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External Stability Under Alternative Nominal Exchange Rate Anchors: An Application to the GCC Countries

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Abstract

Import and export stability is examined under two alternative nominal exchange rate anchors, the U.S. dollar and the SDR. Stability under the two pegs depends critically on import and export elasticity with respect to exchange rates. The implications of import and export elasticity for an optimal currency basket are also explored. The elasticity estimates for the GCC countries suggest that the SDR peg may not outperform the dollar peg in improving external stability. Nevertheless, switching to some other nominal exchange rate anchor may improve external stability, a possibility that remains to be explored.

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Contents **Page**

SUMMARY

All member countries of the GCC effectively peg their currencies to the U.S. dollar.* This policy has been guided by the broad objectives of minimizing exchange risks for the private sector and ensuring stable exchange rates among the GCC member countries. In the recent past, the dollar has exhibited greater instability relative to the SDR than other major currencies, which may result in import and export instability in the GCC countries. This paper examines whether the GCC countries can improve import and export stability by pegging their currencies to the SDR (or to another basket) instead of the dollar without significantly compromising other policy objectives.

A potential improvement in import and export stability from changing the nominal exchange rate peg from the dollar to the SDR depends on import and export elasticity with respect to the exchange rate of the dollar with the other currencies in the SDR basket. If the elasticity under the SDR peg is smaller than the elasticity under the dollar peg, stability is improved by switching to the SDR peg.

Import and export elasticity estimates for the GCC countries suggest that, in most cases, stability may not be improved by switching from the dollar peg to the SDR peg. Elasticity estimates for the trade balances in selected GCC countries support this result. The estimates are used to construct a currency basket that minimizes instability (optimal basket) and this basket is compared to the dollar and SDR pegs. The comparison shows that, in some cases, switching to a currency basket other than the SDR may improve external stability, a possibility that remains to be explored.

* The Cooperation Council for the Arab States of the Gulf (GCC) includes Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (U.A.E.).

I. Introduction

The GCC countries' currencies are effectively pegged to the U.S. dollar (Appendix I).[2] The exchange rate of the dollar with the other four major currencies that make up the SDR (German mark, Japanese yen, French franc, and British pound sterling) has been less stable than the exchange rate of the SDR with those currencies (Chart 1).[3] The fluctuations in the value of the dollar produce a significant degree of instability in the GCC countries' cross-exchange rates with the other SDR currencies. In view of the large share of the other SDR zone countries in the GCC countries' imports and exports, this has evoked arguments in favor of changing the effective peg of the GCC currencies from the dollar to the more stable SDR (Table 5). Along with the sharp depreciation of the dollar in recent years, these arguments have also been motivated by the international arrangements concerning the denomination of oil export prices. Oil exports of the GCC countries are largely dollar denominated and, on average, such exports make up about 80 percent of the GCC countries' exports. However, the shares of the other SDR zone and the rest-of-the-world (ROW) in the GCC countries' total imports are large. The share of the dollar-denominated imports in total imports is smaller than the share of dollar-denominated exports in total exports. Consequently, fluctuations in the value of the dollar may create significant disparities between export earnings and import bill. This, in turn, may result in disparities between the budgetary revenues and expenditures since, on average, about 75 percent of revenues are derived from oil exports and expenditures have a large import component in the GCC countries. Therefore, fluctuations in the value of the dollar may result in budgetary instability that reflects external instability. Thus, it would seem that a case could be made for changing the effective peg of the GCC currencies from the dollar to the SDR or to some other basket of currencies. The main question that this paper addresses is whether changing the effective nominal currency peg from the dollar to the SDR or to another basket might indeed improve overall external stability in the GCC countries.[4]

Since the breakdown of the Bretton Woods system, the literature on exchange rate management has focussed on exchange rate stabilization through alternative pegging arrangements. Simple nominal pegging of the exchange rate-- to a single currency, to the SDR, or to alternative currency baskets-- as well as arrangements targeting real effective

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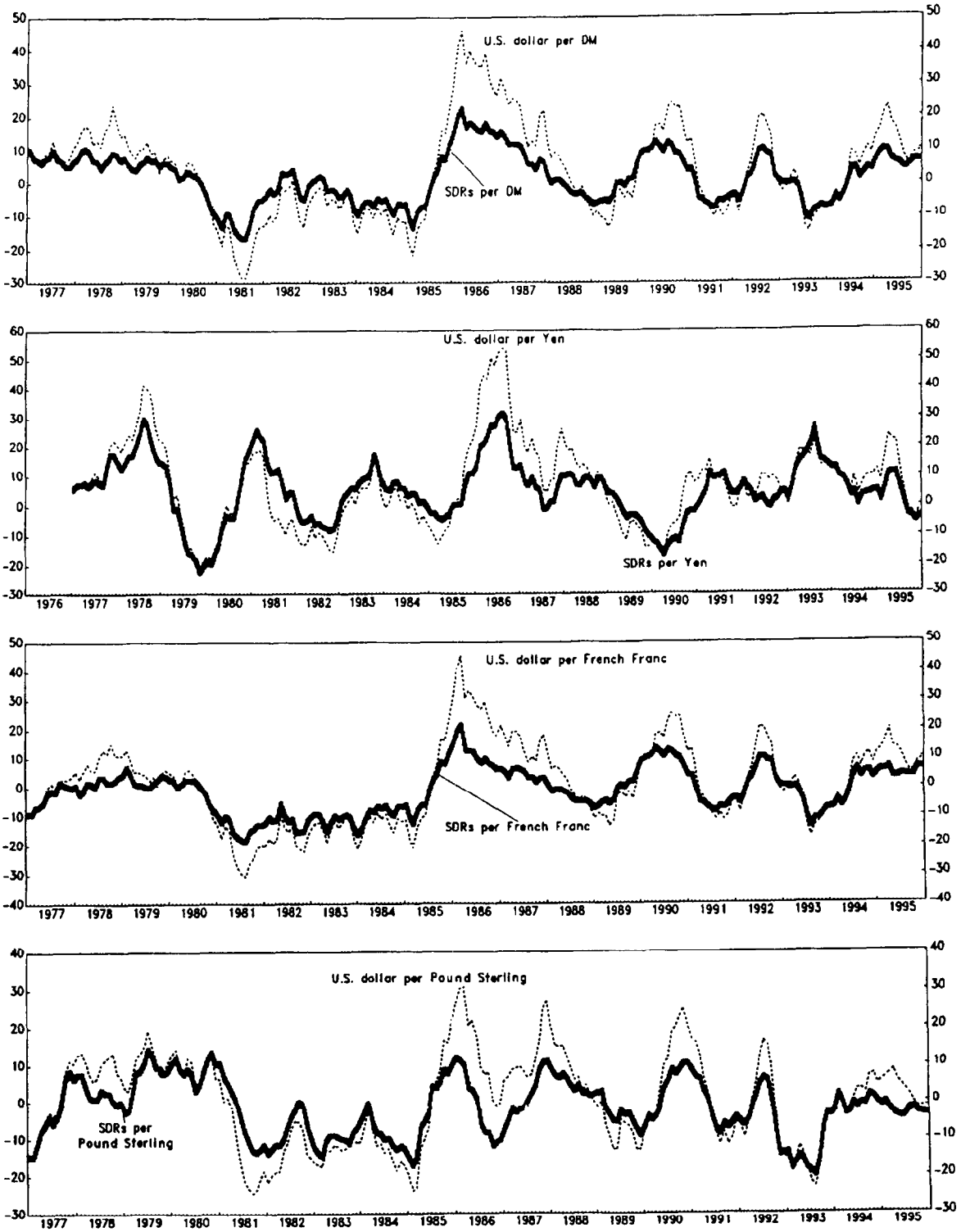
[2] Henceforth, the dollar will refer only to the U.S. dollar. In the GCC countries, the intervention currency is the dollar and foreign reserves for currency cover and balance of payments purposes are largely held in dollars.

[3] For convenience, we shall refer to the block of five countries (including the U.S.) whose currencies make up the SDR as the SDR zone; the sub-block of four countries (excluding the U.S.) shall be refereed to as the *other* SDR zone.

[4] By external stability or instability, we mean the degree of variability in the external accounts (imports, exports, current account balance).

CHART 1
VOLATILITY OF U.S. DOLLAR AND SDR VIS-A-VIS THE OTHER SDR BASKET CURRENCIES (DM, YEN, FF, POUND)
(Annual percentage changes)



Source: International Monetary Fund, International Financial Statistics.

exchange rates have been examined extensively.[5] The focus on nominal pegging has been motivated by the practical simplicity of pegging the nominal exchange rate to an internationally established measure of value such as the dollar or the SDR. Of course, as argued by many authors, pegging the exchange rate to a custom-made basket of currencies other than the SDR may be superior to pegging to a single currency or to the SDR for the objective of improving import and export stability. More broadly, it appears theoretically feasible to design exchange rate pegging schemes to improve the stability of some targeted macroeconomic variables. The main drawback of such schemes is their inherent complexity and heavy data requirements. The complexity of such schemes increases with the types of shocks to be accommodated and the number of macroeconomic variables targeted to be stabilized; this could limit their actual usefulness. In addition, at least in the developing countries, management of more complex exchange pegging arrangements is hampered by data constraints as well as by the lack of developed financial markets and institutions.[6]

In a general equilibrium context, exchange rate stability alone cannot guarantee overall external and domestic stability. However, exchange rate stability affects broad macroeconomic stability, that is, the stability of the fundamental macroeconomic

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[5] For example, Crockett and Nsouli (1977) compared the stability of the exchange rate under pegging to import-weighted currency baskets and to the SDR in a sample of developing countries. Lipschitz and Sundararajan (1980) examined the choice of optimal trade weights to minimize real exchange rate variance. Williamson (1981) examined nominal exchange rate stability under pegging to a simple currency and to the SDR for a sample of Arab countries and concluded that, in general, pegging to the SDR could result in greater exchange rate stability. A comprehensive review of the literature until the early 1980s is provided by Williamson (1982). Branson and Katseli (1980, 1981) examined the design of optimal currency baskets to increase the stability of nominal and real effective exchange rates under alternative policy targets. Brodsy and Sampson (1984) examined trade-weighted exchange pegging arrangements and, for a sample of developing countries, found that the SDR peg was relatively more stable than the dollar peg; however, for the CFA zone countries, they concluded that the French franc peg was relatively more stable than the SDR peg. A comprehensive review of the related literature through 1990 is by Aghevli, Khan and Montiel (1991). Wickham (1987, 1993) emphasized the importance of accounting for the heterogeneity of imports and import elasticities in designing import-weighted optimal currency baskets; Wickham further examined (in an unpublished manuscript) the implications of arithmetic (linear) *versus* geometric pegging arrangements for exchange rate stability.

[6] For example, in targeting the real effective exchange rate, a main drawback is the considerable lag in the availability of price data; see the discussion of the related issues in Aghevli, Khan and Montiel (1991). Furthermore, targeting the real exchange rate can undermine price stability in some circumstances.

variables. [7] Therefore, the objective of exchange rate stabilization needs to be put in proper perspective through incorporating the impact of exchange rate stability on aggregate demand and supply, in particular, demand for imports and exports.[8] Along these lines, this study examines the impact of exchange rate stability on import and export stability. The focus is on shocks on the exchange rate of the dollar with the other SDR currencies under the alternatives of pegging the home currency to the dollar or to the SDR. Under these two pegs, the stability of the real exchange rate between the home country's currency and the other SDR currencies is examined. It is shown that, although by switching from the dollar peg to the SDR peg the stability of the exchange rate between the home country's currency and the other SDR currencies is increased, the stability of the exchange rate between the home country's currency and the dollar is decreased. The combined effect of the switch from the dollar to the SDR does not necessarily translate into an improvement in overall import and export stability. Such a switch in the peg improves import and export stability, if the import and export elasticities with respect to the exchange rate between the dollar and the other SDR currencies under the SDR peg are smaller than they are under the dollar peg. The model is used to examine also the optimal basket weights that would eliminate the variation in imports and exports in response to disturbances in the exchange rate between the dollar and the other SDR currencies.

Using estimable specifications for imports and exports, we examine if the above stability condition is satisfied in the case of the merchandise imports and exports of the GCC countries. The estimates for the import and export elasticities suggest that, in most cases, import and export stability may not necessarily improve by a switch from the dollar to the SDR peg. The regression results for the elasticities of the trade balances of selected GCC countries support this result. The regression results also suggest that, in some cases, pegging to an elasticity-weighted basket of SDR currencies may prove to be more stable than pegging to the dollar or to the SDR. However, optimal pegging arrangements remain to be explored further for the GCC countries. In addition, factors other than stabilization of some selected variables may be important in choosing an exchange rate regime, for example, the credibility

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[7] In this regard, it appears that a broad consensus has not emerged either as to the relative superiority of one type of pegging arrangement over the other, or, as to the relative superiority of pegging as opposed to more flexible arrangements or free-floating. The divergent points of view and empirical results have evidently been associated with the divergent policy objectives adopted by various authors. Additionally, as noted by Williamson (1993), the difficulty of determining an equilibrium exchange rate to serve as a target toward satisfying a certain policy objective through exchange rate stabilization appears to be an important factor behind the divergent results in the literature, at least at the empirical level.

[8] This is the approach taken by Flanders and Helpman (1979), Flanders and Tishler (1981), among others. In a general equilibrium context, two formal expositions of the impact of exchange rate stability on macroeconomic stability are by Turnovsky (1976) and Dornbusch (1982). Dornbusch shows that policies that aim at maintaining a constant real effective exchange rate are stabilizing with respect to demand shocks but such policies are destabilizing with respect to supply shocks. A recent analysis of policies targeting real exchange rates and their consequences for inflation is by Calvo, Reinhart and Vegh (1994).

of exchange policy stance, the impact of exchange rate volatility on market structure, stability in foreign exchange markets, transactions costs arising from exchange rate volatility, etc. If no substantial gain is to be achieved by switching from the dollar peg to the SDR or to some other peg, such considerations may well favor continuing with the dollar peg. An evaluation of the impact of the prevailing exchange rate regimes in the GCC countries on such factors is beyond the scope of this paper.

The paper is organized as follows. In Section II, we present a simple estimable model of import and export stability under the dollar, SDR, and optimal pegs. In Section III, the model is estimated for the GCC countries' merchandise imports and exports, and, where feasible, for trade balances; the regression results are summarized and interpreted. Section IV concludes. Appendix I provides a brief description of the prevailing exchange arrangements in the GCC countries. The description of the database and derivation of the exchange rate indexes used in estimation are presented in Appendix II. The regression results are presented in Appendix III.

II. The Model

The home country has two trading partners, Country 1 and Country 2. Units of currency of the home country, Country 1, and Country 2 are denoted by R, US$, and DM, respectively. The nominal exchange rate between the home country's currency and the US$ is denoted by E, so that R = E·US$. The nominal exchange rate between the US$ and DM is denoted by Z, so that US$ = Z·DM. The nominal exchange rate between R and DM is V, so that R = V·DM and V = E·Z. [9] The price levels of the home country, Country 1, and Country 2 are denoted by P, P^1, and P^2, respectively. Thus, the real exchange rates can be defined as

$$e = \frac{P^1}{EP}\ ;\ z = \frac{P^2}{ZP^1}\ ;\ v = \frac{P^2}{VP} = \frac{P^1}{EP}\frac{P^2}{ZP^1} = ez, \qquad (1)$$

where e is the real exchange rate between R and US$, z is the real exchange rate between US$ and DM, and v is the real exchange rate between R and DM.

1. Imports

Let y and M respectively denote the real income level and the level of total real imports of the home country. An estimable specification for imports is

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[9] For example, one Saudi riyal is equal to 0.2670 dollars (E = 0.2670), or, one dollar is equal to 3.745 Saudi riyals (1/E = 3.7450). Similarly (at end-1994) one dollar is equal to 1.5488 Deutsche marks (Z = 1.5488). Therefore, one Saudi riyal is equal to 0.4136 Deutsche marks (V = E·Z = 0.4136), or, one Deutsche mark is equal to 2.4180 Saudi riyals (1/V = 2.4180).

$$\ln M = m_o + m_1 \ln e + m_2 \ln v + m_3 \ln y \qquad (2)$$

where m's are constants.[10] Differentiation of (2) with respect to Z yields

$$\hat{M} = m_1 \hat{e} + m_2 \hat{v} + m_3 \hat{y} \; ;$$

$$\hat{M} = \frac{dM}{M} \; ; \; \hat{e} = \frac{de}{e} \; ; \; \hat{v} = \frac{dv}{v} \; ; \; \hat{y} = \frac{dy}{y} \qquad (3)$$

where the caps over the terms denote proportional changes. Notice that m_1 is the elasticity of imports with respect to e, m_2 is the elasticity of imports with respect to v, and m_3 is the elasticity of imports with respect to y.

Taking the logarithms of e and v in (1) and differentiating with respect to Z, we can show that

$$\hat{e} = \pi^1 - \pi - \hat{E}_o \; ; \; \hat{v} = \pi^2 - \pi - \hat{E}_o - \hat{Z} \; ;$$

$$\hat{E} = \frac{dE}{E} \; ; \; \hat{Z} = \frac{dZ}{Z} \; ; \; \pi = \frac{dP}{P} \; ; \; \pi^1 = \frac{dP^1}{P^1} \; ; \; \pi^2 = \frac{dP^2}{P^2} \qquad (4)$$

where caps over E and Z denote proportional changes in E and Z, and π, π^1 and π^2 are the inflation rates in the home country, Country 1, and Country 2, respectively.

First consider the case of the dollar peg, or, the case in which the home currency, R, is pegged to US$ at a given constant rate, $E = E_o$. Because E_o is constant, $\hat{E} = 0$, and it follows from (4) that the proportional changes in e and v under the dollar peg are

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[10] Let M^1 and M^2 be the home country's imports from Country 1 and Country 2, respectively, in terms of the home country's currency, such that

$$M^1 = e \cdot f^1(e, v, y) \text{ and } M^2 = v \cdot f^2(e, v, y).$$
$$\quad - \; + + \qquad\qquad + \; - \; +$$

The assumptions for the signs of the partial derivatives of M^1 and M^2 are standard. Thus, total imports can be expressed as $M = M^1 + M^2$. Through differentiating M with respect to Z, it is possible to argue for total imports that, in (2), the signs of m_1 and m_2 are ambiguous and m_3 is unambiguously positive.

$$\hat{e} = \pi^1 - \pi \; ; \; \hat{v} = \pi^2 - \pi - \hat{Z} \; . \qquad (5)$$

Substituting (5) into (3) and rearranging terms, we can show that the proportional change in total imports in response to a disturbance in Z under the dollar peg is

$$\hat{M}^{US\$} = [m_1(\pi^1 - \pi) + m_2(\pi^2 - \pi) + m_3 \hat{y}] - m_2\hat{Z} \; , \qquad (6)$$

where $\hat{M}^{US\$}$ denotes the proportional change in M under the dollar peg. Notice that m_2 is the elasticity of imports with respect to Z under the dollar peg.

Next consider the case where the home country's currency is pegged to the SDR (or, more generally, to another linear basket of currencies) at a constant rate σ so that $R = \sigma \cdot (SDR)$. The assumption concerning σ is that, once it is fixed, it remains unchanged when Z is disturbed, at least in the period when such a disturbance occurs. Consistent with the IMF definition of the SDR, we define the SDR as a weighted-average of the two currencies, US$ and DM, that make up the SDR as below:

$$SDR = \alpha \cdot US\$ + (1-\alpha) \cdot DM \; ; \; 0 < \alpha < 1 \qquad (7)$$

where α is a predetermined constant. Thus, the currency DM stands for the composite of the other four major currencies (excluding the dollar) that make up the SDR.[11] Therefore, recalling that $US\$ = Z \cdot DM$ and using (7), the exchange rate between the SDR and US$ and the exchange rate between the SDR and DM can be calculated as, respectively,

$$\frac{SDR}{US\$} = \frac{\alpha Z + (1-\alpha)}{Z} \; ; \; \frac{SDR}{DM} = \alpha Z + (1-\alpha) \; . \qquad (8)$$

Since $R = \sigma \cdot (SDR) = E \cdot US\$ = V \cdot DM$, using (8), we can express the nominal exchange rate between the home currency and US$ and the nominal exchange rate between the home currency and DM as, respectively,

$$E = \sigma \left[\frac{\alpha Z + (1-\alpha)}{Z}\right] \; ; \; V = \sigma \left[\alpha Z + (1-\alpha)\right] \; . \qquad (9)$$

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[11] The SDR value of α is 0.40, or, the weight of the dollar in the SDR during 1991-95 (Appendix II).

By substituting for E and V from (9) into (1), the corresponding real exchange rates can be derived as

$$e = \frac{1}{\sigma}\left[\frac{Z}{\alpha Z + (1-\alpha)}\right]\left(\frac{P^1}{P}\right) \; ; \; v = ez = \frac{1}{\sigma}\left[\frac{1}{\alpha Z + (1-\alpha)}\right]\left(\frac{P^2}{P}\right) \qquad \textbf{(10)}$$

At the initial point in time when the home country's currency peg is switched from the dollar to the SDR, let the initial values of Z and the price levels be Z_o, P_o, P_o^1, P_o^2, respectively. For small disturbances in Z, it is convenient to index Z_o at unity, that is, $Z_o = 1$. [12] It is possible to choose the value of σ, or the rate at which the home country's currency is pegged to the SDR, such that

$$\sigma = \sigma_o = \frac{E_o Z_o}{\alpha Z_o + (1-\alpha)} = E_o \; ; \; Z_o = 1 \; . \qquad \textbf{(11)}$$

Substitution of (11) into (10) shows that, if $\sigma = \sigma_o = E_o$, then $e = e_o$ and $v = v_o = e_o z_o$, where e_o, v_o, z_o are the initial levels of e, v, z. [13]

By substituting $\sigma_o = E_o$ (a constant) in E as expressed in (9) and through logarithmic differentiation of the resulting term for E, we can show that, with $Z_o = 1$,

$$\hat{E} = -(1-\alpha)\,\hat{Z} \; . \qquad \textbf{(12)}$$

Substitution of (12) into (4) shows that the proportional changes in e and v under the SDR peg are

$$\hat{e} = \pi^1 - \pi + (1-\alpha)\hat{Z} \; ; \; \hat{v} = \pi^2 - \pi - \alpha\hat{Z} \; . \qquad \textbf{(13)}$$

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[12] Choosing $Z_o = 1$ is only an approximation for the convenience of simplifying the notation for the comparison of the variation in E resulting from disturbances in Z under the SDR and US$ pegs.

[13] With $e = e_o$ and $v = v_o$, the real exchange rates are not altered as a result of the switch from the dollar peg to the SDR peg; hence, the initial level of imports is not affected by the switch from the dollar peg to the SDR peg.

By substituting from (13) into (3) and rearranging terms, the proportional change in total imports in response to disturbances in Z under the SDR peg is

$$\hat{M}^{SDR} = [m_1(\pi^1-\pi) + m_2(\pi^2-\pi) + m_3\,\hat{y}] - [\alpha m_2 - (1-\alpha)m_1]\hat{Z}\ , \qquad (14)$$

where $\hat{M}^{SDR}$ denotes the proportional change in M under the SDR peg. The term $[\alpha m_2 - (1-\alpha)m_1]$ is the elasticity of imports with respect to Z under the SDR peg. Comparison of the (absolute values of) the import elasticities in (6) and (14) shows that imports are more stable under the SDR peg than under the dollar peg if

$$|\alpha m_2 - (1-\alpha)m_1| < |m_2|\ . \qquad (15)$$

In summary, if the import elasticity with respect to Z under the SDR peg is less than the import elasticity under the dollar peg, then import stability is improved by switching from the dollar peg to the SDR peg. In addition, when the stability condition in (15) holds, then the stability of imports is improved by switching to the SDR peg without affecting the initial level of imports.[14] The intuition behind the result in (15) can be explained as follows. As indicated by (5), under the dollar peg, disturbances in the nominal exchange rate between US$ and DM, or Z, affect only the exchange rate between the home country's currency and the currency of Country 2, or v. But under the SDR peg, as indicated by (13), disturbance in Z affect both v and e, that is, the exchange rate between the home country's currency and the currency of Country 1 is affected also. Notice that (5) and (13) indicate that v is more stable but e is less stable under the SDR peg than under the dollar peg. If the stability condition in (15) does not hold, then the instability introduced through e dominates the stability introduced through v under the SDR peg and, overall, imports become less stable under the SDR peg than under the dollar peg.

If the choice of a currency basket, defined as in (7), is interpreted to be an independent currency basket under the control of the policy maker, the policy maker can choose the value of α (the basket weights of US$ and DM) such that the variation in imports with respect to disturbances in Z is zero; let this value of α be denoted by α^*. The left-hand-side of the inequality in (15) is zero, that is, the variation in imports with respect to disturbances in Z is zero, if

$$\alpha^* = \frac{m_1}{m_1 + m_2}\ ;\ 0 \le \alpha^* \le 1\ . \qquad (16)$$

Notice that the restriction on the feasible range of values for α^* now applies as a weak inequality, since the policy maker has the leeway to choose $\alpha^* = 1$ (US$ peg) or $\alpha^* = 1$ (DM

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[14] However, notice that the parameters of the elasticity terms are either behavioral parameters (m_1, m_2) or exogenous (α). Therefore, the values of the elasticities are not under the control of the home country and the stability condition in (15) may hold only by fluke.

peg). Given the estimates for m_1 and m_2 in a country, it is possible that $\alpha^* < 0$ or $\alpha^* > 1$, that is α^* may not be in the feasible range of values; in such a case, one of the extreme values of α^*, $\alpha^* = 1$ or $\alpha^* = 0$, can be chosen. By comparing the SDR peg ($\alpha = 0.4$), the US$ peg ($\alpha = 1$), the DM peg ($\alpha = 0$), and the possible optimal peg ($\alpha = \alpha^*$), it is possible to see which of the possible pegs in our model results in the smallest variation in imports due to disturbances in Z. The following observations are illuminating for the interpretation of the empirical results. Notice from (15) that, if elasticity with respect to DM, or m_2, is zero (or statistically insignificant), that is, if imports are not sensitive to variations in the home currency's exchange rate with respect to DM, the focus of import stabilization is the elasticity with respect to the dollar, or m_1. In this case, α should be chosen such that imports are rendered insensitive to variations in the home currency's exchange rate with respect to the dollar. That is, with $m_2 = 0$, (15) implies that the optimal value of α is $\alpha^* = 1$, or, US$ peg is optimal. The opposite is true if imports are not sensitive to changes in the home currency's exchange rate with respect to the dollar, that is, if $m_1 = 0$, then $\alpha^* = 0$, or, DM peg is optimal.

The optimal value of α is the elasticity-weighted value of α that would eliminate the variation in imports with respect to disturbances in Z only. Since prices (P, P_1, P_2) are variable (that is, prices are correlated with disturbances in Z), the variation in imports is non-zero even when $\alpha = \alpha^*$. The above argument is based on minimizing variations in the nominal effective exchange rate (NEER) of the home currency, R, and a basket of two currencies (US$ and DM). The stability of the corresponding real effective exchange rate (REER) would depend on the correlation between relative prices and the bilateral exchange rates. Therefore, the weights that would minimize the variance of REER could be different from the weights used in the calculation of the REER.[15]

2. Exports

An estimable total export function can be specified as

$$\ln X = x_o + x_1 \ln e + x_2 \ln v \qquad (17)$$

where x's are constants, and x_1 and x_2 are the export elasticities with respect to the exchange rates. It is assumed that the income levels of Country 1 and Country 2 do not appreciably affect their imports from the home country, so they are not included in the export function.[16] With arguments similar to those leading to (15), we can show that exports are more stable under the SDR peg than under the dollar peg if

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[15] See Lipschitz and Sundararajan (1980).

[16] This assumption is supported by an examination of data on the GCC countries' exports to and the GDP levels of the SDR zone, the other SDR zone, and the dollar zone during the estimation period.

$$|\alpha\, x_2 - (1-\alpha)\, x_1| < |x_2| \,. \qquad (18)$$

That is, if the export elasticity with respect to Z under the SDR peg is less than the export elasticity under the dollar peg, exports are more stable under the SDR peg than they are under the dollar peg. The stability condition in (18) for exports is similar to the stability condition for imports in (15), therefore, the same interpretation of relative stability under the two pegs applies to exports also. Furthermore, similar to the case of imports, it is possible to solve for the value of α that minimizes the variation in exports with respect to disturbances in Z.

3. Current account, and domestic income and price level

It can be shown that stability conditions similar to those above can be generalized to current account stability, and to domestic income and price (inflation) stability.[17] Therefore, as a first-order approximation, examining the stability of imports and exports is sufficient to draw similar conclusions about the impact of a switch from the US$ peg to the SDR peg on broad macroeconomic stability. Thus, as in the case of imports and exports, it is not possible to argue *a priori* that switching from the US$ peg to the SDR peg improves macroeconomic stability.

III. An Application to the GCC Countries

1. Regression specifications

The database comprises of the IMF International Financial Statistics (IFS), the World Economic Outlook (WEO), and the Direction of Trade (DOT) statistics. The DOT data are available only for merchandise imports and exports. The general estimation period is 1976-94. Shorter estimation periods are used for some GCC countries, as dictated by data availability. Ordinary Least Squares estimation is applied to annual data.

Since our focus is aggregate import and export stability, for each GCC country, we define two trade zones: (1) the SDR zone, comprising the U.S., Germany, Japan, France, and the U.K.; and (2) the world, including the SDR zone.[18]

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[17] The proof for the generalization of the stability conditions to the current account and to income and prices is available from the authors on request; the proof focusses on *demand shocks*.

[18] A significant portion of trade with the rest-of-the-world (ROW) might be denominated in dollars or denominated in other SDR currencies. Although this conjecture is most conspicuously relevant for oil trade, it appears to be quite relevant for the GCC countries' imports also. Thus, there is merit in estimating the regressions for trade including the ROW, that is, for trade with the world (the SDR zone plus the ROW).

Import prices might be sticky, in the sense that the exporting country does not immediately adjust the dollar price of its exports to a GCC country, perhaps because of contractual obligations or for maintaining market share.[19] Furthermore, changes in the home country's income may have a lagged effect on imports. Because of these possibilities, some regressions are estimated with independent variables lagged once. [20]

The specifications presented in (2) and (17) for imports and exports, respectively, are used for estimation purposes. Incorporating lags, these regression equations can be expressed as

$$\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell} \; ; \qquad i, j, \ell = 0, 1 \; ; \tag{19}$$

$$\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j} \; ; \; i, j = 0, 1 \tag{20}$$

where t denotes the current time period and i, j, ℓ denote the time lags.

In some GCC countries, the trade balances are positive throughout the indicated estimation periods. This enables a log-linear specification of trade balances similar to the specifications for imports and exports. [21] With assumptions similar to those that lead to the specifications in (19) and (20), we specify the trade balance regressions as

$$\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell} \; ; \qquad i, j, \ell = 0, 1 \; . \tag{21}$$

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[19] Such import price stickiness was observed in Saudi Arabia in 1994 and early 1995 when the dollar underwent significant depreciation.

[20] Estimation with longer lags did not appreciably improve the regression results or affect the magnitude of the difference between the estimated values of the import and export elasticities under the dollar and the SDR pegs.

[21] Alternatively, difference of log of exports and log of imports (that is, the log of exports-to-imports ratio) could be chosen for analysis.

where b's are constants. Again, conditions similar to (15) and (18) can be derived to examine trade balance stability under the US$ and SDR pegs.

Although not all the GCC countries pegged their currencies to the dollar during 1976-94, all countries pegged their currencies to the dollar for most of this period.[22] The regressions are estimated for the longest possible period during 1976-94. [23] The derivation of the exchange rate indexes used in estimation (e, v, z, Z) is explained in Appendix II. The evaluation of the results is carried out for the last year in the period under consideration, or 1994, with the interpretation that 1994 is the "initial" year when a switch from the dollar peg to the SDR peg is considered (1989 in the case of Kuwait).

2. Regression results

For each GCC country, the most robust results for the elasticity estimates from (19), (20) and (21) are summarized in Table 1, along with the values of α for which the variation in imports, exports and trade balances with respect to disturbances in Z is zero (α^*). The regression results are presented in Appendix III.

For imports, in most cases, the regression results indicate that the differences in the variability of imports under the dollar and the SDR pegs are either small or the US$ peg is more stable. The exceptions are the cases of the U.A.E.'s imports from the world and Kuwait's imports from the SDR zone where the elasticity values under the SDR peg are considerably smaller than the elasticity values under the US$ peg. For exports, the US$ peg dominates except in the cases of Bahrain's and the U.A.E.'s exports to the world. For trade balances, the US$ peg dominates in all cases except in Kuwait where the elasticity estimates under both pegs are the same.

Based on the elasticity estimates in Table 1, a summary comparison of stability under the US$, DM, and the optimal pegs is presented in Table 2. The comparison is based on the following arguments:

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[22] Although Kuwait's currency is not directly pegged to the dollar, the currency basket used by the authorities has a very large dollar weight. Therefore, for regression purposes, we treat Kuwait the same as the other GCC countries whose currencies are directly pegged to the dollar at constant rates.

[23] As a cross-check, regressions were run for Saudi Arabia only for the period when the Saudi riyal was pegged directly to the dollar (1986-94). Although the regressions for the period 1986-94 produced significantly different elasticity estimates relative to the estimates for the period 1976-94, the difference between the import and export elasticity values under the dollar peg and the SDR peg remained small for both periods.

Table. 1: The GCC Countries: Summary of Elasticity and α^* Estimates

	DM peg ($\alpha = 0$)	US$peg ($\alpha = 1$)	SDR peg ($\alpha = 0.4$)	α^*
		SAUDI ARABIA		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	0.46	-0.62	-0.52*	n.a.
World	0.45	-0.51*	-0.47	n.a.
Exports	**x1**	**x2**	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-1.94	1.67*	1.83*	n.a.
World	1.83*	1.62*	1.75*	n.a.
Trade Balance	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$	
SDR zone	-5.86*	4.43*	5.29*	n.a.
		QATAR		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	-1.69*	0.65*	1.27	n.a.
World	-0.61	0.61	0.61	n.a.
Exports	**x1**	**x2**	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-2.00*	0.74	1.49	n.a.
World	-3.14	0.64	2.14	n.a.
Trade Balance	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$	
SDR zone	1.18	-1.01*	-1.11	n.a.
World	-3.07*	-1.16*	1.37*	0.73
		BAHRAIN		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	-0.13	0.37*	0.22	n.a.
World	-0.55*	0.36*	0.48	n.a.
Exports	**x1**	**x2**	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-1.19	0.10	0.75	n.a.
World	0.91	0.98*	-0.15*	0.51

Source: Tables 6-11

* = statistically significant; n.a. = α^* not in the feasible range

Table 1. The GCC Countries: Summary of Elasticity and α* Estimates (continued)

	DM peg (α=0)	US$ peg (α=1)	SDR peg (α=0.4)	α*
		U.A.E.		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	-1.93*	0.63*	1.41	n.a.
World	0.28	0.86*	0.18	0.24
Exports	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-1.20	1.04*	1.13*	n.a.
World	-0.15	0.93*	0.46	n.a.
Trade balance	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$	
SDR zone	-2.95	-0.19	1.70	0.93
World	-1.64	-0.56	0.76	0.75
		OMAN		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	-1.29*	0.10	0.82*	n.a.
World	-0.74	0.21	0.53	n.a.
Exports	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-1.20	0.54	0.94*	n.a.
World	0.84*	0.32	-0.37	0.72
Trade balance	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$	
World	-2.82	0.54	1.91	n.a.
		KUWAIT		
Imports	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$	
SDR zone	-0.34	-0.67*	-0.07	0.33
World	0.05	-0.26	-0.14*	n.a.
Exports	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$	
SDR zone	-2.04*	1.04*	1.64*	n.a.
World	-1.39*	0.68	1.10*	n.a.
Trade balance	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$	
World	-2.12*	-0.91	0.91*	0.70

Source: Tables 6-11

* = statistically significant; n.a. = α* not in the feasible range

1. when m_1 is statistically significant but m_2 is not, then the source of statistically significant variability in imports is due to shocks on Z is m_1, or, the elasticity of imports with respect to the home country's exchange rate with the dollar; then, the left-hand-side of (15) is zero if $\alpha = 1$, that is, the US$ peg should be chosen; the opposite is true when m_2 is statistically significant and m_1 is not; then, the source of statistically significant variability in imports is the elasticity of imports with respect to the home currency's exchange rate with DM, and the left-hand-side of (15) is zero if $\alpha = 0$, that is, the DM peg should be chosen;

2. when both elasticity estimates are statistically significant but α^* is not in the feasible range ($\alpha^* < 0$ or $\alpha^* > 1$), then, if $|m_1| > |m_2|$, the variable is more stable if $\alpha = 1$, that is, the US$ peg should be chosen; if $|m_1| < |m_2|$, the variable is more stable if $\alpha = 0$, that is, the DM peg should be chosen;

3. when α^* is found to be in the feasible range and both m_1 and m_2 are significant, the optimal peg dominates both the US$ and DM pegs.

The statistically significant results in Table 2 are mixed. As regards trade with the SDR zone, for imports, the US$ peg dominates in all countries except Bahrain and Kuwait; for exports, US$ peg dominates in all countries except the U.A.E.; for trade balances, US$ peg dominates in all countries except Qatar.

As regards trade with the world, for imports, the DM peg dominates in all countries except Bahrain; for exports, the US$ peg dominates in all countries except Bahrain and the U.A.E.; for trade balances, US$ peg dominates in Saudi Arabia and Kuwait but an optimal basket ($\alpha^* = 0.73$) dominates in Qatar. Therefore, if the goal were stabilizing Qatar's trade balance with the world, a statistically significant case could be made for the optimal peg in Qatar.[24] However, this result is not conclusive because, in our model, the optimal peg basket is restricted to the five SDR currencies. A comparison of stability of pegging to the dollar as opposed to pegging to a broader or narrower peg basket than the SDR may well produce different results.[25] An exploration of an optimal peg basket based on REER for the GCC countries is outside the scope of this paper.

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[24] In the case of Qatar, the implications of the optimal value of α for broad exchange rate stability was also explored through constructing a broader REER index as a trade-weighted-average of the e and v indexes. The resulting REER index was then recalculated using $\alpha^* = 0.73$. Comparison of the original REER index to the REER index calculated using α^* showed that the difference between their variances over the estimation period was minimal. This result is not surprising because α^* in the case of Qatar is close to the actual value of α (unity) under the prevailing US$ peg.

[25] It is also possible to alter occasionally the composition of such a basket in order to attain greater stability. Frequent changes in the peg would, however, bring the exchange rate regime closer to a managed float.

Table 2. The GCC Countries: Comparison of Import, Export and Trade Balance Stability under Alternative Nominal Currency Pegs 1/

	SAUDI ARABIA			QATAR			BAHRAIN		
Trade zone	Imports	Exports	Trade balance	Imports	Exports	Trade balance	Imports	Exports	Trade balance
SDR zone	...	US$	n.a.	US$	US$	DM	DM	...	n.a.
World	DM	US$	US$	DM	US$	OPT (α^*=0.73)	US$	DM	n.a.

	U.A.E.			OMAN			KUWAIT		
Trade zone	Imports	Exports	Trade balance	Imports	Exports	Trade balance	Imports	Exports	Trade balance
SDR zone	US$	DM	...	US$	...	n.a.	DM	US$	n.a.
World	DM	DM	...	...	US$	...	...	US$	US$

Source: Table 1

1/ US$ indicates that the variable is more stable under the US$ peg; DM indicates that the variable is more stable under the DM peg; SDR indicates that the variable is more stable under the SDR peg; OPT indicates that the value of α is in the feasible range ($0 \leq \alpha^* \leq 1$) and the optimal peg dominates, the value of α^* is indicated in parenthesis below; "..." indicates that the regression results are inconclusive because both elasticity estimates are statistically insignificant; "n.a." indicates that no regression results are available.

IV. Concluding Remarks

We have shown that the stability of imports and exports under the dollar peg and the SDR peg depends critically on the elasticities with respect to the exchange rates. While the home country's real exchange rate with respect to the other SDR currencies (v) is stabilized as a result of the switch from the dollar peg to the SDR peg, the real exchange rate with respect to the dollar (e) is destabilized. Given the import and export elasticities with respect to the exchange rates, it is conceivable that the instability introduced through e dominates the stability introduced through v, resulting in greater overall import and export instability under the SDR peg than under the dollar peg.

In most GCC countries, the empirical results suggest that a switch from the prevailing dollar peg to the SDR peg is not likely to result in an improvement in external stability. In addition, other important factors besides the stabilization of selected target variables should be taken into consideration while evaluating the appropriateness of such a switch; for example, the credibility of exchange policy stance, the impact of exchange rate volatility on market structure, stability in foreign exchange markets, transactions costs arising from exchange rate volatility, and so on. These factors could become critical particularly if no substantial gain in external stability were to be achieved by abandoning the dollar peg in favor of the SDR peg or an optimal peg in the GCC countries.

Should the GCC countries peg their currencies to a more general currency basket instead of the dollar? While switching to the SDR basket may not improve external stability, the benefits of switching to some other nominal exchange rate rule remain to be explored.

The GCC countries: A Brief Description of the Exchange Rate Regimes

1. Saudi Arabia

Saudi riyal is officially pegged to the SDR at SRls 4.2826=SDR 1. The Saudi riyal has been effective pegged to the dollar at the fixed rate of SRls 3.745=U.S.$1 since June 1, 1986.

2. Qatar

Qatar riyal is officially pegged to the SDR at QR 4.7619=SDR 1. The Qatar riyal has been effectively pegged to the dollar at the fixed rate of QR 3.6415=U.S.$1 since 1979.

3. Bahrain

Bahrain dinar is officially pegged to the SDR at BD 0.46190=SDR 1. The Bahrain dinar has been effectively pegged to the dollar at the fixed rate of BD 1=U.S.$ 2.6596 since December 1980.

4. U.A.E.

U.A.E. dirham is officially pegged to the SDR at Dh 4.7619=SDR 1. The U.A.E. dirham has been effectively pegged to the dollar since November 1980 at the fixed rate of Dh 3.6710=U.S.$ 1.

5. Oman

The Oman riyal is officially pegged to the dollar at the fixed exchange rate of RO 1=U.S.$ 2.6008 since 1986.

6. Kuwait

The exchange value of the Kuwait dinar is determined on the basis of a fixed but adjustable relationship between the Kuwait dinar and a weighted basket of currencies, with the weights reflecting the relative importance of these currencies in Kuwait's trade and financial relations. The Central Bank of Kuwait sets the rate for the dollar on the basis of the latest available market quotations for that currency in relation to the other currencies included in the basket. The dollar appears to have a very large weight in the currency basket.

Description of Data and Derivation of the Exchange Rate (Z, z, e, v) Indexes

1. Data

The data on nominal GDP, imports and exports, and CPI come from the IFS, DOT, and WEO. In some GCC countries CPI data were not available for some years, so the CPI for those years were generated using Saudi Arabia's CPI. Recall that E_t, or the *nominal* exchange rate between a GCC country's currency and the U.S. dollar, is the *inverse* of the exchange rate between that country's currency and the dollar reported in the IFS for each GCC country (for example, in the case of Saudi Arabia, $E_t = 0.2670$ and $1/E_t = 3.745$).

2. Z_t and z_t Indexes

Z_t is the index of the *nominal* exchange rate between the U.S. dollar and the composite of the currencies of the other SDR zone countries (Germany, Japan, France, and U.K.). The Z_t index is calculated according to the following formula:

$$Z_t = \sum_{i=1}^{4} w_{it} Z_{it} ;$$

$$w_{it} = \frac{X_{it}^{US} + M_{it}^{US}}{\sum_{i=1}^{4} (X_{it}^{US} + M_{it}^{US})} \quad ; \quad Z_{it} = \left(\frac{US\$}{DM_i}\right)_t \quad , \tag{22}$$

i = Germany, Japan, France, U.K.;

DM_i = Deutsche mark, French franc, Japanese yen, British pound sterling;

w_{it} = the weight of Country i, $0 < w_{it} < 1$;

X_{it}^{US} = United States exports to Country i;

M_{it}^{US} = United States imports from Country i;

Z_{it} = Nominal exchange rate between Country i's currency (DM_i) and the U.S. dollar, or, units of Country i's currency per U.S. dollar;

t = 1976, 1977, ..., 1994.

The index of the *real* exchange rate between the U.S. dollar and the composite of the currencies of the other SDR zone countries is z_t. The z_t index is calculated according to the following formula:

$$z_t = \sum_{i=1}^{4} w_{it}\, z_{it} \; ; \; z_{it} = \frac{P_t^i}{P_t^{US}\, Z_{it}} \quad ; \qquad (23)$$

$$i = \textit{Germany, Japan, France, U.K.}$$

where w_{it} and Z_{it} are defined as above, P_t^i is Country i's CPI, and P_t^{US} is the CPI of the U.S. Z_o and z_o are chosen to be Z_{1994} and z_{1994} and are indexed at unity in 1994 (Table 3).

3. V_t index

V_t is the index of the *nominal* exchange rate between a GCC country's currency and the composite of the currencies of the other SDR zone countries. The V_t index is calculated as

$$V_t = E_t Z_t \qquad (24)$$

where E_t and Z_t are as defined above.

4. e_t and v_t Indexes

The e_t index is the *real* exchange rate between a GCC country's currency and the U.S. dollar. As in (1), e_t is defined as

$$e_t = \frac{P_t^{US}}{P_t\, E_t} \qquad (25)$$

where P_t is a given GCC country's CPI. Consequently, v_t is calculated as $v_t = e_t z_t$, with e_t and z_t defined as above. For regression purposes, e_o and v_o are chosen to be e_{1994} and v_{1994} and both are indexed at unity in 1994 (Table 4).

Since 1994 is assumed to be the "initial" period in which the switch from the dollar peg to the SDR peg is being considered, $\alpha = 0.40$, or the dollar's SDR weight from January 1, 1991 until January 1, 1996. During the same period, the SDR weights of the other SDR zone country's currencies were as follows: German mark = 0.21; Japanese yen = 0.17; French franc = 0.11; British pound sterling = 0.11. Since $(1-\alpha)$ is a composite index, the combined weight of the German mark, French franc, Japanese yen, and British pound sterling is 0.60.

Table 3. The United States: Exchange Rate Indexes, 1976-94

Year	Z	z
1976	2.57	0.93
1977	2.08	1.13
1978	1.70	1.21
1979	2.02	1.37
1980	1.71	1.41
1981	1.95	1.14
1982	2.11	0.98
1983	2.18	0.84
1984	2.44	0.65
1985	2.00	0.78
1986	1.63	0.80
1987	1.23	1.06
1988	1.26	0.99
1989	1.44	0.93
1990	1.29	1.19
1991	1.21	1.12
1992	1.20	0.97
1993	1.11	0.95
1994	1.00	1.00

Source: IMF International Financial Statistics (IFS), Direction of Trade (DOT) Statistics, and staff calculations

Table 4. The GCC Countries: Exchange Rate Indexes, 1976-94

Year	Saudi Arabia		Qatar		Bahrain		U.A.E.		Oman		Kuwait	
	e	v	e	v	e	v	e	v	e	v	e	v
1976	0.44	0.41	0.76	0.71	0.73	0.68	0.85	0.80	0.48	0.45	0.63	0.63
1977	0.42	0.47	0.73	0.82	0.66	0.75	0.80	0.90	0.46	0.52	0.59	0.71
1978	0.43	0.52	0.77	0.93	0.60	0.72	0.86	1.04	0.50	0.61	0.62	0.81
1979	0.48	0.66	0.81	1.11	0.64	0.87	0.92	1.27	0.55	0.75	0.69	1.01
1980	0.52	0.73	0.85	1.19	0.70	0.98	0.98	1.39	0.60	0.84	0.74	1.12
1981	0.57	0.65	0.86	0.98	0.69	0.78	1.06	1.20	0.64	0.73	0.83	1.01
1982	0.60	0.59	0.87	0.73	0.67	0.66	1.05	1.03	0.67	0.65	0.84	0.88
1983	0.63	0.53	0.87	0.73	0.67	0.57	1.07	0.90	0.70	0.59	0.84	0.76
1984	0.69	0.45	0.90	0.59	0.70	0.46	1.09	0.71	0.80	0.52	0.90	0.63
1985	0.75	0.58	0.91	0.71	0.74	0.58	1.09	0.84	0.86	0.67	0.92	0.76
1986	0.81	0.65	0.91	0.73	0.78	0.62	1.05	0.84	0.91	0.73	0.93	0.80
1987	0.85	0.90	0.92	0.98	0.82	0.87	1.03	1.09	0.92	0.98	0.89	1.01
1988	0.88	0.87	0.92	0.91	0.85	0.84	1.02	1.02	0.94	0.94	0.95	1.02
1989	0.91	0.85	0.93	0.87	0.88	0.82	1.04	0.97	0.98	0.91	1.00	1.00
1990	0.94	1.12	0.95	1.13	0.92	1.09	1.09	1.29	0.94	1.11	n.a.	n.a.
1991	0.93	1.04	0.95	1.06	0.95	1.06	1.07	1.20	0.93	1.03	n.a.	n.a.
1992	0.96	0.94	0.95	0.92	0.98	0.95	1.04	1.01	0.95	0.92	n.a.	n.a.
1993	0.98	0.93	0.99	0.93	0.98	0.93	1.02	0.96	0.97	0.92	n.a.	n.a.
1994	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	n.a.	n.a.

Source: IMF International Financial Statistics (IFS), Direction of Trade (DOT) Statistics, World Economic Outlook (WEO) database, and staff calculations.

n.a. = not available in 1990, not used for regression purposes during 1990-94.

Table 5. The GCC Countries and the U.S.: Average Trade Shares with the SDR Zone, the Other SDR Zone, and the World, 1976-94

	SDR Zone							World		
				Other SDR Zone						
	Total SDR Zone	U.S.	Total Other SDR Zone	Germany	Japan	France	U.K.	Total World	SDR Zone	ROW
					In Percent					
IMPORTS										
Saudi Arabia	100	34	66	15	28	8	14	100	56	44
Qatar	100	16	84	16	32	11	26	100	58	42
Bahrain	100	31	69	12	24	7	27	100	30	70
U.A.E.	100	21	79	15	33	9	22	100	52	48
Oman	100	15	85	13	36	7	30	100	50	50
Kuwait	100	26	74	17	34	9	14	100	54	46
EXPORTS										
Saudi Arabia	100	32	68	5	43	14	6	100	47	53
Qatar 1/	100	5	90	2	72	14	2	100	50	44
Bahrain 1/	100	30	64	1	56	1	6	100	14	81
U.A.E.	100	11	89	4	71	9	5	100	51	49
Oman	100	17	83	6	59	5	13	100	47	53
Kuwait	100	15	85	4	62	8	11	100	31	69
IMPORTS AND EXPORTS										
Saudi Arabia	100	33	67	10	36	11	10	100	52	48
Qatar 1/	100	11	87	9	52	12	14	100	54	43
Bahrain 1/	100	30	67	6	40	4	17	100	22	76
U.A.E.	100	16	84	10	52	9	13	100	51	49
Oman	100	16	84	9	48	6	21	100	49	51
Kuwait	100	20	80	11	48	8	12	100	43	57
								World		
								Total World	Other SDR Zone	ROW
United States										
Imports	n.a.	n.a.	100	18	59	9	14	100	29	71
Exports	n.a.	n.a.	100	19	45	13	23	100	24	76
Imports and Exports	n.a.	n.a.	100	19	52	11	19	100	26	74

Source: IMF Direction of Trade (DOT) Statistics ; n.a. = not applicable

1/ Due to missing data in some years, components do not add up to 100.

Table 6. Saudi Arabia: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-94

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
M_t = Imports from the SDR zone					
i, j, $\ell = 0$	-4.89	1.35	0.46	-0.62	-0.52
t-statistic	-2.51	5.77	1.61	-1.99	-3.83
R^2	0.72				
M_t = Imports from the World					
i, j, $\ell = 0$	-2.09	1.09	0.45	-0.51	-0.47
t-statistic	-1.32	5.73	1.96	-2.01	-1.15
R^2	0.74				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1976-94

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
X_t = Exports to the SDR zone				
i, j = 1	6.47	-1.94	1.67	1.83
t-statistic	67.48	-6.25	5.35	6.21
R^2	0.73			
X_t = Exports to the World				
i, j = 1	7.24	-1.83	1.62	1.75
t-statistic	67.49	-5.27	4.63	9.47
R^2	0.65			

Trade balance: $\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell}$; 1976-94

	b_o	b_3	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$
B_t = Trade balance with the world					
i, j = 0; $\ell = 1$	-14.76	2.50	-5.86	4.43	5.29
t-statistic	-2.81	3.91	-6.66	5.21	6.27
R^2	0.77				

Source: Staff estimates

($\alpha_{1994} = 0.40$)

Table 7. Qatar: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-94

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
M_t = Imports from the SDR zone					
i, j = 0; ℓ = 1	0.05	0.60	-1.69	0.65	1.27
t-statistic	0.96	3.25	-3.36	2.77	1.00
R^2	0.66				
M_t = Imports from the World					
i, j = 0; ℓ = 1	1.41	0.48	-0.61	0.61	0.61
t-statistic	1.55	2.95	-1.38	2.94	2.68
R^2	0.54				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1978-94

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
X_t = Exports to the SDR zone				
i, j = 1	4.14	-2.00	0.74	1.49
t-statistic	28.54	-2.11	1.79	5.16
R^2	0.35			
X_t = Exports to the World				
i, j = 1	4.62	-3.14	0.64	2.14
t-statistic	27.57	-2.87	1.36	5.37
R^2	0.41			

Trade balance: $\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell}$; 1978-94

	b_o	b_3	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$
B_t = Trade balance with the SDR zone					
i, j, ℓ = 0	-9.07	2.28	1.18	-1.01	-1.11
t-statistic	-3.96	5.45	0.89	-2.19	-1.33
R^2	0.71				
B_t = Trade balance with the world					
i, j, ℓ = 0	-9.84	2.45	-3.07	-1.16	1.37
t-statistic	-6.91	9.45	-3.69	-4.07	7.63
R^2	0.92				

Source: Staff estimates

($\alpha_{1994} = 0.40$)

Table 8. Bahrain: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-94

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
			M_t = Imports from the SDR zone		
i, j, ℓ = 1	-0.68	0.80	-0.13	0.37	0.22
t-statistic	-0.74	2.40	-0.42	2.12	0.57
R^2	0.57				
			M_t = Imports from the World		
i, j = 1, ℓ = 0	-1.00	1.33	-0.55	0.36	0.48
t-statistic	-1.28	4.74	-2.68	2.96	0.89
R^2	0.80				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1979-94

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
		X_t = Exports to the SDR zone		
i, j = 1	-0.26	-1.19	0.10	0.75
t-statistic	-1.10	-1.25	0.16	1.02
R^2	0.13			
		X_t = Exports to the World		
i, j = 1	3.17	0.91	0.98	-0.15
t-statistic	20.62	1.48	2.44	-2.08
R^2	0.57			

Source: Staff estimates

(α_{1994} = 0.40)

Table 9. United Arab Emirates: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-94

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
			M_t = Imports from the SDR zone		
i, j = 0, ℓ = 1	-1.41	0.96	-1.93	0.63	1.41
t-statistic	-0.81	3.86	-2.84	2.67	0.01
R^2	0.60				
			M_t = Imports from the World		
i, j, = 1, ℓ = 0	4.99	0.14	0.28	0.86	0.18
t-statistic	1.87	0.37	0.42	2.15	1.82
R^2	0.39				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1976-94

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
		X_t = Exports to the SDR zone		
i, j = 1	5.82	-1.20	1.04	1.13
t-statistic	106.10	-1.97	3.33	16.09
R^2	0.49			
		X_t = Exports to the World		
i, j = 1	6.52	-0.15	0.93	0.46
t-statistic	161.28	-0.33	4.05	1.60
R^2	0.52			

Trade balance: $\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell}$; 1978-94

	b_o	b_3	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$
			B_t = Trade balance with the SDR zone		
i, j = 1; ℓ = 0	-10.37	2.15	-2.95	-0.19	1.70
t-statistic	-1.28	1.87	-1.50	-0.15	1.40
R^2	0.30				
			B_t = Trade balance with the world		
i, j = 1; ℓ = 0	-9.04	2.08	-1.64	-0.56	0.76
t-statistic	-1.40	2.27	-1.05	-0.57	1.48
R^2	0.33				

Source: Staff estimates

(α_{1994} = 0.40)

Table 10. Oman: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-94

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
			M_t = Imports from the SDR zone		
i, j, ℓ = 1	-3.61	1.45	-1.29	0.10	0.82
t-statistic	-3.79	5.77	-2.58	0.44	4.06
R^2	0.87				
			M_t = Imports from the World		
i, j, ℓ = 1	-1.78	1.16	-0.74	0.21	0.53
t-statistic	-2.19	5.44	-1.73	1.08	1.75
R^2	0.90				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1976-94

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
		X_t = Exports to the SDR zone		
i, j = 1	1.50	-1.20	0.54	0.94
t-statistic	6.61	-1.50	0.66	4.48
R^2	0.15			
		X_t = Exports to the World		
i, j = 1	3.01	0.84	0.32	-0.37
t-statistic	37.42	2.96	1.11	-1.41
R^2	0.67			

Trade balance: $\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell}$; 1976-94

	b_o	b_3	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$
			B_t = Trade balance with the world		
i, j, ℓ = 0	-4.35	1.56	-2.82	0.54	1.91
t-statistic	-1.28	1.74	-1.58	0.64	1.50
R^2	0.18				

Source: Staff estimates

($\alpha_{1994} = 0.40$)

Table 11. Kuwait: Regression Results

Imports: $\ln M_t = m_o + m_1 \ln e_{t-i} + m_2 \ln v_{t-j} + m_3 \ln y_{t-\ell}$; 1976-89

	m_o	m_3	m_1	m_2	$[\alpha m_2-(1-\alpha)m_1]$
			M_t = Imports from the SDR zone		
i, j = 0, ℓ = 1	-3.00	1.22	-0.34	-0.67	-0.07
t-statistic	-3.46	6.13	-1.57	-3.26	-1.74
R^2	0.82				
			M_t = Imports from the World		
i, j = 0, ℓ = 1	-0.15	0.73	0.05	-0.26	-0.14
t-statistic	-0.24	5.20	0.35	-1.82	-2.22
R^2	0.77				

Exports: $\ln X_t = x_o + x_1 \ln e_{t-i} + x_2 \ln v_{t-j}$; 1976-89

	x_o	x_1	x_2	$[\alpha x_2-(1-\alpha)x_1]$
		X_t = Exports to the SDR zone		
i, j = 0	2.15	-2.04	1.04	1.64
t-statistic	12.96	-3.85	2.13	5.15
R^2	0.59			
		X_t = Exports to the World		
i, j = 1	3.45	-1.39	0.68	1.10
t-statistic	24.22	-3.24	1.80	3.40
R^2	0.54			

Trade balance: $\ln B_t = b_o + b_1 \ln e_{t-i} + b_2 \ln v_{t-j} + b_3 \ln y_{t-\ell}$; 1976-89

	b_o	b_3	b_1	b_2	$[\alpha b_2-(1-\alpha)b_1]$
			B_t = Trade balance with the world		
i, j = 1; ℓ = 0	-10.78	3.02	-2.12	-0.91	0.91
t-statistic	-4.73	5.72	-4.36	-1.81	3.84
R^2	0.89				

Source: Staff estimates

(α_{1994} = 0.40)

References

Aghevli, Bijan B., Mohsin S. Khan and Peter J. Montiel, **Exchange Rate Policy in Developing Countries: Some Analytical Issues**, International Monetary Fund, Occasional Paper No. 78, (1991).

Branson, William H. and Louka T. Katseli-Papaefstratiou, "Income Stability, Terms of Trade, and the Choice of Exchange Rate Regime", ***Journal of Development Economics*** 7, (1980), 49-69.

____ and Louka T. Katseli, "Currency Baskets and Real Effective Exchange Rates", Yale University Economic Growth Center, Center Discussion Paper No. 372, (1981).

Brodsky, David A. and Gary P. Sampson, "The Sources of Exchange Rate Instability in Developing Countries: Dollar, French Franc and SDR Pegging Countries, ***Weltwirtschaftliches Archiv*** 120(1), (1984), 133-154.

Calvo, Guillermo A., Carmen M. Reinhart and Carlos A. Vegh, "Targeting the Real Exchange Rate: Theory and Evidence", International Monetary Fund, Working Paper (WP/94/22), (1994).

Crockett, Andrew D. and Saleh M. Nsouli, "Exchange Rate Policies for Developing Countries", ***The Journal of Development Studies*** 13(2), (1977), 125-143.

Dornbusch, Rudiger, "PPP Exchange-Rate Rules and Macroeconomic Stability", ***Journal of Political Economy*** 90(1), (1982), 158-165.

Flanders, M. June and Asher Tishler, "The Role of Elasticity Optimism in Choosing an Optimal Currency Basket with Applications to Israel", ***Journal of International Economics*** 11, (1981), 395-406.

____ and Elhanan Helpman, "An Optimal Exchange Rate Peg in a World of General Floating", ***Review of Economic Studies*** (July 1979), 533-542.

Lipschitz, Leslie and V. Sundararajan, "The Optimal Basket in a World of Generalized Floating", ***IMF Staff Papers*** 27(1), (1980), 80-100.

Turnovsky, Stephen J., "The Relative Stability of Alternative Exchange Rate Systems in the Presence of Random Disturbances", ***Journal of Money, Credit, and Banking***, (February, 1976), 29-50.

Wickham, Peter, "A Cautionary Note on the Use of Exchange Rate Indicators", International Monetary Fund, PPAA/93/5, (1993).

Wickham, Peter, "A Revised Weighting Scheme for Indicators of Effective Exchange Rates", International Monetary Fund, Working Paper (WP/87/87), (1987).

_____, "Notes on Currency Baskets and Effective Exchange Rate Indices", International Monetary Fund, unpublished manuscript.

Williamson, John, "Exchange Rate Management", ***The Economic Journal*** 103, (1993), 188-197.

_____, "A Survey of the Literature on the Optimal Peg", ***Journal of Development Economics*** 11, (1982), 39-61.

_____, "Exchange Rate Coordination and the Arab Dinar: An Investigation of Certain Practical Steps to Arab Monetary Integration", Mimeograph, A Report to the Center for Arab Unity Studies (Beirut) and the Arab Monetary Fund (Abu Dhabi), (1981).