Monetary Union in the GCC: A Preliminary Analysis

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Tarek Coury is Assistant Professor of Public Policy at the Dubai School of Government and Research Associate at the John F. Kennedy School of Government, Harvard University. Part of this work was done while I was a faculty in the Economics Department, Oxford University and visiting scholar at the Harvard Kennedy School, all of whose support is acknowledged. In addition, I would like to thank the Centre for International Governance and Innovation (CIGI), Prof. Ngaire Woods of the Oxford Global Economic Governance and the Dubai School of Government for financial support.

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Comments are welcome and should be sent to tarek.coury@dsge.com. This paper is meant as an overview of the topic and serves as an extended introduction to a more formal analysis, to be made available at a later date. The paper has benefited in its early stages from useful comments by Christopher Bowdler, Domenico Lombardi and John Thanassoulis. We have also benefited from comments by participants at a Centre for International Governance and Innovation conference and a seminar at the Kennedy School, Harvard University. In addition, we wish to thank an anonymous referee for comments on a later draft. The usual disclaimer applies.

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Abstract: States comprising the Gulf Cooperation Council have expressed an intent to form a monetary union in 2010. The planned union follows a policy of intraregional economic and financial integration and was formulated shortly after the creation of the GCC in 1981. This paper studies conditions under which a common currency should be adopted and whether the Gulf States meet these conditions. We employ annual GDP and inflation data for the period 1980-2006. The analysis reveals little business cycle synchronization among constituent states, despite highly correlated natural resource-driven exports; suggesting little economic rationale for a monetary union. Additionally, business cycles of Gulf States show little correlation with the business cycle of the United States; this in turn suggests that a monetary union whose common currency is pegged to the US dollar is likely to perpetuate current inflation volatility and may exacerbate it. The lack of synchronization signals that particular care in resolving economic asymmetries through agreed-upon structural adjustments and proper institutional design of a common central bank is necessary to achieve a viable common currency. Implementation of these changes may require Gulf states to revisit the timing of the currency union.

Keywords: monetary union, GCC, Gulf Cooperation Council, Gulf States, Oil.

JEL Codes: F15, F33, F42, F55, F59
1 Introduction

Gulf Cooperation Council (GCC) states have expressed an intent to form a monetary union in 2010. The timing and arrangement of the union are a matter of ongoing debate and have not been settled at this point. It is believed that, should the Gulf States form the monetary union, the common currency would be pegged to the US dollar. The long term view has it that the currency peg would eventually be dropped in order to gain greater monetary autonomy.

The planned monetary union follows a policy of intraregional economic and financial integration and was formulated shortly after the creation of the GCC in 1981. The Unified Economic Agreement Between the Countries of the Gulf Cooperation Council, signed in 1982 [12], calls for closer cooperation and coordination on a number of issues, including financial and monetary cooperation. Article 22 states that “Member States shall seek to coordinate their financial, monetary and banking policies and enhance cooperation between monetary agencies and central banks, including the endeavour to establish a joint currency in order to further their desired economic integration.”

The Gulf States have since followed through on some aspects of this commitment for greater integration; Muhammed Al-Jasser and Abdulrahman Al-Hamidy [1] summarize these steps in a 2003 note: “[the GCC] have made the movement of national goods, labour and capital across their borders completely free. Also, they have adopted a common tariff and harmonised their customs administration and procedures. They have instituted steps to resolve cross-border trade disputes and agreed to accord national treatment for tax to each other’s individuals and corporations. They have liberalised land ownership for each other’s nationals, both for building a second home and for business purposes.”

This paper sheds light on the economic rationale for a common currency for the GCC. We consider a number of economic criteria that we expect would make for a viable monetary union. First, we consider whether business cycles are broadly synchronized across the Gulf States. Using aggregate output data dating back to 1980, we find that the constituent economies of the Gulf States have business cycles that do not comove, with some exceptions. The business cycle component is extracted from aggregate output data using a common numerical technique. With some exceptions, we also find that inflation rates, as measured by the consumer price index of individual states, also do not comove. Analysis of these data indicate little business cycle synchronization across the Gulf States. A common monetary policy may therefore have conflicting effects in terms of inflation performance across constituent economies.

Second, we find little comovement of business cycle components of the Gulf States with the United States, and no comovement of inflation between the Gulf States and the US. This evidence is consistent with little economic synchronization of Gulf States with the US and confirms the view that a currency peg to the US dollar is not a first best outcome.

The feasibility of a common currency rests on a number of elements, including business cycle synchronization and the choice of a monetary regime. Other elements,

1The GCC comprises Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.
such as structural adjustments to be made in preparation of a monetary union along with institutional adjustments, are equally important. In fact, this paper argues that particular attention should be paid to proper institutional design in light of a lack of business cycle and inflation synchronization among Gulf States.

There is a vast literature in economics on the criteria necessary for a successful monetary union, beginning with the work of Robert Mundell [20] who discusses the useful role factor mobility can play in reducing the effects of disturbances in a monetary union. The work of Ronald McKinnon [19] argues that because gains from a monetary union stem from a reduction in exchange rate variability, more open economies are more likely to benefit from such an arrangement. Peter Kenen [17] argues that the effects of shocks on constituent economies in a union is likely to be smaller if these economies are diversified, and proposes diversification as one criterion for the viability of a proposed monetary union. More recently, a paper by Tamim Bayoumi and Barry Eichengreen [7] emphasize the importance of similar economic disturbances to a group of countries as a criterion for the viability of a common currency and apply their analysis to countries in Europe, Asia and the Americas. In policy practice, the Treaty Establishing the European Community emphasizes the importance of harmonized government budget deficits in ensuring more synchronized business cycles; HM Treasury emphasizes the role of business cycle synchronization in its criteria for joining the Economic and Monetary Union (EMU).

Summary statistics on Gulf States may be found in a recent paper by Michael Sturm et al. [24]. An up-to-date literature review on the optimality of a currency union among GCC states may be found in a recent paper by Abu-Qarn and Abu-Bader [2]. They analyze the optimality of a GCC monetary union and find that GCC states are currently not ready to form a lasting and successful currency union. Recent papers by Esteban Jadresic [16] and Fasano et al. [10] emphasize the importance of structural adjustments and policy coordination, among other things, as necessary criteria for a successful common currency.

The paper is organized as follows. In section 2, we briefly discuss the economic rationale for a currency union with a focus on differentiating features of the Gulf States. In section 3, we analyze aggregate data of the Gulf States and discuss our results with a view to shedding light on the adequacy of a monetary union. Section 4 concludes.

2 Determinants of an Optimal Currency Union

The first criterion we posit for the monetary union is that the constituent economies of the GCC states should be synchronized. By this we mean that business cycles

\[ \text{2} \text{Title VII of the Treaty establishes the broad guidelines. The document is online at http://europa.eu/eur-lex/en/treaties/selected/livre204.html} \]

\[ \text{3} \text{See the document by HM Treasury [13].} \]

\[ \text{4} \text{The identification scheme employed (Blanchard and Quah [6]) does not capture the following important features of a small open economy: demand-side shocks affect medium-run output through the competitiveness of the economy; also, the exchange rate regime plays an important role in the short-run in determining output and subsequent medium-term inflation paths.} \]
across the GCC should comove, as should the rates of inflation. We adopt the Consumer Price Index (CPI) as our preferred measure of inflation instead of GDP deflator-measured inflation. This is because CPI inflation does not reflect price changes in exports of natural resources as much as the GDP deflator measure. It is therefore a somewhat closer measure of the relevant rate of inflation for the private sector operating in the Gulf States.⁵

With the exception of Kuwait, all Gulf States peg their currency to the US dollar.⁶ Kuwait pegs its currency against a basket of currencies. The GCC states fit the profile of small open economies facing at least three symmetric shocks. The first is the implied monetary expansion due to the recent fall in the intended Federal Funds Rate in the United States. The second is the increased competitiveness due to the fall of the US dollar against the Euro and the British Pound (despite recent gains). The third is a common demand-side shock due to natural-resource driven exports.

The first criterion ensures that the business cycles of the Gulf States move in the same direction when their constituent economies are subject to these symmetric shocks. If this criterion is met, the Mundell-Fleming-Dornbusch model,⁷ the standard open economy model, predicts that a countercyclical monetary policy would have similar welfare-enhancing effects in the short-run. As we shall see in the following section, business cycles do not comove among Gulf States, with some exceptions. This may be either because they are subject to additional asymmetric shocks to their economies, or their fiscal responses to these symmetric shocks are asymmetric. Alternatively, it may be that constituent economies are asymmetrically diversified.⁸ In both cases, a common monetary policy is likely to have welfare-reducing effects among at least some Gulf States.

The open economy model also predicts that symmetric demand-side shocks across small open economies with fixed exchange rates cause medium-run inflationary pressures. It also predicts that symmetric supply-side shocks cause a fall in inflationary pressures in the medium-run. The data however reveal that inflation dynamics are not synchronized across GCC states, with one exception. This is further empirical evidence that the first criterion is not met.

The principle that business cycles should be synchronized for a successful currency union is recognized in both policy circles and academic research. For example, in 1997, the UK government committed to the principle of joining the European Economic and Monetary Union (EMU) contingent on five “economic tests”: convergence, flexibility, investment, financial services, growth stability and employment. The test of

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⁵The relevant measure for inflation-targeting central banks is some measure of CPI. From its inception, the Bank of England has targeted the Retail Prices Index excluding mortgage interest payments (RPIX) and recently switched to targeting the CPI. The European Central Bank targets the Harmonised Index of Consumer Prices (HICP), a common measure of CPI across EMU countries. The Federal Reserve System does not officially target a rate of inflation.

⁶Data on the exchange rate regimes for GCC states can be found on Jay Shambaugh’s website. See paper [23].

⁷The static open economy model was developed by Robert A. Mundell [21] and Marcus J. Fleming [11], and extended to a dynamic setting by Rudiger Dornbusch [9].

⁸The paper by Sturm et al. [24] discusses the extent of diversification across GCC states and finds that Gulf State economies have substantially different degrees of economic diversification.
convergence is formulated in a 1997 Treasury publication [13]: “Are business cycles and economic structures compatible so that we and others could live comfortably with euro interest rates on a permanent basis?”.\(^9\)

A substantial literature has developed around the subject of optimal currency unions. In his seminal work, Robert A. Mundell [20] emphasized the gains to trade in goods, capital and financial markets relative to the loss of monetary autonomy that a currency union requires. In particular, he stressed the importance of minimal asymmetric shocks, a high degree of factor mobility and synchronized fiscal shocks. Recent work by Alberto Alesina and Robert J. Barro [3] claim that a necessary condition for a group of countries to form a monetary union is to have highly correlated business cycles. Their economic model stresses the importance of both relative output and relative price synchronization among constituent countries as a precondition for an optimal currency area.

The second criterion relates to the exchange rate regime currently being discussed for the common currency. It is usually argued that a first step in the monetary union will have the US dollar acting as a nominal anchor. The second criterion therefore considers whether the economies of the GCC states are synchronized with the US economy. The justification for this second criterion is much the same as those already stated: in particular, if the economies of the GCC and the US are synchronized, a countercyclical monetary policy enacted by the United States will have welfare enhancing effects across all economies. The data however reveal that the evidence is consistent with little business cycle synchronization between the GCC and the US, with some exceptions.

This preliminary analysis ignores institutional and political aspects of the current debate on the existence of an optimal currency area (OCA) within the GCC; these important aspects merit a separate treatment that is outside the scope of this paper. On balance however, we believe that institutional and political features particular to the GCC reinforce the notion that a monetary union in the GCC is premature. For example, the much-cited ex-post optimality of the EMU area should not be used as a prima facie case for the acceleration of monetary integration within the GCC, as it ignores important institutional and political differences between the two blocs. Indeed, the current political economy of decision-making within the GCC is very different from the EMU and requires careful scrutiny.\(^10\) The lack of business cycle and inflation synchronization therefore signals that particular care should be taken in resolving economic asymmetries through agreed-upon structural adjustments and through the proper institutional design of a common central bank to achieve a viable common currency.

The main benefit of a common currency, increased intra-GCC trade flows, may be

\(^9\)HM Treasury’s 2003 assessment of UK convergence with the Euro Area states that “we cannot yet be confident that UK business cycles are sufficiently compatible with those of the euro area to allow the UK to live comfortably with euro area interest rates on a permanent basis. Overall, at the present time, while the extent of convergence with the euro area has significantly increased, the convergence test is not met.”

\(^10\)There is a vast theoretical and empirical literature on the importance and difficulty of establishing and maintaining central bank credibility. Seminal works in this literature include a paper by Finn E. Kydland and Edward C. Prescott [18] and another by Robert J. Barro and David B. Gordon[5]. A literature review may be found in Richard Clarida et al [8].
small relative to the cost of losing monetary autonomy. This is because a majority of GCC trade flows are natural resource exports with countries outside the GCC. The situation in the GCC therefore does not mirror the situation of European countries prior to the formation of EMU: the ex-post optimality of EMU is due in part to both structural adjustments that took place as part of the institutional design of the European Central Bank as described in the Maastricht treaty, and to increased intraregional trade flows. If these increased trade flows are due exclusively to the elimination of currency risk, these gains should already be reflected in current GCC trade data as these economies have faced minimal currency risks since the creation of the Council.

Finally, it should be noted that economies in the GCC may have experienced a structural break since the late 1990s as many Gulf States have moved forward with expansionary industrial and fiscal policies with a view to diversifying their economies away from natural resources. As a result, one could argue that these economies are more synchronized now than in the past. The lack of higher frequency data does not however allow us to settle this issue.

3 Analysis of the Data and Discussion

We employ annual real GDP data for the GCC countries and the United States for the period 1980-2006, taken from the IMF World Economic Outlook Database. An eventual GCC monetary union should have constituent economies whose business cycles are broadly aligned. Business cycles are measured by fluctuations of real GDP around its growth rate. In order to extract the business cycle component from GDP data, we employ an HP Filter with an appropriate adjustment of the smoothing parameter to reflect use of annual data. This is done for the GCC and US data.

We now consider whether the evidence is consistent with our first criterion. Table 1 below shows that the business cycles among constituent states do not comove, with two exceptions: the cross-correlations among contemporaneous business cycle components are not positive at a statistically significant level, except for the case of Bahrain and Oman (.4469, significant at 5%), and Kuwait and Qatar (.3833, significant at 5%). However, the contemporaneous business cycle components of Kuwait and

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11 See the paper by Holger Wolf and Tarik Yousef [26] and an earlier paper by Estaban Jadresic [16].
12 Data are available online at http://www.imf.org/external/ns/cs.aspx?id=28. The reader should qualify the analysis in this paper with well-known issues regarding to the quality of aggregate data from Gulf States.
13 See Hodrick and Prescott [14].
14 If $y_t$ is the GDP time-series, the HP filter removes a trend $\tau_t$ by solving the problem

\[
\min_{\tau_t} \sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda ((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2
\]

The component $y_t - \tau_t$ is referred to as the business cycle component. A value for $\lambda$ of 6.25 is chosen, using the adjustment for annual data devised by Morten O. Ravn and Harald Uhlig [22].
15 For completeness, we have included additional tables in appendix A along with relevant graphs in appendix B.
Saudi Arabia move in opposite directions (−.4332, significant at 5%). This means that a countercyclical monetary policy enacted for the benefit of Saudi Arabia is likely to be to the detriment of Kuwait’s economy, and vice-versa.

Table 1 below reports the cross-correlations of business cycle components for the GCC states between current and lagged output. The data reveal a statistically significant positive correlation between current and lagged business cycle components for the economies of Oman and Bahrain (.4039, significant at 5%), Oman and the UAE (.6103, significant at 5%) and Saudi Arabia and the UAE (.3345, significant at 5%). The data also reveal large negative cross-correlations for the economies of Kuwait and the UAE, lagged (−.6803, significant at 5%) and the UAE and Oman, lagged (−.3933, significant at 5%). Given the length of the propagation mechanism of monetary policy, a contractionary policy may have significantly different intertemporal effects on constituent economies and may well further exacerbate aggregate price instability.

Table 2 below reports the cross-correlations of business cycle components for the GCC states between current and lagged output. The data reveal a statistically significant positive correlation between current and lagged business cycle components for the economies of Oman and Bahrain (.4039, significant at 5%), Oman and the UAE (.6103, significant at 5%) and Saudi Arabia and the UAE (.3345, significant at 5%). The data also reveal large negative cross-correlations for the economies of Kuwait and the UAE, lagged (−.6803, significant at 5%) and the UAE and Oman, lagged (−.3933, significant at 5%). Given the length of the propagation mechanism of monetary policy, a contractionary policy may have significantly different intertemporal effects on constituent economies and may well further exacerbate aggregate price instability.

The use of cross-correlations to analyze features of aggregate fluctuations in open economies was pioneered by David K. Backus et al [4]. Their paper analyzes international cross-correlations of aggregate variables in a theoretical open economy model. These results are contrasted to aggregate fluctuations generated in a typical closed economy real business cycle model.

The outside lag of a monetary contraction, as measured by the response it has on output after a monetary shock, is at least 18 months for the US economy. See Walsh [25] for a discussion.
We now consider whether the data is consistent with our second criterion. If the common currency is initially pegged to the US dollar, the monetary union will be welfare-enhancing if the economies of the GCC are broadly synchronized with the economy of the United States. Tables 1 and 2 however reveal that only Kuwait and Qatar have business cycles components that are positively correlated with the United States'. Table 2 shows that the lagged business cycle component of Saudi Arabia's economy is negatively correlated with the business cycle component of the US. As a result, a policy of output and price stability pursued in the United States when the US economy is operating below potential may cause further inflationary pressures in some GCC economies, including its largest constituent economy.¹⁸

### TABLE 3
CROSS-CORRELATIONS OF CONTEMPORANEOUS INFLATION

<table>
<thead>
<tr>
<th></th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Oman</th>
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<th>UAE</th>
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<td>.3787</td>
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<td>.1295</td>
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</table>

1980 – 2006 IMF WEO Data. * is significant at 5%. GDP deflator-induced.

Table 3 reports cross-correlations of inflation, as measured by GDP deflator data for the GCC states and the United States. It shows that contemporaneous inflation across GCC countries is highly positively correlated and statistically significant, with some exceptions. These results are consistent with the medium-run effects of a common aggregate demand shock on prices in small open economies whose currencies are pegged to an anchor. In this case, the shock is likely driven by natural resources exports. The inflationary pressures are causing these economies’ currencies to appreciate in real terms.

### TABLE 4
CROSS-CORRELATIONS OF CONTEMPORANEOUS CPI

<table>
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<tr>
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<th>Bahrain</th>
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<td>UAE</td>
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<td>USA</td>
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<td>.0091</td>
<td>.2500</td>
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<td>−.0129</td>
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</table>

1980 – 2006 IMF WEO Data. * is significant at 5%. Average CPI over one year.

¹⁸The Federal Reserve System has cut the intended federal funds rate from 4.75% in September 2007 to 1.5% in October 2008. These interest rate cuts act like a monetary expansion across GCC States whose currency is pegged to the US dollar.
Table 4 reports cross-correlations of inflation, as measured by yearly averages of Consumer Price Indices for the GCC and for the United States. It reveals that inflation dynamics across GCC states are not broadly synchronized, with the exception of inflation rates in Kuwait and Oman. It also reveals that inflation in Kuwait and the UAE are negatively correlated. The results in table 4 are in stark contrast with the results in table 3. GDP deflator-induced inflation data includes inflationary pressures in all sectors of the economy, including natural resources exports, which account for a significant proportion of output among almost all GCC states. CPI data on the other hand is meant to measure the price of a basket of goods for a typical consumer. The latter measure removes inflationary pressures associated with natural resources exports and is a closer measure of the relevant inflation rate for the private sector.

This section has shown that Gulf States are not synchronized in the way their business cycles and inflation rates respond to shocks. This is problematic as common monetary policy is likely to be welfare-reducing, at least for some constituent states. As previously mentioned, it is likely that the response to symmetric shocks (like natural resources-driven exports) is asymmetric: indeed, this is plausible as Gulf States have pursued different fiscal and industrial policies in recent years; these business cycles asymmetries may also stem in part from asymmetric economic diversification. This result therefore suggests at least one structural adjustment that may be necessary for a successful monetary union: an alignment of fiscal spending across Gulf States may take different forms, but one possible solution may involve limits on spending as a percentage of domestic output. Such an arrangement has been adopted inside EMU. As the example of the European monetary union has shown, an institutional arrangement ensuring that such fiscal limits are met is difficult to achieve.\(^{19}\)

4 Concluding Comments

An analysis of inflation data and the business cycle components of aggregate output for the Gulf States reveals that the evidence is consistent with little business cycle synchronization among constituent states, despite highly correlated natural resource-driven exports; this suggests little current economic rationale for a monetary union. In addition, business cycle components of Gulf States show little correlation with the business cycle component of the United States; this in turn suggests that a monetary union whose common currency is pegged to the US dollar is likely to maintain and possibly exacerbate inflation volatility in the Gulf States.

There are some exceptions to this analysis: we find a statistically significant positive correlation between business cycle components of Bahrain and Oman, and the business cycle components of Kuwait and Qatar. More concerning is the finding that

\(^{19}\)The Stability and Growth Pact states that budget deficits should not exceed 3% of output and that government debt should not exceed 60% of output. It also promises sanctions when constituent countries do not comply. Yet, no sanctions were applied to France and Germany when they failed to meet them. The criteria allow some room for “convergence” of fiscal spending, and are spelled out in articles 98-104 of the Treaty Establishing the European Community. They are available online at http://europa.eu/eur-lex/en/treaties/selected/livre223.html#anArt6
Kuwait and Saudi Arabia’s business cycles countermove (the correlation of their business cycle component is $-0.4332$ and is significant at 5%). These results are consistent with the claim that business cycles across these economies are not broadly aligned. We also find that there is no statistically significant positive correlation between the contemporaneous components of GCC business cycles and the US business cycle with the exception of Kuwait and Qatar. We also find that Saudi Arabia’s lagged business cycle is negatively correlated with the US business cycle at a statistically significant level.

In October of 2007, the Managing Director of the International Monetary Fund [15] announced that “although some important differences have emerged in members’ positions on the progress toward the monetary union, there is considerable momentum among the members to form the union. Deep political commitments provide the necessary environment to pursue an accelerated implementation of the remaining steps, including a formal agreement on the convergence criteria, establishment of a common market and customs union by 2008, and putting in place the necessary institutional framework and infrastructure.”

This analysis however reveals that the economic rationale for a monetary integration is unclear and has the potential of seriously exacerbating current inflationary trends and inflation volatility. We therefore believe that constituent governments should consider revisiting the time horizon for the implementation a monetary union and continue structural adjustments and institutional development necessary for the viability of a common currency.
## 5 Appendix A

### TABLE 5
**CROSS-CORRELATIONS OF CONTEMPORANEOUS TREND COMPONENTS**

<table>
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<td>.9858*</td>
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<td>USA</td>
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<td>.8219*</td>
<td>.9850*</td>
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</table>

1980 – 2006 IMF WEO Data. * is significant at 5%

### TABLE 6
**INTERTEMPORAL CROSS-CORRELATIONS OF TREND COMPONENTS**

<table>
<thead>
<tr>
<th></th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Oman</th>
<th>Qatar</th>
<th>KSA</th>
<th>UAE</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain, Lagged</td>
<td>.9996*</td>
<td>.9213*</td>
<td>.9622*</td>
<td>.9271*</td>
<td>.9564*</td>
<td>.9754*</td>
<td>.9835*</td>
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<tr>
<td>Kuwait, Lagged</td>
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<td>.9865*</td>
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<td>.9775*</td>
<td>.8671*</td>
<td>.9088*</td>
<td>.8090*</td>
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<tr>
<td>Oman, Lagged</td>
<td>.9475*</td>
<td>.7808*</td>
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<tr>
<td>Qatar, Lagged</td>
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<td>.9644*</td>
<td>.7578*</td>
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<td>.8775*</td>
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<td>.8265*</td>
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<td>.9235*</td>
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<td>.8118*</td>
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<td>.9866*</td>
<td>.9800*</td>
<td>.8654*</td>
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<tr>
<td>UAE, Lagged</td>
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1980 – 2006 IMF WEO Data. * is significant at 5%
### TABLE 7
INTERTEMPORAL CROSS-CORRELATIONS OF INFLATION

<table>
<thead>
<tr>
<th></th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Oman</th>
<th>Qatar</th>
<th>KSA</th>
<th>UAE</th>
<th>USA</th>
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</thead>
<tbody>
<tr>
<td>Bahrain, Lagged</td>
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<td>-.2065</td>
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<td>Kuwait, Lagged</td>
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1980 – 2006 IMF WEO Data. * is significant at 5%. GDP deflator-induced.

### TABLE 8
INTERTEMPORAL CROSS-CORRELATIONS OF CPI

<table>
<thead>
<tr>
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<th>Bahrain</th>
<th>Kuwait</th>
<th>Oman</th>
<th>Qatar</th>
<th>KSA</th>
<th>UAE</th>
<th>USA</th>
</tr>
</thead>
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<td>.2039</td>
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</tbody>
</table>

1980 – 2006 IMF WEO Data. * is significant at 5%. Average CPI over one year.
6 Appendix B

FIGURES 1 - CYCLE COMPONENT OF GCC STATES VS. THE US

- Bahrain
- United States of America

- Kuwait
- United States of America

- Oman
- United States of America

- Qatar
- United States of America

- Saudi Arabia
- United States of America

- United Arab Emirates
- United States of America
FIGURES 3 - CONSUMER PRICE INDICES OF GCC STATES VS. THE US

Bahrain - United States of America

Kuwait - United States of America

Oman - United States of America

Qatar - United States of America

Saudi Arabia - United States of America

United Arab Emirates - United States of America
FIGURES 4 - CONSUMER PRICE INDICES ACROSS GCC STATES
GDP DEFLATOR-INDUCED (LEFT) AND CPI (RIGHT)

FIGURES 5 - BUSINESS CYCLES ACROSS GCC STATES
References


