and the Fed really need to cooperate? Optimal monetary policy in a two-country world*, Journal of Monetary Economics* 51 (4), 753–779.
Rutledge E. (2008), Monetary union in the Gulf: Prospects for a single currency in the Arabian peninsula, London: Routledge.
Stockman, A., Ohanian, L. (1997), Short run independence of monetary policy under pegged exchange rates and the effects of money on exchange rates and interest rates, *Journal of Money, Credit and Banking* 29 (4), 780–806.
Takayasu, M. et al (2006), Temporal characteristics of moving average of foreign exchange markets, Practical Fruits of Econophysics, Japan: Springer Tokyo, 29-32.
Tavlas, G.S. (1993), The 'new' theory of optimum currency areas, *The World Economy* 16, 537–554.
Tavlas, G.S., Dellas, H., Stockman, A. (2008), The classification and performance of alternative exchange-rate systems, *European Economic Review* 52, 941–963.
Velasco, A., Neut, A. (2004), Tough policies, incredible policies? Harvard University, Technical Report, Mimeo.
Zaidi, I. (1990), Monetary coordination among the Gulf cooperation council countries*, World Development* 18, 759-768.