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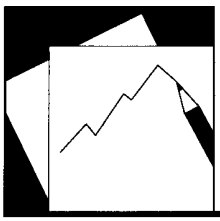

IMF Working Paper

Determinants of Inflation in GCC

Magda Kandil and Hanan Morsy

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Determinants of Inflation in GCC

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Abstract

Inflationary pressures have heightened in the oil-rich Gulf Cooperation Council (GCC) since 2003. This paper studies determinants of inflation in GCC, using an empirical model that includes domestic and external factors. Inflation in major trading partners appears to be the most relevant foreign factor. In addition, oil revenues have reinforced inflationary pressures through growth of credit and aggregate spending. In the short-run, binding capacity constraints also explain higher inflation given increased government spending. Nonetheless, by targeting supply-side bottlenecks, the increase in government spending is easing capacity constraints and will ultimately help to moderate price inflation.

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I. INTRODUCTION

Inflationary pressures have heightened in the oil-rich Gulf Cooperation Council (GCC). Average inflation for the region is estimated to have increased to about 11.5 percent in 2008, a sharp increase compared to an inflation of 6.3 percent in 2007. Price developments have not been uniform across the six GCC countries, with the largest surge in inflation estimated for Saudi Arabia and the lowest for Bahrain.

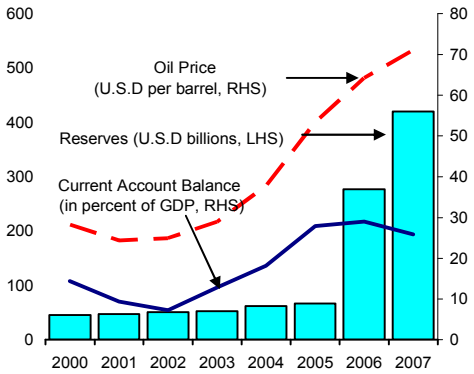
Higher oil revenues and the related spending boom have been linked to the surge of inflation in GCC countries. Member countries, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, have been enjoying a windfall of oil revenues on the back of record crude prices (see Figure 1). While the surge in revenues has boosted economic growth, it has left the countries awash in cash. The increased liquidity resulted in massive expansion in credit and aggregate demand, which faced the structural bottlenecks on the supply side, particularly in real estate.

GCC countries have traditionally pegged domestic currencies to the U.S. dollar. By doing so, GCC countries have sought to insulate oil revenues in the budget from exchange rate volatility. Oil funds have been largely invested in dollar-denominated assets that further reinforced the desire of GCC countries to stabilize the value of their domestic currencies relative to the U.S. dollar. In addition, the peg to the US dollar has boosted confidence and external stability, which are necessary to spur investment and capital inflows. Absent flexibility in the exchange rate, monetary policy becomes largely endogenous where adjustments in the interest rate follow monetary policy in the United States to maintain the currency peg under liberalized capital accounts. Accordingly, monetary policy lacks the flexibility to weather the effects of external shocks which have spilled over on domestic prices. As most GCC countries adjusted interest rates downward in response to monetary easing in the United States, central banks in the region resorted to direct instruments, namely imposing higher required reserves ratios on financial institutions and caps on loans to the private sector, to contain inflationary pressures.

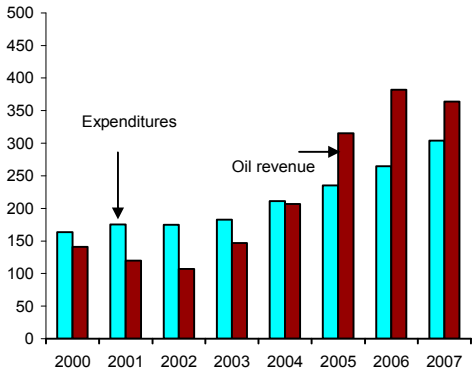
U.S. dollar depreciation may have also contributed to inflationary pressures, raising questions about the sustainability of the peg in GCC. The downward trend in the U.S. dollar implied a depreciation of GCC national currencies relative to other trading partners' currencies, particularly the Euro. As a result, import prices soared in many GCC countries. It is estimated that at least 20 percent of inflation is attributed to the surge in import prices. This led Kuwait to abandon the peg of the dinar to the U.S. dollar in May 2007 and establish a (weighted) peg to a composite of currencies for major trading partners. Speculations mounted regarding the possibility of ending the peg to the U.S. dollar in other GCC countries. More recently, however, inflationary pressures have abated following weakening domestic demand and a significant decline in import prices.

Figure 1

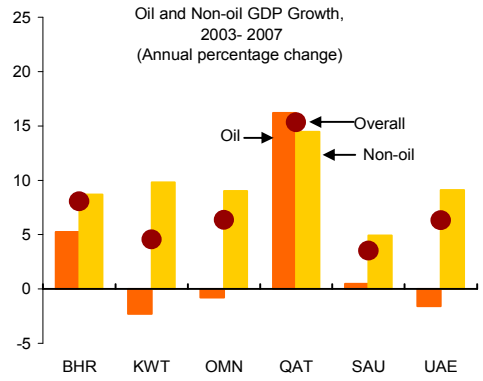
Oil prices have soared in recent years leading to stronger current account position, higher international reserves...



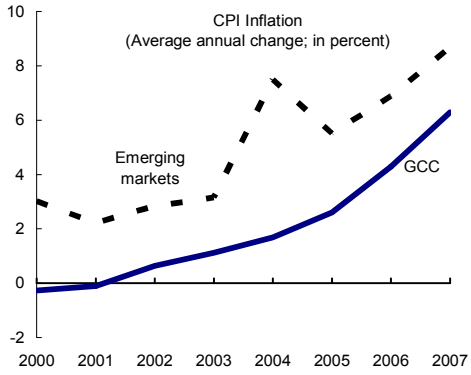
higher oil revenues and government spending...



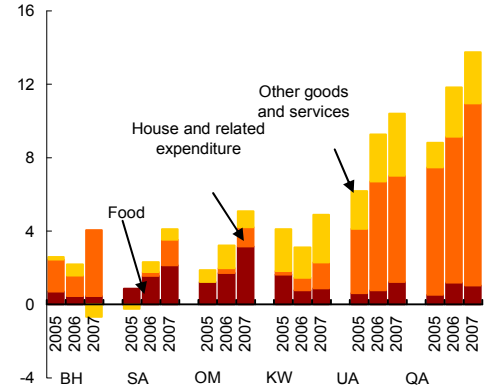
and a significant growth in momentum in GCC



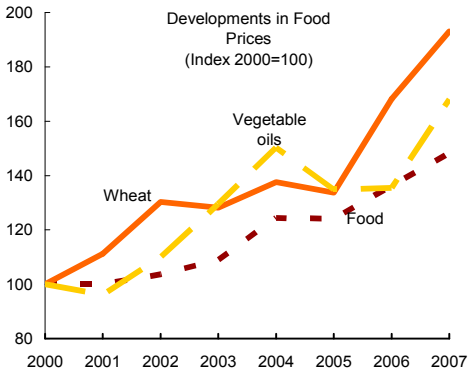
However, the surge in liquidity and aggregate demand has accelerated inflation in GCC.



Rising housing cost, higher food prices and buoyant domestic demand contributed to higher CPI inflation.



The sharp increase in international food prices furter accelerated inflation.



This paper studies the determinants of inflation in GCC countries, using an empirical model that includes domestic and external factors. The sample period for investigation is 1970–2007,[2] providing a long span to differentiate short and long-term factors affecting inflation, against the backdrop of a pegged exchange rate that prevailed in all countries. Higher oil prices increase government revenues, wealth, and domestic liquidity, resulting in demand expansion and inflationary pressures. A corresponding increase in government spending further reinforces the inflationary effects of higher oil price through higher demand for goods and services. GCC countries are also highly dependent on imports of consumption and intermediate goods, and inflation in major trading partners is likely to create additional inflationary pressures. Further, the analysis considers the inflationary pressures of movements in the nominal effective exchange rate, capturing movements in bilateral exchange rates with respect to major trading partners. While the peg fixes the exchange rate with respect to the U.S. dollar, depreciation in bilateral exchange rates, relative to non-dollarized trading partners, is likely to reinforce the increase in the price of imports and price inflation. To isolate the effect of food price inflation, the empirical model includes an index of international food prices. Supply-side bottlenecks are likely to have further pushed inflation in GCC. To capture this channel, the model includes a measure of excess demand, deviation in real GDP relative to potential.

II. LITERATURE REVIEW

The literature on the determinants of inflation considers both demand and supply pressures. Researchers distinguish between supply-side constraints, demand pressures, and spillovers from external factors, as well as the role of second-round effects and entrenched expectations on price adjustments.[3]

[2] The data are from IMF WEO, and IFS databases.

[3] Researchers have employed various techniques to study inflation in various countries. De Brower and Ericsson (1998) model inflation in Australia using a mark-up model. Juselius (1992) investigates spillover effects of German shocks on inflation in Denmark, via interest rate and exchange rate channels. The analysis in Lim and Papi (1997) highlights the role of money and exchange rate in determining inflation in Turkey. Along the same line, Bonato (2007) finds a strong relation between money and inflation in Iran. In addition to common inflationary sources, some studies have zeroed in on country-specific determinants of inflation (see, e.g., Sekine (2001; Japan), Khan and Schimmelpfennig (2006; Pakistan), Diouf (2007; Mali), and Hofmann (2006) concludes that monetary indicators are still useful in predicting euro area inflation out of sample since the start of EMU. Borio and Filardo (2007), in a large cross-section of countries, find that proxies for global economic shock, along with import and oil prices, add considerable explanatory power to traditional benchmark inflation rate equations. Cheung (2009), analyzing seven major industrialized economies, concludes that commodity prices have provided significant signals for inflation since mid-1990s.

Higher inflation in GCC has also attracted research on the sources of underlying pressures. Many studies, however, consider inflation in individual countries, without taking into account regional issues. Moreover, the focus of most of the empirical work has been on short-run inflationary pressures, without taking into account other factors operting in the long term.[4] More recently, however, Hasan and Alogeel (2008) estimate a model that distinguishes between long- and short-term determinants of inflation in Kuwait and Saudi Arabia. This investigation provides a more comprehensive evaluation of the determinants of inflation in the six GCC countries.

The analysis in this paper provides a thorough evaluation of the determinants of inflation in GCC, differentiating between specific aspects of member countries. The analysis of the determinants will shed light on the sources of inflationary pressures. However, the analysis departs from previous work[5] by considering the impact of public spending and the money supply on inflation. Previous research has focused on the inflationary effect of higher oil price on oil-producing countries. Our research attempts to identify the specific transmission channels of higher oil price into inflation by considering the inflationary effects of domestic variables that are highly dependent on the oil price, namely government spending and the money supply. Higher government spending on goods and services, as well as on wages and salaries is likely to exert persistent inflationary pressures, including through second round effects. In contrast, public investment is geared towards relaxing capacity constraints, easing structural bottlenecks and mitigating inflationary pressures. Similarly, growth of international reserves, on account of higher oil price, is likely to increase liquidity, availing resources for private activity. Higher private consumption is inflationary. In contrast, private investment, particularly in the real estate sector, could relax capacity constraints and ease inflation.

In addition to domestic sources of inflation, inflation in GCC is likely to have varied with external shocks. Higher inflation in major trading partners is likely to spill over on domestic inflation, absent adjustment in the exchange rate. Despite the peg, inflationary pressures could develop in response to depreciation in the exchange rate relative to non-dollarized trading partners. Further, as GCC countries are highly dependent on food imports, higher international food prices are likely to increase inflation, subject to the weight of food prices in the CPI basket and absent price controls.

[4] The specifics of the analysis have varied across existing studies. Darrat (1985) analyzes the effect of monetary growth on higher inflation and lower growth in Libya, Nigeria and Saudi Arabia. Keran and Al Malik (1979) contrast the effects of monetary growth and imported inflation on domestic inflation in Saudi Arabia. Other studies have analyzed the effect of exchange rate pass-through on domestic inflation (see, e.g., Pattanaik (2003)).

[5] See, Hasan and Alogeel (2008).

III. ECONOMETRIC METHODOLOGY

Inflation in GCC countries is likely to depend on specific underlying pressures. **Predominance of oil exports is a common feature of GCC members' economies**. They are highly dependent on imports and all, except Kuwait which switched to pegging to a basket of currencies in 2007, have pegged exchange rates to the U.S. dollar.[6] The recent downward trend of the U.S. dollar has also exposed GCC members to imported inflation, which was further compounded by the hike in international prices during 2007-08, particularly of food. Nonetheless, inflation has varied across the region, in response to varying domestic policies and structural constraints. Figure 1 compares inflation across the region.

The empirical model captures potential inflationary pressures, both domestic and external, in the short- and long-run. The quantity theory implies that inflation is a monetary phenomenon in the very long-run. That is, sustained inflation is a function of monetary growth. Nonetheless, a number of complementary factors that are unique to oil-producing countries, like GCC, may further contribute to sustained inflationary pressures in long enough horizons. Government spending may contribute to gross capital formation with long-lasting effect on capacity building and, therefore, inflation. In addition, external shocks, namely higher prices in trading partners and/or exchange rate depreciation, absent independent monetary policy under pegged exchange rate, could increase inflationary pressures in the long-run. The spillover effect of external shocks could be sustained over time, underpinned by higher oil wealth. In addition, long-term determinants of inflation are likely to produce short-run inflationary shocks that are exacerbated by supply-side bottlenecks. The empirical model is an error-correction model, where the cointegrating vector will capture the longer-term determinants of inflation and the short-run dynamics will trace the effects of the shocks in the following year.

Domestic determinants of inflation include two sources of demand: government spending and the money supply. External variables include the nominal effective exchange rate, and a weighted average of price in major trading partners. More specifically, the price level in the long run is modeled as follows:

$$P = f(NEER, P^*, M, G)$$

where P is the domestic price level, measured by the consumer price index (CPI), *NEER* is the nominal effective exchange rate,[7] P^* is a weighted average of price in major trading partners, *M* is broad money, and *G* is government spending. Table 1 summarizes the

[6] The GCC currencies were de facto pegged to the U.S. dollar for decades.

[7] By construction, the nominal effective exchange rate is a weighted average of bilateral exchange rates relative to currencies of major trading partners. This measure excludes oil exports.

cointegration test for GCC countries. The results indicate the existence of one cointegrating vector.[8]

Table 1. Cointegration Test for Inflation Equation 1/2/

	Null Hypothesis					
	r=0		r≤1		r≤2	
	Trace Stat. (95% C.V.)	Max Stat. (95% C.V.)	Trace Stat. (95% C.V.)	Max Stat. (95% C.V.)	Trace Stat. (95% C.V.)	Max Stat. (95% C.V.)
Bahrain	126.04*	57.63*	68.40*	33.78*	34.63	21.30
	(79.34)	(37.16)	(55.25)	(30.82)	(35.01)	(24.25)
Kuwait	153.70*	89.79*	63.90*	44.26*	19.65	12.07
	(79.34)	(37.16)	(55.25)	(30.82)	(35.01)	(24.25)
Oman	169.18*	74.03*	95.16*	60.23*	34.93	21.74
	(79.34)	(37.16)	(55.25)	(30.82)	(35.01)	(24.25)
Qatar	67.82*	43.23*	24.59	14.55	10.04	9.83
	(55.25)	(30.82)	(35.01)	(24.25)	(18.40)	(17.15)
Saudi Arabia	102.25*	49.58*	52.67	24.28	28.40	16.47
	(79.34)	(37.16)	(55.25)	(30.82)	(35.01)	(24.25)
UAE	150.04*	64.57*	85.47*	48.11*	37.37	27.59
	(79.34)	(37.16)	(55.25)	(30.82)	(35.01)	(24.25)

1/ r is the number of cointegrating vectors.
2/ Asterisks * indicate rejection of the hypothesis at 95% C.V. Critical values in ( ).

The empirical model combines the determinants of inflation in the long-run with short-term dynamics. Given evidence of non-stationarity in the data[9], an error correction model is specified as follows:

$$\Delta p_t = c + \delta(p_{t-1} - \alpha_1 neer_{t-1} - \alpha_2 p^*_{t-1} - \alpha_3 m_{t-1} - \alpha_4 g_{t-1}) + \sum_{i=1}^{k} b_{1i}\Delta p_{t-i} + \sum_{i=1}^{k} b_{2i}\Delta neer_{t-i} + \sum_{i=1}^{k} b_{3i}\Delta p^*_{t-i} + \sum_{i=1}^{k} b_{4i}\Delta m_{t-i} + \sum_{i=1}^{k} b_{5i}\Delta g_{t-i} + \sum_{i=1}^{k} b_{7i}\Delta p^f{}_{t-i} + \sum_{i=1}^{k} b_{8i} excd_{t-i}$$

Here, k is the number of lags defining short-run dynamics. Lower case variables represent the log transformation of determinants of inflation in the long-run, as defined above. In addition to the long-run variables, two additional variables enter the short-run dynamics, the first

[8] In some cases, the results in Table 1 indicate the existence of two cointegrating vectors at the 5 percent significance level. These different results could be due to the fact that Eigenvalue and Trace Statistics have tendency to over reject the null hypothesis due to small sample bias, i.e., they suggest more cointegrating vectors as the sample size falls, or as the number of variables or lags increases (see, e.g., Hasan and Alogeel (2008)).

9 Stationarity test results indicate that the variables are I(1). Upon first differencing, variables are stationary.

difference of the log value of the food price, p^f, and a measure of excess demand, relative to potential, *excd*.[10]

Inflationary pressures could stem from currency depreciation, inflation in trading partners, higher food price, growth in the money supply or growth in government spending. Currency depreciation increases the cost of imports which is likely to feed through domestic inflation. Depreciation, coupled with permanent increase in monetary growth, e.g., in response to higher reserves accumulation, would result in a higher price inflation in the long-run. Absent adjustment in the exchange rate, higher import prices could spillover to domestic inflation. Higher cost of imports, coupled with higher standard of living, would result in an increase in price inflation in the long-run.[11] Domestic policies regarding food prices have varied across GCC and the weight of food price in the CPI basket varies across the region, necessitating a separate assessment of the inflationary effect of food prices in the model. In addition to external inflationary pressures, two sources of domestic demand pressures are included in the model, the growth of the money supply and government spending.

Structural bottlenecks on the supply side could further escalate price inflation in the face of demand pressures. To formalize this channel, we introduce a measure of excess demand into the empirical model, defined as follows:

$$excd_t = RGDP - \overline{RGDP}$$

Here, *excd* is excess demand; *RGDP* is a measure of real income, the real value of gross domestic product and $\overline{RGDP}$ is its potential, approximated by its de-trended value using an hp-filter. To the extent that real GDP reflects spending power, excess spending relative to the output potential would exert inflationary pressures in the short-run. Hence, lagged excess demand is introduced into the empirical model, augmenting the specification of short-run dynamics.

[10] Excess demand is proxied by deviations of real GDP from the Hodrick_Prescott trend. Experiments that introduce lagged values of wages in the short-run did not yield significant results, ruling out the effects of second-round effect on inflation. If wages adjust upward in response to higher price inflation, higher wages could further push prices upward, resulting in a vicious cycle of upward wage and price spiral.

[11] Foreign inflation, produced by a hike in import prices and/or currency depreciation, produces a one time increase in the price level that may not be sustained, absent accommodating monetary growth. That is, the latest episode of oil price boom and accompanying increase in international reserves helped sustain the inflationary effects of external shocks that would have abated otherwise.

IV. DATA AND ESTIMATION

The determinants of inflation in the long-run and short-run dynamics vary across GCC countries. In the long-run, the main results reveal that: (i) trading partners' inflation is a major determinant of inflation in the long-run in Bahrain, Kuwait, Saudi Arabia, and the United Arab Emirates, (ii) exchange rate depreciation increases inflation in Bahrain, Oman, Qatar and Saudi Arabia, (iii) in Bahrain, Oman, and the United Arab Emirates, higher government spending eases capacity constraints and moderates inflation (iv) monetary growth increases inflation in Bahrain and the United Arab Emirates, and (v) adjustment to equilibrium generally occurs relatively quickly.

In the short-run, the highlights are: (i) higher inflation in trading partners increases inflation in Qatar and Saudi Arabia, (ii) exchange rate depreciation tends to increase inflation in Bahrain and the United Arab Emirates, reflecting higher price of imports, (iii) higher international food prices raise domestic inflation in Oman and Saudi Arabia, (iv) higher government spending fuels inflation in Bahrain, Kuwait, Oman, and the United Arab Emirates, (v) excess demand, relative to potential is a significant factor for higher inflation in Kuwait, Oman, Qatar, and the United Arab Emirates. Variation in the results across countries (see Table 2) will reflect differences in the pass-through channel, demand pressures, and supply-side bottlenecks.[12]

Table 2. Vector Error Correction Estimates: Long Run Equation 1/

Long Run Equation:	Bahrain	Kuwait	Oman	Qatar	S. Arabia	UAE
neer(-1)	-0.20	0.05	-0.55	-0.53	-0.24	0.20
	[-6.18]	[3.47]	[-12.08]	[-9.72]	[-2.06]	[4.47]
p(-1)*	1.30	0.48	0.00		1.92	0.81
	[11.82]	[6.44]	[0.02]		[6.79]	[3.64]
m(-1)	0.50	-0.06	0.06	-0.02	0.14	0.18
	[9.08]	[-16.05]	[1.50]	[-0.50]	[1.49]	[4.43]
g (-1)	-0.07	0.02	-0.29	0.14	0.07	-0.26
	[-2.09]	[4.74]	[-5.95]	[3.69]	[0.99]	[-6.17]
Adjustment Coefficient	-0.68	-0.56	-0.58	-0.40	-0.22	-0.22
	[-4.87]	[-3.95]	[-5.33]	[-4.89]	[-3.96]	[-3.81]
Short Run Dynamic:	Bahrain	Kuwait	Oman	Qatar	S. Arabia	UAE
D(p(-1))	0.12	0.32	0.45	0.58	-0.14	0.78
	[0.81]	[1.88]	[2.64]	[5.30]	[-0.76]	[4.50]
D(neer(-1))	-0.14	0.03	0.29	-0.03	0.03	-0.10
	[-2.13]	[0.62]	[2.59]	[-0.69]	[0.64]	[-2.13]
D(p*(-1))	-0.13	-0.13	-0.19		0.91	0.20
	[-0.51]	[-1.98]	[-1.76]		[4.54]	[1.27]
D(m(-1))	-0.13	0.01	-0.04	0.11	0.05	-0.05
	[-2.37]	[0.58]	[-0.47]	[2.84]	[0.95]	[-1.24]
D(g (-1))	0.08	0.08	0.25	-0.14	0.00	0.04
	[2.46]	[3.26]	[3.38]	[-3.57]	[0.29]	[1.78]
D(pf(-1))	-0.12	-0.05	0.25		0.08	-0.01
	[-2.46]	[-1.43]	[3.05]		[2.07]	[-0.28]
D(excd(-1))	0.03	0.01	0.19	0.00	0.00	0.00
	[0.68]	[2.84]	[4.39]	[-0.09]	[-0.60]	[4.20]

1/For Kuwait credit to private sector was used as a proxy.
Included observations: 26 after adjustments
T-statistics in [ ]

[12] See detailed results by country in Tables 1-6 in the Appendix.

Bahrain:

The main driving forces of inflation in the long-run include exchange rate depreciation and inflation in trading partners, reinforced by monetary growth. Exogenous external shocks in major trading partners are fed through to domestic prices and domestic liquidity, increasing inflationary pressures. Exchange rate depreciation is fed through to the domestic price level, presenting a channel whereby appreciation could mitigate the spillover effects of external shocks. The results indicate that higher government spending moderates inflation in the long run. This is likely to be driven by the impact of higher public investment that targets structural bottlenecks and eases capacity constraints. The speed of adjustment to eliminate deviation from long-run equilibrium appears relatively high.

The short-run dynamics reinforces the pass-through effects of exchange rate adjustment. Appreciation (depreciation) mitigates (reinforces) inflationary pressures in the short-run. In contrast to the long-run evidence, an increase in government spending is inflationary in the short-run. The negative effect of monetary growth on inflation is somewhat puzzling. While the growth of money could avail credit to finance private investment and relax structural bottlenecks, the disinflationary effect was not expected in the short-run. An increase in international food price is not passed through to domestic price inflation, reflecting subsidies and price controls that counter the spillover effects of external shocks.

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by monetary growth, fluctuations in the exchange rate, government spending, and inflation in major trading partners.[13] The impulse response functions illustrate persistent inflationary effects attributed to the growth of the money supply and government spending. In contrast, the pass-through channels of the change in the exchange rate and inflation in trading partners do not appear long-lasting.

Kuwait:

The main determinant of inflation in the long-run is trading partners' inflation and the growth of government spending. Higher inflation in trading partners is spilled over to domestic inflation. Appreciation of the exchange rate increases the purchasing power of wealth, stimulating higher spending and price inflation in the long-run. Higher government spending is inflationary in the long-run. In contrast, the growth of private credit eases capacity constraints and reduces price inflation in the long-run. The speed of adjustment is significant, indicating fast adjustment towards long-run equilibrium.

Significant short-term dynamics are driven by excess demand relative to potential and higher government spending. Binding capacity constraints increase inflation in the face of

[13] Details of the variance decomposition results by country are shown in Table 7 of the appendix. Impulse response functions for significant coefficients (Table 2) are available in Figure 1 of the Appendix.

higher excess demand. Further, the growth of government spending increases price inflation in the short-run.[14]

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by inflation in trading partners, fluctuations in the exchange rate, government spending and private credit, respectively. The impulse response functions illustrate persistent inflationary effects attributed to the pass-through channel of the change in the exchange rate and inflation in major trading partners. In contrast, the inflationary effect of higher government spending appears less persistent and the inflationary effect of private credit growth appears the least persistent.

Oman:

Prices surge in the long run in response to currency depreciation, signifying the pass-through effect of exchange rate adjustments. Depreciation increases the value of imports and accelerates price inflation. Consistent with the evidence for Bahrain, the role of government spending in relaxing capacity constraints is evident in Oman. Higher spending, by targeting supply-side bottlenecks, eases pressure on inflation in the long-run. The speed of adjustment is high following deviation from long-run equilibrium.

Short-run dynamics reveal significant movement in inflation in response to currency appreciation, higher government spending, higher food prices and excess demand. In contrast to the long-run evidence, appreciation increases price inflation in the short-run. Appreciation increases the purchasing power of domestic savings (the wealth effect),[15] resulting in more spending and higher inflation. In addition, the inflationary effect of higher government spending in the short-run is in sharp contrast to the long-run evidence. Binding supply-side constraints in the short run force an increase in price inflation following an increase in government spending. This is further reinforced by the inflationary effect of excess demand, relative to potential, in the short-run. Moreover, the surge in international food price spills over to higher domestic inflation. The various inflationary pressures are persistent in the short-run, as evident by the observed large adjustment of CPI inflation to its lag.

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[14] Consistent with the evidence in Hasan and Alogeel (2008), the main determinant of inflation in Kuwait in the long-run is inflation in major trading partners. However, our results indicate that the pass-through channel of exchange rate depreciation to inflation is not statistically significant in the long-run, notwithstanding its contribution to the variance decomposition and persistent impulse response to the shock in the short-run. We attribute the difference to model specification. Most notably, Hasan and Alogeel (2008) exclude government spending, which proved to be inflationary. A positive correlation between government spending and exchange rate depreciation may have exaggerated the inflationary effect of depreciation in the long-run in their model specification due to the omitted variable bias.

[15] The theoretical channel is articulated in Kandil and Mirzaie (2002). Unanticipated current appreciation decreases the demand for money and increases aggregate spending, as agents capitalize on the value added of currency appreciation.

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by fluctuations in the exchange rate, government spending, inflation in trading partners and the growth of the money supply, respectively. The impulse response functions rule out persistent effects of the various determinants on price inflation over time.

Qatar:

Exchange rate depreciation and higher growth of government spending increase CPI inflation in the long-run. The pass-through effect of exchange rate adjustment is significant on inflation. Accordingly, appreciation (depreciation) of the nominal effective exchange rate decreases (increases) CPI inflation. Growth of government spending increases domestic demand, reinforcing inflationary pressures in the long-run. The adjustment coefficient indicates reasonably fast convergence to full equilibrium.

Monetary growth is a source of inflationary pressures in the short-run. Higher monetary growth increases the supply of credit and domestic demand. However, higher government spending on infrastructure helps ease capacity constraints in the current period, which moderates price inflation in the following period. The dynamics of inflation is highly persistent in the short-run, as evident by the response of inflation to its lag.

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by fluctuations in the exchange rate, government spending, and the growth of the money supply, respectively. The impulse response functions illustrate persistent inflationary effects attributed to the growth of government spending and the money supply. In contrast, the pass-through channel of the change in the exchange rate does not appear long-lasting.

Saudi Arabia:

There is a long-run relationship between inflation in Saudi Arabia and inflation in its trading partners. Inflation in trading partners spills over to higher domestic price inflation. This channel is further reinforced by currency depreciation, resulting in higher price of imports and inflation. The speed of adjustment appears relatively low following deviation from long-run equilibrium, reflecting continued evolution in underlying fundamentals and tendency to revert to a new equilibrium.

The spillover effect from trading partners is robust on inflation in the short-run. Absent adjustment in the exchange rate, higher inflation of imported goods increases domestic inflationary pressures. Further, the external shock is reinforced by higher international food prices that spillover to domestic inflation.[16]

[16] Consistent with the evidence in Hasan and Alogeel (2008), inflation in major trading partners is the main driving force of inflation in Saudi Arabia, reinforced by exchange rate depreciation, while domestic factors play a limited role in driving inflation. In contrast to Hasan and Alogeel (2008), however, our results do not support the inflationary effect of monetary growth in the short-run. We attribute the difference to model specification, as they exclude important determinants of inflation, most notably the food price and government spending, which may have affected other estimates in their model.

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by inflation in major trading partners, fluctuations in the exchange rate, government spending, and monetary growth, respectively. The impulse response functions illustrate persistent inflationary effects attributed to the pass-through channel of the change in the exchange rate and government spending. In contrast, the inflationary effects of inflation in trading partners and monetary growth appear less pronounced or persistent over time.

United Arab Emirates:

Inflation in the long-run is affected by inflation in trading partners and growth of the money supply. The wealth effect of currency appreciation dominates the cost of imports channel on inflation. Accordingly, appreciation increases the purchasing power of domestic savings, increasing spending and price inflation. Moreover, higher domestic spending, supported by higher monetary growth, reinforces the spillover inflationary effects of external shocks. In contrast, however, the increase in government spending—similar to the evidence for Bahrain, and Oman—has successfully targeted supply-side bottlenecks, easing inflationary pressures in the long-run. The speed of adjustment appears relatively low following deviation from long-run equilibrium, signifying continued evolution in underlying fundamentals.

Both excess demand and currency depreciation are inflationary in the short-run. Capacity constraints are binding, increasing inflation in the face of excess demand in the short-run**.** Further, exchange rate depreciation increases the price of imports and domestic inflation. The resulting inflation, from both channels, is persistent, as evident by significant response to lagged fluctuations.

Results of the variance decomposition indicate that the variance of inflation is dominated by its own lag, followed by inflation in trading partners, government spending, fluctuations in the exchange rate, and monetary growth, respectively. The impulse response function illustrates persistent inflationary effects attributed to monetary growth, the growth of government spending, and inflation in trading partners. In contrast, the pass-through channel of the change in the exchange rate appears less persistent over time.

V. EXTENSIONS

Higher government spending eases capacity constraints and inflationary pressures. The evidence in three GCC countries supports lower price inflation in response to higher government spending in the long-run.[17] Such evidence reflects the positive effect of public investment on capacity building and infrastructure. To shed additional light on this hypothesis, the evidence in Appendix Tables 8–10 summarizes results of estimating the

[17] We denote the log of public consumption by Con^p, the log of public investment by I^p, and the log of private credit by pcr.

empirical models that include a decomposition of government spending into consumption and investment components, data permitting.[18]

Higher public investment eases constraints on structural bottlenecks and reduces price inflation. In each of Kuwait, Oman, and, higher public investment decreases price inflation significantly in the long-run. In contrast, government consumption has a significant inflationary effect in the United Arab Emirates, and insignificant effects in other cases, in the long-run. Further, higher private investment in the United Arab Emirates, proxied by private credit growth, contributes to additional capacity buildup that complements the impact of public investment in relaxing supply-side constraints and reducing price inflation in the long-run.

VI. CONCLUSIONS

Foreign and domestic factors explain inflation in GCC countries. Among foreign factors, inflation in major trading partners appears the most relevant to domestic inflation in GCC. Higher inflation in trading partners has pushed prices upward in four GCC countries in the long-run, including in Saudi Arabia, the largest country in GCC. The sustained inflationary pressures in response to higher inflation in trading partners was made possible through an accommodating monetary policy, reflecting high international reserves across most of the GCC. Moreover, fixed exchange rate systems have restricted flexibility to adjust the exchange rate and mitigate the effects of external shocks on domestic inflation.

Domestic factors have reinforced inflationary pressures in response to external shocks. Specifically, oil resources have facilitated the buildup of international reserves, facilitating growth of credit and aggregate spending. This channel is inflationary in the long-run in two GCC countries. In other countries, monetary policy may have intervened to sterilize excess liquidity and contain sustained inflationary pressures in the long-run. Moreover, where monetary growth has supported investment spending, inflationary pressures have eased on account of less binding capacity constraints.

Government spending appears to have eased inflationary pressures in three GCC countries in the long-run. Binding capacity constraints lead, in general, to higher inflation in the face of government spending in the short-run. Nonetheless, by targeting supply-side bottlenecks, the increase in spending has eased capacity constraints and moderated price inflation in the long-run. In other GCC countries, government spending may not have efficiently targeted capacity constraints to determine the inflationary process in the long-run. To pinpoint determinants of these differences across countries, decomposing government spending into consumption and investment components provides further support to this hypothesis. In Kuwait, Oman, and the United Arab Emirates, higher public investment eases inflationary pressures in the long-run. Moreover, private investment in United Arab Emirates,

[18]The estimation is limited to the four GCC countries where government spending has significant effect on inflation in the long-run: Bahrain, Kuwait, Oman, and the UAE. The empirical models vary across countries to establish evidence of co-integration across variables in the long-run. Qatar was excluded due to data limitations.

boosted by private credit growth, complements public investment and contributes to capacity buildup, further reducing price inflation in the long-run.

Exchange rate depreciation, relative to major trading partners, could reinforce the increase in import prices and the inflationary effect of external shocks. The recent downward trend of the U.S. dollar, the currency of the peg in the majority of GCC, has drawn attention to the effect of nominal effective exchange rate depreciation on higher inflation. In support of the pass-through channel, nominal effective depreciation has a significant inflationary effect in four GCC countries in the long-run. Currency appreciation could mitigate the spillover effects of external shocks and stem the risk of persistent inflation in economies that are undergoing a spending spiral, triggered by the oil price boom and accompanying expansionary stance.

Supply-side bottlenecks remain binding, necessitating more public investment towards capacity building. In a number of GCC countries, higher government spending and credit growth have successfully targeted supply-side constraints, slowing down price inflation. Building on these efforts, priorities should be in place to direct both public and private resources towards relaxing binding capacity constraints, capitalizing on the added windfall of oil resources, to counter the spillover effects of external shocks.

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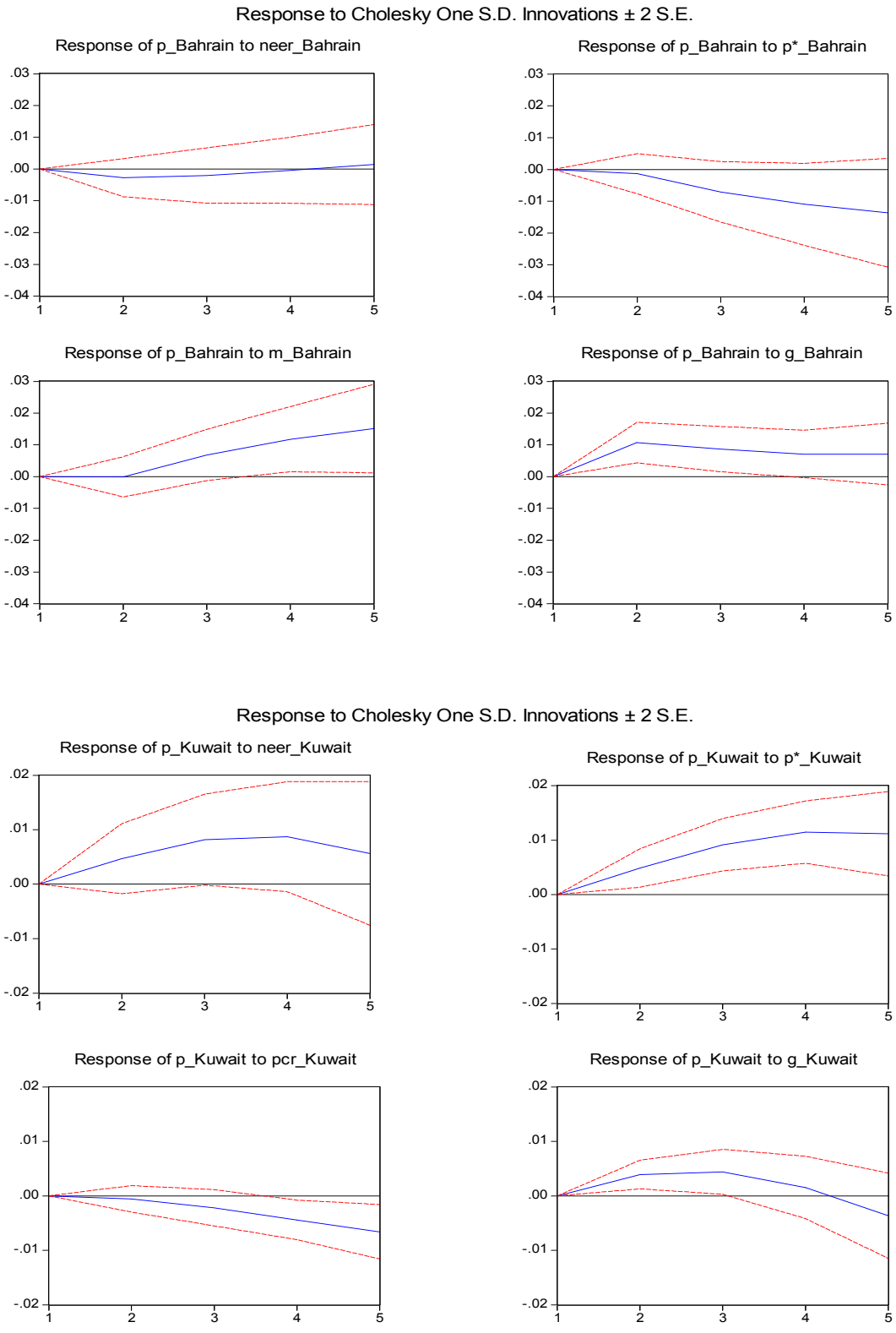
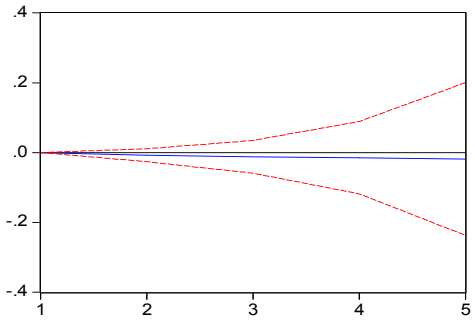
Appendix Figure 1. Impulse Response

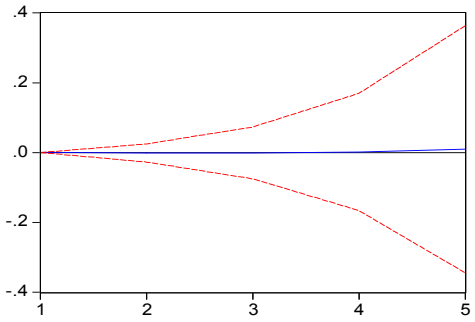


Response to Cholesky One S.D. Innovations ± 2 S.E.

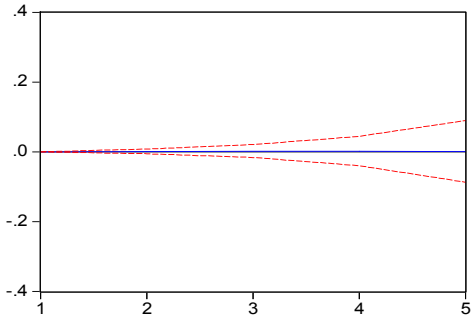
Response of p_Oman to neer_Oman



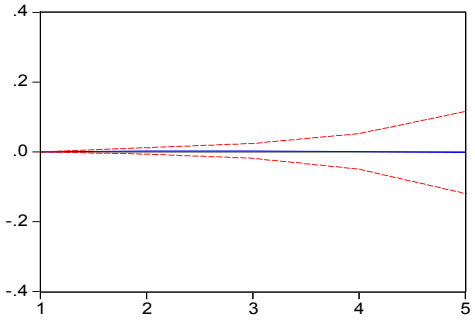
Response of p_Oman to p*_Oman



Response of p_Oman to m_Oman

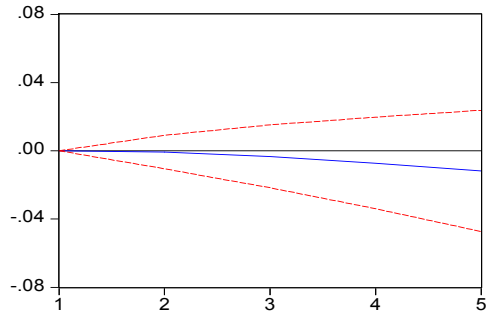


Response of p_Oman to g_Oman

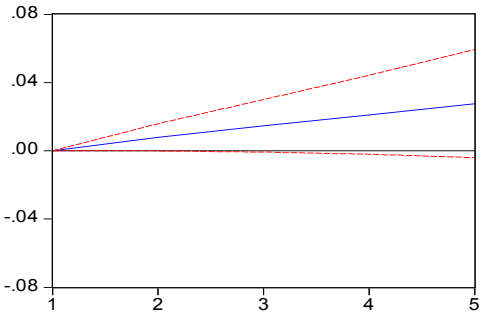


Response to Cholesky One S.D. Innovations ± 2 S.E.

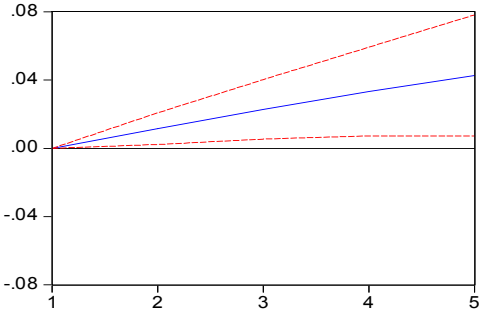
Response of p_Qatar to neer_Qatar



Response of p_Qatar to m_Qatar

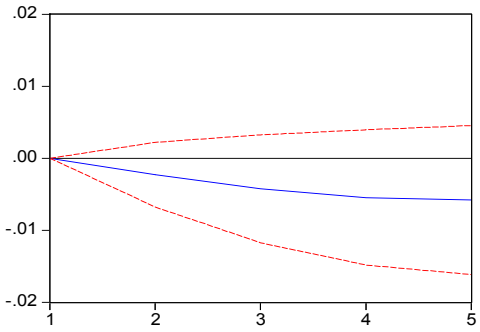


Response of p_Qatar to g_Qatar

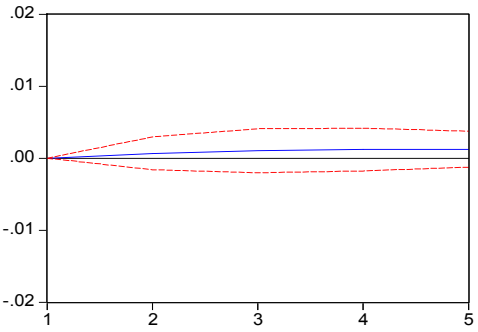


Response to Cholesky One S.D. Innovations ± 2 S.E.

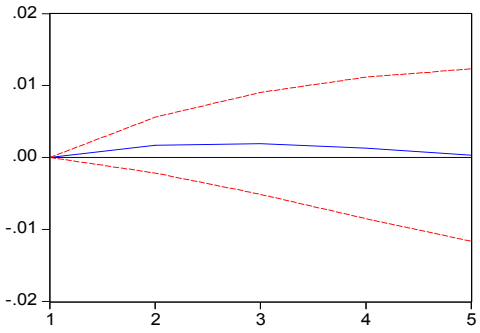
Response of p_Saudi to neer_Saudi



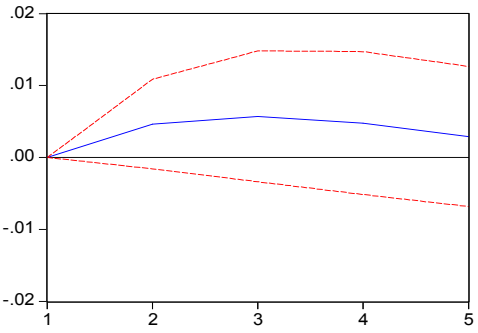
Response of p_Saudi to p*_Saudi



Response of p_Saudi to m_Saudi

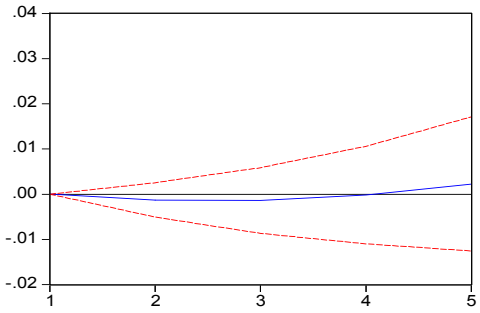


Response of p_Saudi to g_Saudi

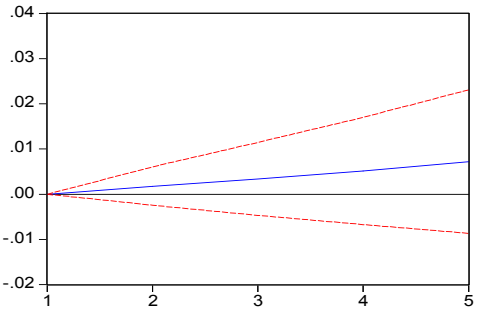


Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of p_UAE to neer_UAE



Response of p_UAE to p*_UAE



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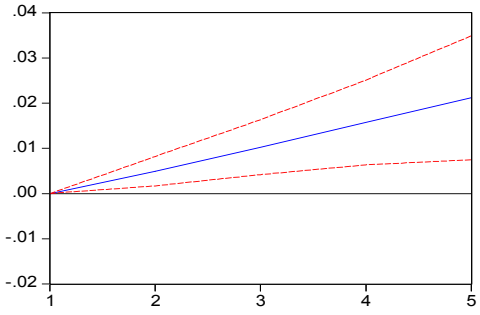
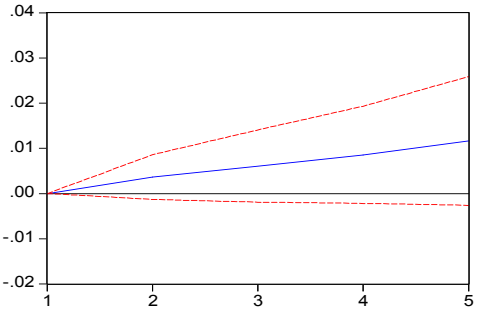


Response of p_UAE to g_UAE



Appendix. Detailed ECM Results

Table 1. Bahrain: Vector Error Correction Estimates 1/

Long Run Equation:					
p (-1)	1				
neer (-1)	0.2011 (-0.03252) [6.18238]				
p^* (-1)	-1.2977 (-0.10979) [-11.8195]				
m (-1)	-0.5010 (-0.05515) [-9.08427]				
g (-1)	0.0695 (-0.03324) [2.09076]				
t	0.0525				
C	-0.7539				
Adjustment Coefficient	-0.6778 (-0.139209) [-4.869040]				
Short Run Dynamic:	D(*p*)	D(*neer*)	D(p^*)	D(*m*)	D(g)
D(*p* (-1))	0.1167 (-0.14384) [0.81144]	1.0843 (-0.55439) [1.95592]	0.0049 (-0.19485) [0.02514]	0.1111 (-0.76317) [0.14560]	-0.2238 (-1.26875) [-0.17636]
D(*neer* (-1))	-0.1396 (-0.06547) [-2.13210]	0.1564 (-0.25234) [0.61964]	0.0155 (-0.08869) [0.17456]	-0.8879 (-0.34737) [-2.55614]	0.0406 (-0.5775) [0.07027]
D(p^* (-1))	-0.1288 (-0.25269) [-0.50958]	-0.8671 (-0.97391) [-0.89031]	0.5369 (-0.3423) [1.56861]	1.0557 (-1.34067) [0.78744]	-0.4349 (-2.22884) [-0.19511]
D(*m* (-1))	-0.1340 (-0.05643) [-2.37388]	-0.4321 (-0.21748) [-1.98675]	-0.0193 (-0.07644) [-0.25241]	0.1202 (-0.29938) [0.40160]	0.0335 (-0.49772) [0.06740]
D(g (-1))	0.0751 (-0.03046) [2.46426]	-0.1264 (-0.1174) [-1.07692]	0.0003 (-0.04126) [0.00824]	0.3725 (-0.1616) [2.30473]	-0.0235 (-0.26866) [-0.08734]
C	0.0051 (-0.01139) [0.44453]	-0.0081 (-0.04389) [-0.18515]	0.0163 (-0.01543) [1.05596]	-0.1274 (-0.06042) [-2.10836]	-0.0576 (-0.10045) [-0.57332]
t	0.0005 (-0.00036) [1.42016]	0.0020 (-0.00139) [1.46074]	-0.0003 (-0.00049) [-0.68211]	0.0064 (-0.00191) [3.34930]	0.0051 (-0.00317) [1.61039]
D(p^f (-1))	-0.1244 (-0.05064) [-2.45573]	-0.3470 (-0.19518) [-1.77789]	0.0407 (-0.0686) [0.59286]	-0.6483 (-0.26868) [-2.41290]	-0.2517 (-0.44668) [-0.56345]
D(excd(-1))	0.0332 (-0.04847) [0.68486]	-0.0914 (-0.18682) [-0.48909]	-0.0737 (-0.06566) [-1.12221]	0.6592 (-0.25718) [2.56309]	-0.1008 (-0.42755) [-0.23569]
R-squared	0.8512	0.6238	0.2523	0.6028	0.4850
Adj. R-squared	0.7675	0.4122	-0.1683	0.3793	0.1953
Sum sq. resids	0.0022	0.0323	0.0040	0.0612	0.1692
S.E. equation	0.0117	0.0449	0.0158	0.0619	0.1028
F-statistic	10.1687	2.9481	0.5998	2.6978	1.6740
Log likelihood	85.1612	50.0835	77.2701	41.7737	28.5577
Akaike AIC	-5.7816	-3.0833	-5.1746	-2.4441	-1.4275
Schwarz SC	-5.2978	-2.5995	-4.6907	-1.9602	-0.9436
Mean dependent	0.0093	-0.0050	0.0186	0.0770	0.0569
S.D. dependent	0.0242	0.0586	0.0146	0.0785	0.1146

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 2. Kuwait: Vector Error Correction Estimates1/

Long Run Equation:					
p (-1)	1				
neer (-1)	-0.0515 -0.0148 [-3.47266]				
p^* (-1)	-0.4839 -0.0752 [-6.43932]				
pcr (-1)	0.0612 -0.0038 [16.0457]				
g (-1)	-0.0174 -0.0037 [-4.73562]				
t	-0.0134				
C	-2.2089				
Adjustment Coefficient	-0.5607 -0.1420 [-3.947677]				
Short Run Dynamic:	D(*p*)	D(*neer*)	D(p^*)	D(*pcr*)	D(g)
D(*p* (-1))	0.3246 (-0.17282) [1.87824]	1.8183 (-0.99172) [1.83345]	0.2969 (-0.14531) [2.04332]	1.3369 (-1.65997) [0.80540]	4.3035 (-1.41352) [3.04456]
D(*neer* (-1))	0.0290 (-0.04663) [0.62112]	-0.2678 (-0.2676) [-1.00090]	0.0164 (-0.03921) [0.41913]	0.2440 (-0.44791) [0.54470]	0.4097 (-0.38141) [1.07424]
D(p^* (-1))	-0.1276 (-0.06452) [-1.97803]	0.5563 (-0.37023) [1.50244]	0.1249 (-0.05425) [2.30271]	0.8880 (-0.6197) [1.43291]	-0.8181 (-0.5277) [-1.55038]
D(*pcr* (-1))	0.0108 (-0.01853) [0.58331]	0.1620 (-0.10632) [1.52348]	-0.0012 (-0.01558) [-0.07465]	0.4724 (-0.17796) [2.65422]	-0.2361 (-0.15154) [-1.55776]
D(g (-1))	0.0782 (-0.024) [3.25662]	-0.1832 (-0.13773) [-1.32998]	-0.0809 (-0.02018) [-4.01015]	-0.3941 (-0.23054) [-1.70947]	0.0283 (-0.19631) [0.14417]
C	0.0365 (-0.01248) [2.92151]	-0.2189 (-0.07164) [-3.05543]	0.0237 (-0.0105) [2.25973]	-0.1393 (-0.11991) [-1.16166]	-0.1601 (-0.10211) [-1.56840]
t	-0.0007 (-0.00038) [-1.84714]	0.0055 (-0.00218) [2.50125]	-0.0001 (-0.00032) [-0.17716]	0.0065 (-0.00365) [1.76751]	0.0070 (-0.00311) [2.23888]
D(p^f (-1))	-0.0469 (-0.03288) [-1.42528]	-0.4385 (-0.18868) [-2.32411]	0.0104 (-0.02764) [0.37766]	0.3495 (-0.31581) [1.10680]	-0.0714 (-0.26892) [-0.26544]
D(excd(-1))	0.0064 (-0.00225) [2.84395]	-0.0099 (-0.01291) [-0.76614]	-0.0023 (-0.00189) [-1.20286]	0.0142 (-0.02161) [0.65521]	0.0271 (-0.0184) [1.47399]
R-squared	0.8962	0.6068	0.8720	0.7305	0.8045
Adj. R-squared	0.8295	0.3540	0.7898	0.5572	0.6788
Sum sq. resids	0.0009	0.0311	0.0007	0.0872	0.0632
S.E. equation	0.0082	0.0471	0.0069	0.0789	0.0672
F-statistic	13.4349	2.4006	10.6001	4.2164	6.4006
Log likelihood	87.6555	45.7232	91.8176	33.3606	37.2178
Akaike AIC	-6.4713	-2.9769	-6.8181	-1.9467	-2.2681
Schwarz SC	-5.9804	-2.4861	-6.3273	-1.4559	-1.7773
Mean dependent	0.0248	0.0016	0.0326	0.1525	0.0375
S.D. dependent	0.0199	0.0587	0.0151	0.1186	0.1186

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 3. Oman: Vector Error Correction Estimates 1/

Long Run Equation:					
p (-1)	1				
neer (-1)	0.5475 (-0.04532) [12.0805]				
p^*(-1)	0.0046 (-0.2478) [0.01866]				
m (-1)	-0.0634 (-0.04234) [-1.49683]				
g (-1)	0.2873 (-0.04829) [5.94905]				
t	-0.0122				
C	-6.9870				
Adjustment Coefficient	-0.5763 -0.1081 [-5.332936]				
Short Run Dynamic:	D(*p*)	D(*neer*)	D(p^*)	D(*m*)	D(g)
D(*p* (-1))	0.4491 (-0.16986) [2.64382]	-0.0997 (-0.52738) [-0.18896]	-0.4416 (-0.38184) [-1.15655]	0.2467 (-0.57888) [0.42618]	-0.2620 (-0.4817) [-0.54383]
D(*neer* (-1))	0.2880 (-0.11101) [2.59429]	-0.2885 (-0.34467) [-0.83699]	-0.0211 (-0.24955) [-0.08474]	-0.3978 (-0.37833) [-1.05137]	0.3817 (-0.31482) [1.21247]
D(*p* *(-1))	-0.1866 (-0.10602) [-1.75966]	0.0130 (-0.32915) [0.03961]	0.2144 (-0.23832) [0.89943]	0.3288 (-0.3613) [0.91005]	0.4462 (-0.30064) [1.48404]
D(*m* (-1))	-0.0392 (-0.08302) [-0.47247]	0.3111 (-0.25775) [1.20694]	-0.3327 -0.1866 [-1.78285]	0.7482 (-0.28292) [2.64446]	0.1465 (-0.23542) [0.62235]
D(g (-1))	0.2459 (-0.07285) [3.37532]	-0.0568 (-0.22618) [-0.25132]	-0.0691 (-0.16376) [-0.42194]	-0.1182 -0.2483 [-0.47611]	-0.0884 (-0.20659) [-0.42766]
C	0.0133 (-0.02187) [0.61027]	-0.0825 (-0.06791) [-1.21420]	0.1398 (-0.04917) [2.84317]	-0.0721 (-0.07454) [-0.96774]	-0.0027 (-0.06203) [-0.04426]
t	-0.0004 (-0.00073) [-0.53631]	0.0018 (-0.00226) [0.79193]	-0.0036 (-0.00164) [-2.18769]	0.0036 (-0.00248) [1.44783]	0.0017 (-0.00207) [0.81879]
D(p^f(-1))	0.2473 (-0.0811) [3.04977]	-0.5282 (-0.2518) [-2.09767]	-0.2181 (-0.18231) [-1.19618]	-0.1741 (-0.27639) [-0.62995]	0.2444 (-0.22999) [1.06259]
D(excd(-1))	0.1892 (-0.04306) [4.39309]	-0.3454 (-0.13369) [-2.58349]	-0.1988 (-0.09679) [-2.05356]	-0.1817 (-0.14674) [-1.23842]	-0.3581 (-0.12211) [-2.93232]
R-squared	0.7420	0.5176	0.5648	0.5810	0.7054
Adj. R-squared	0.6054	0.2622	0.3344	0.3591	0.5494
Sum sq. resids	0.0082	0.0787	0.0412	0.0948	0.0656
S.E. equation	0.0219	0.0680	0.0493	0.0747	0.0621
F-statistic	5.4327	2.0268	2.4514	2.6187	4.5226
Log likelihood	71.0938	40.5043	49.2233	37.9887	42.9506
Akaike AIC	-4.5255	-2.2596	-2.9054	-2.0732	-2.4408
Schwarz SC	-4.0455	-1.7796	-2.4255	-1.5933	-1.9608
Mean dependent	0.0121	-0.0057	0.0195	0.1075	0.0666
S.D. dependent	0.0349	0.0792	0.0604	0.0933	0.0926

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 4. Qatar: Vector Error Correction Estimates 1/

Long Run Equation:				
p (-1)	1			
neer (-1)	0.5312 (-0.05467) [9.71698]			
p^* (-1)				
m (-1)	0.0206 (-0.04127) [0.49890]			
g (-1)	-0.1441 (-0.03904) [-3.69132]			
t	-0.0300			
C	-5.7107			
Adjustment Coefficient	-0.3987 (-0.081477) [-4.89386]			
Short Run Dynamic:	D(*p*)	D(*neer*)	D(*m*)	D(g)
D(*p* (-1))	0.5756 (-0.10855) [5.30206]	-1.0549 (-0.48041) [-2.19593]	0.6057 (-0.65195) [0.92901]	0.5046 (-0.73753) [0.68416]
D(*neer* (-1))	-0.0264 (-0.03824) [-0.69007]	0.6023 (-0.16924) [3.55909]	0.0275 (-0.22967) [0.11975]	-0.5758 (-0.25982) [-2.21616]
D(*m* (-1))	0.1092 (-0.03841) [2.84446]	-0.1233 (-0.16996) [-0.72521]	0.1459 (-0.23065) [0.63252]	0.5333 (-0.26093) [2.04379]
D(g (-1))	-0.1395 (-0.03906) [-3.57086]	0.3529 (-0.17288) [2.04131]	0.1759 (-0.23461) [0.74955]	-0.9984 (-0.26541) [-3.76183]
C	-0.0077 (-0.0113) [-0.68489]	0.0831 (-0.05001) [1.66154]	0.0055 (-0.06787) [0.08098]	-0.1216 (-0.07678) [-1.58341]
t	0.0011 (-0.00044) [2.53991]	-0.0023 (-0.00195) [-1.17526]	0.0029 (-0.00265) [1.08415]	0.0089 (-0.003) [2.97864]
D(excd(-1))	-0.0001 (-0.00128) [-0.08548]	0.0043 (-0.00567) [0.75785]	0.0014 (-0.0077) [0.18730]	-0.0084 (-0.00871) [-0.96948]
R-squared	0.8917	0.5781	0.4436	0.6780
Adj. R-squared	0.8556	0.4374	0.2581	0.5707
Sum sq. resids	0.0055	0.1072	0.1974	0.2526
S.E. equation	0.0161	0.0714	0.0969	0.1097
F-statistic	24.7038	4.1102	2.3914	6.3175
Log likelihood	83.1941	40.0601	31.2055	27.6287
Akaike AIC	-5.1858	-2.2110	-1.6004	-1.3537
Schwarz SC	-4.8086	-1.8339	-1.2232	-0.9765
Mean dependent	0.0478	-0.0094	0.1355	0.0866
S.D. dependent	0.0425	0.0952	0.1126	0.1674
Determinant resid covariance (dof adj.)		0.0000		
Determinant resid covariance		0.0000		
Log likelihood		190.4113		
Akaike information criterion		-10.6491		
Schwarz criterion		-8.9517		
Mean dependent	0.0373	-0.0044	0.0246	0.1265
S.D. dependent	0.0349	0.0697	0.0119	0.1120

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 5. Saudi Arabia: Vector Error Correction Estimates 1/

Long Run Equation:					
p (-1)	1				
neer (-1)	0.2412 (-0.11708) [2.05991]				
p^*(-1)	-1.9154 (-0.28212) [-6.78929]				
m (-1)	-0.1423 (-0.09567) [-1.48734]				
g (-1)	-0.0736 (-0.07404) [-0.99338]				
t	0.0811				
C	1.8863				
Adjustment Coefficient	-0.2153 0.0544 [-3.959824]				
Short Run Dynamic:	D(*p*)	D(*neer*)	D(p^*)	D(*m*)	D(g)
D(*p* (-1))	-0.1369 (-0.17993) [-0.76092]	1.0787 (-0.86461) [1.24756]	-0.0678 (-0.17073) [-0.39686]	0.0433 (-0.57716) [0.07503]	2.5258 (-2.52281) [1.00118]
D(*neer* (-1))	0.0306 (-0.04753) [0.64448]	-0.1156 (-0.22839) [-0.50625]	-0.0017 (-0.0451) [-0.03683]	-0.3051 (-0.15246) [-2.00124]	-0.9668 (-0.66642) [-1.45074]
D(p^*(-1))	0.9115 (-0.20086) [4.53805]	-1.0485 (-0.9652) [-1.08627]	0.5281 (-0.19059) [2.77100]	1.4051 (-0.6443) [2.18085]	3.3740 (-2.8163) [1.19803]
D(*m* (-1))	0.0505 (-0.05347) [0.94510]	-0.2383 (-0.25694) [-0.92736]	-0.0638 (-0.05074) [-1.25651]	-0.1551 (-0.17152) [-0.90450]	-0.2607 (-0.74972) [-0.34772]
D(g (-1))	0.0049 (-0.01659) [0.29340]	0.0941 (-0.07974) [1.18010]	0.0057 (-0.01575) [0.35899]	0.1345 (-0.05323) [2.52766]	-0.1082 (-0.23268) [-0.46481]
C	-0.0762 (-0.01926) [-3.95583]	0.0659 (-0.09256) [0.71151]	0.0324 (-0.01828) [1.77521]	-0.0192 (-0.06179) [-0.31072]	-0.4154 (-0.27008) [-1.53821]
t	0.0016 (-0.00046) [3.47085]	-0.0006 (-0.00222) [-0.26784]	-0.0005 (-0.00044) [-1.06184]	0.0021 (-0.00148) [1.43757]	0.0127 (-0.00649) [1.95406]
D(p^f(-1))	0.0833 (-0.04019) [2.07248]	-0.3787 (-0.19311) [-1.96136]	0.0342 (-0.03813) [0.89616]	0.1300 (-0.1289) [1.00816]	-0.1976 (-0.56345) [-0.35069]
D(excd(-1))	-0.0001 (-0.00013) [-0.59792]	0.0013 (-0.00062) [2.14234]	0.0001 (-0.00012) [0.45597]	0.0006 (-0.00041) [1.51242]	-0.0011 (-0.00181) [-0.60540]
R-squared	0.7974	0.5746	0.6811	0.8160	0.3793
Adj. R-squared	0.6902	0.3494	0.5123	0.7186	0.0507
Sum sq. resids	0.0021	0.0495	0.0019	0.0221	0.4213
S.E. equation	0.0112	0.0540	0.0107	0.0360	0.1574
F-statistic	7.4347	2.5517	4.0346	8.3757	1.1542
Log likelihood	89.1471	46.7645	90.5643	57.6770	17.8516
Akaike AIC	-5.8627	-2.7233	-5.9677	-3.5316	-0.5816
Schwarz SC	-5.3828	-2.2434	-5.4878	-3.0517	-0.1017
Mean dependent	0.0051	-0.0060	0.0382	0.0837	0.0251
S.D. dependent	0.0202	0.0669	0.0153	0.0679	0.1616

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 6. United Arab Emirates: Vector Error Correction Estimates 1/

Long Run Equation:					
p (-1)	1				
neer (-1)	-0.2047 (-0.04579) [-4.47070]				
p^* (-1)	-0.8071 (-0.22152) [-3.64368]				
m (-1)	-0.1769 (-0.03993) [-4.42870]				
g (-1)	0.2647 (-0.04288) [6.17301]				
t	-0.0026				
C	-0.1734				
Adjustment Coefficient	-0.2206 (-0.057856) [-3.812334]				
Short Run Dynamic:	D(*p*)	D(*neer*)	D(p^*)	D(*m*)	D(g)
D(*p* (-1))	0.7763 (-0.17251) [4.50033]	-1.5589 (-0.55694) [-2.79896]	0.0841 (-0.14086) [0.59690]	0.1537 (-1.32245) [0.11620]	-0.4589 (-1.80142) [-0.25473]
D(*neer* (-1))	-0.1020 (-0.04795) [-2.12804]	-0.2799 (-0.15481) [-1.80795]	0.0291 (-0.03916) [0.74396]	-0.1867 (-0.3676) [-0.50780]	-0.2852 (-0.50073) [-0.56951]
D(p^* (-1))	0.1986 (-0.15667) [1.26748]	0.3541 (-0.5058) [0.70012]	0.4588 (-0.12793) [3.58626]	1.0684 (-1.20101) [0.88957]	3.7723 (-1.63599) [2.30579]
D(*m* (-1))	-0.0536 (-0.04306) [-1.24448]	0.5588 (-0.13902) [4.01925]	-0.0383 (-0.03516) [-1.08813]	0.3081 (-0.33011) [0.93332]	-0.3392 (-0.44967) [-0.75436]
D(g (-1))	0.0406 (-0.02283) [1.77880]	-0.1891 (-0.0737) [-2.56611]	-0.0104 (-0.01864) [-0.55837]	0.0879 (-0.17501) [0.50224]	-0.0863 (-0.2384) [-0.36209]
C	-0.0246 (-0.01618) [-1.52036]	0.0277 (-0.05223) [0.52985]	0.0244 (-0.01321) [1.84922]	-0.1173 (-0.12403) [-0.94577]	-0.2869 (-0.16895) [-1.69807]
t	0.0013 (-0.00047) [2.76854]	-0.0011 (-0.0015) [-0.72067]	-0.0001 (-0.00038) [-0.35927]	0.0059 (-0.00357) [1.66522]	0.0099 (-0.00487) [2.03365]
D(p^f (-1))	-0.0123 (-0.0444) [-0.27803]	-0.3709 (-0.14335) [-2.58717]	0.0687 (-0.03626) [1.89575]	0.0023 (-0.34039) [0.00664]	0.1417 (-0.46367) [0.30551]
D(excd(-1))	0.0010 (-0.00024) [4.19588]	0.0002 (-0.00076) [0.24886]	-0.0002 (-0.00019) [-0.88368]	0.0010 (-0.0018) [0.58005]	0.0015 (-0.00246) [0.62392]
R-squared	0.8497	0.8215	0.7318	0.4410	0.3528
Adj. R-squared	0.7701	0.7270	0.5898	0.1451	0.0101
Sum sq. resids	0.0022	0.0225	0.0014	0.1268	0.2353
S.E. equation	0.0113	0.0364	0.0092	0.0864	0.1176
F-statistic	10.6770	8.6922	5.1536	1.4904	1.0294
Log likelihood	89.0543	57.4099	94.5259	34.0607	25.7154
Akaike AIC	-5.8559	-3.5118	-6.2612	-1.7823	-1.1641
Schwarz SC	-5.3759	-3.0319	-5.7812	-1.3023	-0.6842
Mean dependent	0.0426	0.0023	0.0405	0.1178	0.0519
S.D. dependent	0.0235	0.0696	0.0144	0.0934	0.1182

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
1/ Included observations: 26 after adjustments, Standard errors in ( ) and t-statistics in [ ].

Table 7. Variance Decomposition of p						
Period	p	neer	p*	m	pcr	g
Bahrain						
1	100.00	0.00	0.00	0.00		0.00
2	71.02	8.54	0.51	18.68		1.25
3	49.49	6.19	2.35	36.17		5.81
Kuwait						
1	100.00	0.00	0.00		0.00	0.00
2	80.06	7.08	7.75		0.10	5.01
3	51.20	18.32	22.21		1.07	7.20
Oman						
1	100.00	0.00	0.00	0.00		0.00
2	95.57	3.83	0.14	0.06		0.39
3	89.08	9.87	0.20	0.24		0.62
Qatar						
1	100.00	0.00		0.00		0.00
2	75.80	18.45		1.32		4.44
3	61.73	33.83		1.80		2.64
Saudi Arabia						
1	100.00	0.00	0.00	0.00		0.00
2	48.14	5.16	42.75	1.51		2.44
3	21.88	7.32	65.24	0.66		4.90
UAE						
1	100.00	0.00	0.00	0.00		0.00
2	96.86	0.44	2.11	0.00		0.60
3	89.21	0.20	3.28	0.96		6.35

Table 8. Bahrain: Vector Error Correction Estimates

Long Run Equation:

p (-1)	1
$neer$ (-1)	3.06 (0.1783) [17.1596]
m (-1)	0.215729 (0.1638) [1.31716]
Con^p (-1)	0.153943 (0.2464) [0.62487]
I^p (-1)	-1.065624 (0.0812) [-13.1261]
t	0.024969
C	-21.05932
Adjustment Coefficient	-0.071717 (0.0230) [-3.118091]

Short Run Dynamic:	D(p)	D($neer$)	D(m)	D(Con^p)	D(I^p)
D(p (-1))	-0.291773 (0.2463) [-1.18488]	0.905887 (0.9595) [0.94413]	-0.72696 (1.0783) [-0.67415]	-1.216965 (0.5597) [-2.17416]	-0.977597 (3.7994) [-0.25730]
D($neer$ (-1))	0.151614 (0.1264) [1.19961]	0.044783 (0.4925) [0.09094]	-0.901824 (0.5535) [-1.62944]	0.440146 (0.2873) [1.53208]	1.592057 (1.9500) [0.81643]
D(m (-1))	-0.076998 (0.0595) [-1.29471]	-0.161708 (0.2317) [-0.69783]	-0.026192 (0.2604) [-0.10057]	-0.038677 (0.1352) [-0.28611]	0.231658 (0.9176) [0.25246]
D(Con^p (-1))	-0.251305 (0.1547) [-1.62425]	-0.14519 (0.6029) [-0.24083]	0.37262 (0.6775) [0.54996]	-0.655822 (0.3517) [-1.86475]	-0.597275 (2.3872) [-0.25020]
D(I^p (-1))	-0.037059 (0.0267) [-1.38820]	-0.057848 (0.1040) [-0.55612]	0.176687 (0.1169) [1.51138]	-0.04586 (0.0607) [-0.75574]	-0.180362 (0.4119) [-0.43789]
C	-0.047317 (0.0179) [-2.64534]	-0.108282 (0.0697) [-1.55361]	-0.137358 (0.0783) [-1.75360]	-0.083273 (0.0407) [-2.04810]	-2.58E-01 (0.2760) [-0.93313]
t	0.002834 (0.0009) [3.20893]	0.004206 (0.0034) [1.22207]	0.007787 (0.0039) [2.01335]	0.006707 (0.0020) [3.34098]	0.0131 (0.0136) [0.96138]
D(p^f (-1))	1.90E-02 (0.0680) [0.27969]	-0.352296 (0.2648) [-1.33023]	-6.29E-01 (0.2976) [-2.11232]	0.172118 (0.1545) [1.11404]	6.42E-01 (1.0487) [0.61225]
D(excd(-1))	-0.044654 (0.0814) [-0.54830]	-0.134888 (0.3173) [-0.42506]	0.742636 (0.3566) [2.08230]	-0.328835 (0.1851) [-1.77629]	-0.166984 (1.2566) [-0.13289]
R-squared	0.681039	0.459165	0.705539	0.752332	0.363075
Adj. R-squared	0.441818	0.053538	0.484693	0.566581	-0.114619
Sum sq. resids	0.002327	0.035329	0.044623	0.012023	0.553951
S.E. equation	0.013925	0.05426	0.06098	0.031653	0.214855
F-statistic	2.846905	1.131989	3.194712	4.050221	0.760058
Log likelihood	69.47994	39.55823	36.98935	51.41485	9.28228
Akaike AIC	-5.407267	-2.687112	-2.453578	-3.764987	0.065247
Schwarz SC	-4.911339	-2.191184	-1.957649	-3.269058	0.561176
Mean dependent	0.006838	-0.016415	0.080529	0.055453	0.056743
S.D. dependent	0.018639	0.055773	0.084949	0.04808	0.203508

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
Standard errors in ( ) & t-statistics in [ ]

Table 9. Kuwait: Vector Error Correction Estimates

Long Run Equation:

p (-1)	1.0000
$neer$ (-1)	-0.0227 (-0.07357) [-0.30800]
Con^p (-1)	0.0257 (-0.04073) [0.63141]
I^p (-1)	0.0920 (-0.02807) [3.27854]
t	-0.0264
C	-3.6396
Adjustment Coefficient	-0.3859 (-0.1207) [-3.19688]

Short Run Dynamic:

	D(p)	D($neer$)	D(Con^p)	D(I^p)
D(p (-1))	0.7100 (-0.31246) [2.27221]	1.0628 (-0.95407) [1.11398]	2.0839 (-0.78305) [2.66123]	1.6084 (-5.11795) [0.31427]
D($neer$ (-1))	0.0949 (-0.10116) [0.93824]	-0.0788 (-0.30888) [-0.25522]	0.2467 (-0.25351) [0.97318]	0.2477 (-1.65695) [0.14951]
D(Con^p (-1))	0.0694 (-0.05716) [1.21494]	0.0652 (-0.17453) [0.37332]	-0.2718 (-0.14324) [-1.89773]	-0.5940 (-0.93621) [-0.63444]
D(I^p (-1))	0.0620 (-0.03458) [1.79160]	-0.1139 (-0.1056) [-1.07859]	0.1199 (-0.08667) [1.38320]	0.1280 (-0.56648) [0.22596]
C	0.0257 (-0.01835) [1.39984]	-0.1302 (-0.05604) [-2.32289]	0.0245 (-0.04599) [0.53369]	-0.4124 (-0.30062) [-1.37172]
t	-0.0008 (-0.0006) [-1.26522]	0.0043 (-0.00184) [2.33166]	-0.0008 (-0.00151) [-0.51926]	0.0161 (-0.00985) [1.63953]
D(p^f (-1))	0.0077 -0.0701 [0.10988]	-0.4405 (-0.21398) [-2.05843]	0.1610 (-0.17562) [0.91677]	0.4888 (-1.14786) [0.42584]
D(excd(-1))	0.0233 (-0.00398) [5.86975]	-0.0086 (-0.01214) [-0.71098]	0.0132 (-0.00996) [1.32523]	-0.1146 (-0.06512) [-1.76009]
R-squared	0.8077	0.5016	0.8437	0.4201
Adj. R-squared	0.7051	0.2358	0.7604	0.1109
Sum sq. resids	0.0041	0.0386	0.0260	1.1121
S.E. equation	0.0166	0.0508	0.0417	0.2723
F-statistic	7.8732	1.8869	10.1244	1.3586
Log likelihood	69.9120	43.1216	47.8628	2.8071
Akaike AIC	-5.0760	-2.8435	-3.2386	0.5161
Schwarz SC	-4.6342	-2.4017	-2.7968	0.9578
Mean dependent	0.0279	-0.0030	0.0427	0.0030
S.D. dependent	0.0306	0.0581	0.0851	0.2888

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
Included observations: 26 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Table 10. Oman: Vector Error Correction Estimates

Long Run Equation:

p (-1)	1.0000
$neer$ (-1)	0.1041
	(-0.06119)
	[1.70067]
p^* (-1)	-1.4899
	(-0.28661)
	[-5.19846]
Con^p (-1)	-0.0803
	(-0.05773)
	[-1.39115]
I^p (-1)	0.0377
	(-0.0136)
	[2.76971]
t	0.0386
C	0.6598
Adjustment Coefficient	-0.9048
	(-0.13927)
	[-6.49720]

Short Run Dynamic:

	D(p)	D($neer$)	D(p^*)	D(Con^p)	D(I^p)
D(p (-1))	0.9289	-0.3878	-0.6079	-0.8866	1.0622
	(-0.15098)	(-0.50019)	(-0.39561)	(-0.43502)	(-1.46361)
	[6.15271]	[-0.77534]	[-1.53651]	[-2.03813]	[0.72574]
D(Con^p (-1))	0.2889	-0.2151	-0.1866	-0.3502	1.6060
	(-0.07334)	(-0.24297)	(-0.19217)	(-0.21131)	(-0.71095)
	[3.93921]	[-0.88534]	[-0.97121]	[-1.65737]	[2.25900]
D(p^* (-1))	0.1100	-0.1190	0.2198	0.4356	0.5055
	(-0.0789)	(-0.26138)	(-0.20673)	(-0.22732)	(-0.76482)
	[1.39386]	[-0.45535]	[1.06320]	[1.91606]	[0.66098]
D(Con^p (-1))	0.0926	0.1072	-0.2942	0.1257	-0.0598
	(-0.06542)	(-0.21674)	(-0.17142)	(-0.1885)	(-0.63419)
	[1.41580]	[0.49474]	[-1.71634]	[0.66671]	[-0.09432]
D(I^p (-1))	0.0393	-0.0618	0.0704	-0.0255	0.3122
	(-0.0231)	(-0.07654)	(-0.06054)	(-0.06657)	(-0.22397)
	[1.70035]	[-0.80706]	[1.16237]	[-0.38366]	[1.39374]
C	-0.0419	-0.0223	0.1301	0.0616	-0.0650
	(-0.01756)	(-0.05818)	(-0.04601)	(-0.0506)	(-0.17023)
	[-2.38579]	[-0.38246]	[2.82713]	[1.21831]	[-0.38212]
t	0.0011	0.0008	-0.0040	-0.0001	0.0037
	(-0.00062)	(-0.00204)	(-0.00162)	(-0.00178)	(-0.00598)
	[1.82886]	[0.37901]	[-2.45650]	[-0.04213]	[0.62187]
D(p^f (-1))	0.1842	-0.5680	-0.1176	-0.0576	1.0235
	(-0.07076)	(-0.23444)	(-0.18542)	(-0.20389)	(-0.68598)
	[2.60342]	[-2.42273]	[-0.63428]	[-0.28249]	[1.49209]
D(excd(-1))	0.0279	-0.2274	-0.2203	-0.0428	-0.3670
	(-0.03111)	(-0.10308)	(-0.08153)	(-0.08965)	(-0.30162)
	[0.89665]	[-2.20574]	[-2.70184]	[-0.47702]	[-1.21666]
R-squared	0.8111	0.5978	0.5670	0.5591	0.5177
Adj. R-squared	0.7110	0.3848	0.3377	0.3257	0.2623
Sum sq. resids	0.0060	0.0656	0.0410	0.0496	0.5617
S.E. equation	0.0188	0.0621	0.0491	0.0540	0.1818
F-statistic	8.1087	2.8070	2.4731	2.3952	2.0274
Log likelihood	75.2993	42.9573	49.2906	46.7263	13.9683
Akaike AIC	-4.8370	-2.4413	-2.9104	-2.7205	-0.2939
Schwarz SC	-4.3570	-1.9613	-2.4305	-2.2405	0.1860
Mean dependent	0.0121	-0.0057	0.0195	0.0790	0.0767
S.D. dependent	0.0349	0.0792	0.0604	0.0658	0.2116

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
Standard errors in ( ) & t-statistics in [ ]

Table 11. United Arab Emirates: Vector Error Correction Estimates

Long Run Equation:

p(-1)	1
$neer$(-1)	0.8613 (-0.08217) [10.4825]
p^*(-1)	-1.5886 (-0.59082) [-2.68873]
pcr(-1)	0.2304 (-0.05511) [4.17992]
Con^p(-1)	-0.9306 (-0.07985) [-11.6545]
I^p(-1)	0.1221 (-0.03861) [3.16324]
t	0.0542
C	-0.6619
Adjustment Coefficient	0.0982 (-0.03944) [2.49075]

Short Run Dynamic:

	D(p)	D($neer$)	D(p^*)	D(pcr)	D(Con^p)	D(I^p)
D(p(-1))	0.3242 (-0.20467) [1.58400]	0.4252 (-0.9915) [0.42881]	0.1007 (-0.14385) [0.70023]	3.3745 (-2.39024) [1.41177]	0.7300 (-1.20705) [0.60479]	0.0267 (-3.33756) [0.00801]
D($neer$(-1))	-0.2018 (-0.05271) [-3.82788]	0.1915 (-0.25536) [0.75005]	0.0228 (-0.03705) [0.61550]	1.0645 (-0.61561) [1.72912]	-0.5795 (-0.31088) [-1.86402]	-1.5711 (-0.85959) [-1.82775]
D(p^*(-1))	0.0661 (-0.16145) [0.40944]	0.7675 (-0.78213) [0.98136]	0.5124 (-0.11347) [4.51577]	3.1554 (-1.8855) [1.67349]	3.3537 (-0.95216) [3.52222]	0.5015 (-2.63278) [0.19047]
D(pcr(-1))	-0.0308 (-0.02962) [-1.04108]	0.1598 (-0.14347) [1.11362]	-0.0134 (-0.02081) [-0.64357]	-0.4753 (-0.34586) [-1.37421]	0.0391 (-0.17466) [0.22404]	-0.0123 (-0.48293) [-0.02556]
D(Con^p(-1))	0.0781 (-0.03753) [2.08046]	-0.1415 (-0.18181) [-0.77855]	-0.0409 (-0.02638) [-1.55209]	-0.3260 (-0.43829) [-0.74370]	0.0705 (-0.22133) [0.31838]	-0.3195 (-0.612) [-0.52204]
D(I^p(-1))	-0.0014 (-0.0244) [-0.05836]	0.0515 (-0.11821) [0.43584]	0.0037 (-0.01715) [0.21388]	-0.1774 (-0.28498) [-0.62238]	0.0821 (-0.14391) [0.57021]	-0.1163 (-0.39793) [-0.29230]
C	0.0055 (-0.0217) [0.25219]	-0.0733 (-0.10511) [-0.69782]	0.0151 (-0.01525) [0.99241]	-0.6978 (-0.25339) [-2.75399]	-0.3289 (-0.12796) [-2.57058]	-0.0504 (-0.35381) [-0.14242]
t	0.0008 (-0.00066) [1.22748]	0.0009 (-0.00318) [0.27494]	0.0000 (-0.00046) [0.07493]	0.0210 (-0.00766) [2.74555]	0.0087 (-0.00387) [2.25394]	0.0066 (-0.0107) [0.61581]
D(p^f(-1))	0.0365 (-0.04913) [0.74231]	-0.5447 (-0.23799) [-2.28879]	0.0564 (-0.03453) [1.63417]	0.5972 (-0.57373) [1.04088]	-0.5989 (-0.28973) [-2.06714]	-0.3273 (-0.80111) [-0.40857]
GDPDEV_UAE(-1)	0.0011 (-0.00026) [4.18461]	0.0000 (-0.00124) [-0.01500]	-0.0001 (-0.00018) [-0.56665]	-0.0045 (-0.00299) [-1.48972]	0.0010 (-0.00151) [0.65925]	0.0098 (-0.00418) [2.35123]
R-squared	0.8336	0.5550	0.7800	0.6025	0.8110	0.4529
Adj. R-squared	0.7295	0.2769	0.6425	0.3540	0.6930	0.1110
Sum sq. resids	0.0024	0.0561	0.0012	0.3258	0.0831	0.6353
S.E. equation	0.0122	0.0592	0.0086	0.1427	0.0721	0.1993
F-statistic	8.0132	1.9954	5.6728	2.4247	6.8678	1.3248
Log likelihood	87.6792	45.0786	97.2013	21.3204	39.7672	12.3066
Akaike AIC	-5.6799	-2.5243	-6.3853	-0.7645	-2.1309	-0.0968
Schwarz SC	-5.1520	-1.9964	-5.8573	-0.2365	-1.6030	0.4312
Mean dependent	0.0426	0.0023	0.0405	0.0479	0.0685	0.0820
S.D. dependent	0.0235	0.0696	0.0144	0.1776	0.1301	0.2113

Sources: IMF International Financial Statistics; World Economic Outlook; Regional Economic Outlook.
Standard errors in ( ) & t-statistics in [ ]