Demand For Imports In The G.C.C. Countries

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Articles

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Abstract

Investigating the import demand function has been one of the most active research areas in international economics. The reason for this popularity is its appliccations to a wide range of important macroeconomic policy issues. These include the international transmission of domestic disturbances, the impact of expenditure switching through exchange rate management and commercial policy on a country's trade balance and the degree to which the external balance affects the economy's growth. Moreover, knowledge of import demand function is highly useful in understanding the fluctuations of imports over the course of a business cycle and in the choice of economic policy options aimed at managing imports and balance of payments issues. Finally, the estimated demand elasticities are of vital importance when it comes to evaluating the effect of price changes in a partial equilibrium framework.

This empirical study investigates the process of adjustment of imports to changes in the level of domestic economic activity (in-

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come) and the relative prices in the Gulf Cooperation C (GCC) Countries. The aim is to provide new estimates of t gregate demand for imports in these countries over the last tw ades, applying standard econometric techniques complemen appropriate diagnostic tests based on recent and by now used dynamic modeling and cointegration techniques. In ad estimates of short run and long run income and price elasticit the individual countries within the GCC are obtained.

The results indicate that the demand for imports in the m of the GCC countries is inelastic with respect to income ar ative price level in the shortrun. However, in the long run, come elasticity becomes greater than one while the relative elasticity remains less than one. Thus, indicating that impo generally considered a necessity.

1-Introduction

Investigating the import demand function has been one most active research areas in international economics. The for this popularity is its applications to a wide range of imp macroeconomic policy issues. These include the international mission of domestic disturbances, the impact of expen switching through exchange rate management and commerci icy on a country's trade balance and the degree to which t ternal balance affects the economy's growth. Moreover, knov of import demand function is highly useful in understandi fluctuations of imports over the course of a business cycle the choice of economic policy options aimed at managing ir and balance of payments issues. Finally, the estimated elas are of vital importance when it comes to evaluating the ef price changes in a partial equilibrium framework.

The economies of the GCC couuntries are characterize high degree of interdependence with the rest of the world. As

they are heavily reliant on imports as a means of sustaining their standard of living and providing the various needs of their populations. Despite the above fact and the vital importance of imports for the GCC countries, limited empirical work has been carried out to delineate the structure of demand for imports. Two recent papers that deal with the issue of import demand in Kuwait are Mohammad (1998) and Elsamadisy (1995). Relevant research dealing with other countries in the region includes Shaltout (1987) for the UAE, Doroodian et al. (1994) for Saudi Arabia. Moreover, Asseery and Perdikis (1993) studied the import demand for five of the six GCC countries (Bahrain was not included). Other studies for the GCC include Metwelly (1987) and Metwelly and Abdel-Rahman (1985).

A brief list of research dealing with import demand in other countries includes: Nyatepe-Coo (1994), Abebayehu (1989), Deyak et. al. (1989), Sarmad (1988), Melo and Vogt (1984), Thursby and Thursby (1984), Warner and Kreinin (1983), and Goldstein et. al. (1980).

The purpose of this empirical study is to investigate the process of adjustment of imports to changes in the level of domestic economic activity (income) and relative prices in the Gulf Cooperation Council (GCC) countries. The aim is to provide new estimates of the aggregate demand for imports in these countries over the last two decades, applying standard econometric techiques complemented by appropriate diagnostic tests based on recent and by now widely used dynamic modeling and cointegration techniques. In addition, to obtain estimates of short run and long run income and price elasticities for the individual countries within the GCC.

The remaining part of this paper is organized as follows: Section two briefly discusses the role of trade in the GCC economies. Section three contains a detailed review of the literature that pertains to the GCC countries. Section four discusses some theoretical issues

dealing with the demand for imports. The empirical results ar sented and extensively discussed in section five. Finally, th clusions are presented in section six.

2- Trade in the GCC Economies

The Gulf Cooperation Council Countries (GCC), which cc of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Emirates (UAE), are characterized by a high degree of dependence with the rest of the world. This arises from the fa these countries rely heavily on a single exportable commodit crude oil), as the main source of foreign exchange earnings. over, due to the developing nature of these economies and th ited availability of indigenous resources (other than oil), th heavily reliant on imports as a means of sustaining the stand living and providing for the various needs of their populati well as for development projects.

Due to the virtual dependence of GCC on oil revenues, t tent of these countries interdependence with the rest of the was dramatically increased after the 1973-1974 oil price revc and again due to the 1979-1980 upheaval in the oil market c by the Iranian revolution and the subsequent Iran-Iraq war.

To ascertain the significance of the foreign sector in the economies we calculated the ratios of imports to GDP, exp GDP and the average of imports plus exports to GDP respec These ratios are presented in table (1) below for the various tries of the GCC and for the indicated time intervals.

It is clear form table (1) that the GCC countries differ i degree of dependence on foreign trade. In fact, while the r imports to GDP remains near 100 percent for Bahrain duri entire observation period, it was found to be about 40% for th of Oman. Concerning the other countries, this ratio stays cl the 20% - 30% range for Kuwait, Qatar, Saudi Arabia and the

ed Arab Emirates. It should be noted that the observed variations in this ratio among the various countries reflect the structure of these economies and their degree of diversification. Nonetheless, all these countries rely to a significant degree on the outside world for their import needs.

Concerning the exports to GDP indicator, it is noted that it is uniformly high for all the GCC countries. No doubt, this is a reflection of the dominance of crude oil exports in their economies. According to the data in table (1), this ratio is the largest in the case of Bahrain (87 percent) and it is similar in magnitude for Kuwait, Oman, Qatar and United Arab Emirates (50-70 percent). In contrast, Saudi Arabia has the smallest ratio among the entire group (35 percent). It should be mentioned that Saudi Arabia, Bahrain, Oman and UAE enjoy a somewhat more diversified export base as compared to Kuwait, and Qatar.

Finally, we turn to the average of imports plus exports to GDP which is called the "Degree of Openness" indicator or the degree of "Outward Orientation". According to the data presented in table(1), Bahrain exhibits the greatest degree of openness. In fact, its measure of openness is found to be very large (89.92 percent). Moreover, the degree of openness is fairly large for other GCC countries such as Kuwait, Oman, Qatar and United Arab Emirates (50-60 percent). In contrast, the ratio for Saudi Arabia is rather small and stands at 28.81 percent. Here, it is worthy to caution that a small value for this indicator does not imply the insignificance of trade in the structure of the economy, but merely a reflection of the diversified nature of the economy.

Regarding the changes in these ratios over time, a careful examination of the data revealed no specific trend but merely fluctuations in exports and imports reflecting the developments in the oil market and its impact on these economies. From the brief discussion above, it can be concluded that the GCC countries rely

heavily on foreign trade and consequently imports constitute jor element in these economies and play an important role welfare of these societies.

Table (1): Trade Indicators for the GCC Countries (Perce
(Average Value over Sample)*

Indicator Country	Imports to GDP	Exports to GDP	Avg. Imp Exports
Bahrain	91.88 (1975-1996)	87.27 (1975-1995)	89. (1975-
Kuwait	26.85 (1970-1996)	54.50 (1970-1995)	40. (1970-
Oman	39.46 (1970-1992)	57.47 (1970-1992)	48. (1970-
Qatar	23.30 (1975-1994)	61.90 (1975-1982)	43. (1975-
Saudi Arabia	22.08 (1970-1995)	35.55 (1970-1994)	28. (1970-
United Arab Emirates	29.77 (1974-1991)	66.45 (1974-1991)	48. (1974-

* Numbers in parentheses indicate the time interval.

3- Literature Review

Despite the vital importance of imports for the economies of the GCC countries, only a handful of empirical work has been carried out to investigate the determinants of import demand in these countries.

Early studies on total demand for imports in the member states of the Gulf Cooperation Council assumed that the demand for imports is highly price inelastic. Hence these studies specified the demand for imports to be only a function of real incomes, see Metwally and Abdel-Rahman (1985).

Subsequent investigations of the demand for imports in these countries have applied a typical conventional specification, where the quantity of imports is assumed to depend on economic activity variable and on relative prices defined as the ratio of price of imports index to an overall domestic price index. It was found that the relative prices are an important determinant of imports in the GCC countries. These studies include Shaltout (1987), Assery and Perdikis, (1990,1993), Elsamadisy (1995), Doroodian et al. (1994) and Mohammad (1998).

Concerning the functional form, both Shaltout (1987) and Mohammed (1998) assumed a log-linear form for the demand for imports in Kuwait. Using more formal tests, Elsamadisy(1995) tablished the superiority of the log-linear form over the coventional linear specification of the demand for imports in Kuwait. The same conclusion was reached for Saudi Arabia by Doroodian, et.al. (1994) after an extensive econometric investigation of the issue.

In contrast to the above-mentioned studies, Asseery and Perdikis (1993) obtained mixed results in the case of the GCC countries. Using the Box-Cox (1964) transformation, they favored the linear specification in the case of Kuwait and Oman, while the log-linear

form was preferred for the case of Qatar, Saudi Arabia, and (Bahrain was not included in their study).

In one of the early studies of import demand, Shaltout (utilized a log-linear functional form for estimating the dema imports in the UAE. The results indicated that demand for in is inelastic both with respect to income (0.939) and relative (0.278).

With regards to dynamics, Shaltout (1987) concluded th adjustment lag in the case of UAE is shorter than one year. ever, no estimates of the long run elasticities were obtained. tinguishing feature,however,of this studyis its disaggregated n

A study of import demand in Kuwait by Mohammad (1998) f the response of demand for imports to be inelastic with resp income both in the short-run and the long run. Concerning t sponsiveness of the demand for imports to prices, he foun own-price elasticity of imports to be also inelastic in both the run and long run.

Elsamadisy (1995) developed a generalized specification demand for total imports in Kuwait. Instead of using the co tional relative prices of both imports and import substitut used the prices of tradable and nontradable goods as proxies f ative prices. Since these indices were not readily availabl samadisy constructed them for tradables and nontradables i wait using the GDP deflator concept. By dividing the Ku economy into sectors and dichotomizing these sectors into ables and nontradables, he calculated the GDP deflator for sectors and used the resulting prices as indices.

The essential problem with the indices used by Elsamad that they were based on highly aggregated data series. Thus, a classification of tradables and nontradables was not possible this scale of sectorally aggregated data. Hence the generate series of relative prices are not necessarily accurate and may

some doubts on his results .

An additional limitation of these results is that Elasmadisy used several dummy variables. In fact, he arbitrarily used a dummy variable that takes the value of one during the period 1975-1989 as a proxy for wealth. However, this is not accurate because the oil price slumps started in 1983 resulting in a budget deficit much earlier than suggested by the author.

The author also included the war shock effect in his model through the use of a dummy variable for the year 1981 to represent the war between Iraq and Iran. In fact he failed to consider a potential similar impact from the Iraqi invasion of Kuwait in 1990. His results, however, show that the war shock dummy variable carried a highly significant negative sign, indicating a temporary decline in import demand. This result is not supported in reality, because the price of oil surged to unprecedented levels due to the Iraq-Iran war and consequently import demand in most of the GCC countries increased.

In a study about Saudi Arabia, Doroodian, et.al. (1994), found the short run and long run income elasticities to be less than one. In fact they estimated the income elasticity to be 0.22 in the short run and 0.47 in the long run. On the other hand, they found that the own price elasticity of imports in the short run to be-0.68 and - 1.45 in the long run. Cross price elasticity (response of import demand to the price of domestic substitutes) was found to be elastic in both the short run and long run. Their results indicated a cross elasticity of 1.3 in the short run and 2.9 in the long run.

The results obtained by Asseery and Perdikis (1993) show that the demand for imports is price inelastic for Kuwait, Oman, Qatar and UAE, while the demand for imports was found to be price elastic for Saudi Arabia. On the other hand, the demand for imports was found to be income elastic for the case of Kuwait, Oman and UAE, while found to be inelastic for the case of Qatar and Saudi

Arabia. Asseery and Perdikis (1993) offered no justificati these differences in price and income elasticities among the tries of the GCC.

The work of Asseery and Perdikis (1993) suffers from s serious shortcomings. First, they did not seriously tackle the lem of autocorrelation at least in the case of Kuwait and Saud bia. Second, they assumed a long run equilibrium structure f import demand and ignored the short run dynamics of the de for imports. Third, they did not pay attention to the analysis o stationarity. Finally, they did not evaluate the structural stabi parameters estimated by their model.

With regards to the dynamics in the import demand fun Mohammad (1998) estimated the magnitude of the coeffici adjustment at (0.5490). This suggests that the comparison of run price and income elasticities with respective short-run el ities would reveal that most of the relative price and income a ments take place within a one-year period. This suggests th justment of actual level of imports to its desired level is a instantaneous. This result is in line with the estimates reach Asseery and Perdikis (1990) and Doroodian et al. (1994) for Arabia.

Elsamadisy, however, reached different conclusions abo speed of adjustment of desired import demand levels to actua els. He found that adjustment is rather slow and may take t more years for actual import demand to adjust to its desired Metwally & Rahman (1985) obtained similar results for K

4- The Demand for Imports: Some Theoretical Issues

The sensitivity of imports to changes in income is of part interest for predicting the behavior of imports over the cou the business cycle. In addition, the various price elasticities a portant because imports will change over time when foreign p

and domestic prices change. Finally such estimates are necessary to predict possible changes in imports that may occur as a result of changes in trade policy or exchange rates.

The traditional demand for import function can be written in terms of domestic income and price levels as:

$$m_t = f(y,p); \qquad (1)$$

With: $f_1 \supset 0,\ f_2 \subset 0$

where m,y, and p are respectively, the real quantity of imports, real domestic income, and a vector of different prices. The signs indicated for the partial derivatives are those customarily assumed in the literature see: e.g. Goldstein and Khan (1985).

Though the sign of the partial derivative of the import demand with respect to income is expected to be positive, a negative sign can not be ruled out. For example, if imports represent the difference between domestic consumption and domestic production of importable goods, production may rise faster/slower than consumption in response to rise in real imcome. Hence imports could fall/ rise as the real income increases, resulting in a negative/positive sign for the income parameter (Goldstein and Khan (1976)).

This above general specification has dominated the empirical literature on the demand for imports in both developed and developing countries because of its empirical success. Senhadji (1997), however, has criticized this specification of the demand for imports function on microeconomic grounds. The thrust of his argument is based on the fact that this functional form has been derived from a utility maximization process.

With regard to the variables included in the model, most studies have employed some measure of real income as their activity variable. This choice raises at least two important issues - both derived from standard consumption theory- which are often not addressed (King (1993)). The first relates to the role of permanent versus cur-

rent income levels in determining consumption - including ir consmption. Permanent income is probably the more appro of the two in theary,but in practice,it is difficult to quantif jectively. More specifically, it is impossible to establish obje ly what the appropriate lag structure is between current and p nent income in order for the latter - which is not observable - estimated using the former.

The second issue is that income is not simply allocated bet imports and import substitutes, but is spread over all goods sumed within the economy. This makes it necessary to inclu additional price measure, i.e., the price of all other goods sically, there are three distinct ways to incorporate the re prices into the demand for import function. One option allov relative prices to enter in an unrestricted form. This approach relative prices into domestic price level (Pd) and imported level (Pm) in order to analyze their effects separately. Equatic expresses this type of models.

$$m_t = a_0 + a_1 y_t + a_2 p_{dt} + a_3 p_{mt}; \qquad (2$$

Under the absence of money illusion, import demand fur will be homogeneous of degree zero in prices and money in Therefore, the demand for imports can be expressed in ter real income and relative prices. Such homogeneity is stress including a single relative price variable that explains wh onomic agents switch their demand between imports and dor products, see Carone (1996). This specification imposes tl striction that the influences of the two price variables are eq magnitude but opposite in sign. This is known as the homog restriction (i.e.$a_2+a_3=0$). Hence equation (2) becomes:

$$m_t = \beta_0 + \beta_1 y + \beta_2 (p_m / p_d)_t; \qquad (3$$

This form is popular in the literature because it offers an important advantage in the estimation stage. Specifically, it eliminates the multicollinearity problems that could exist in the formulation suggested under equation (2) due to the correlation between the domestic and import prices especially in the case of small open economies such as the GCC economies. A list of previous studies utilizing this approach includes: Athukorala and Menon (1995), Gafar (1995, 1988), Assery and Perdikis (1993), Koshal et al. (1993), Asseery and Peel (1991), Bahmani-Oskooee (1986), Melo and Vogt (1984), Boylan et al. (1980), Khan and Ross (1977) and Khan (1974)

It should be mentioned, however, that if the underlying import demand function is not homogeneous of degree zero, i.e. consumers respond differently to changes in *Pm* and *Pd*, the use of the relative prices may obscure the responsiveness of imports to changes in these individual variables. Clearly, this could lead to misspecification of the regression equation with all the associated problems.

Finally import prices are sometimes decomposed into foreign import prices and the exchange rate in order to directly observe how changes in the exchange rate may affect import demand. This means that equation (3) is presented in the following form;

$$m_1 = \beta_0 + \beta_1 y + \beta_2 (p_m . \theta / p_d)_t ; \qquad (4)$$

Where θ is the exchange rate? Deyak, Sawyer, and Sprinkle (1993) adopted this approach among others.

It should be mentioned that none of the three specifications is clearly superior from a theoretical point of view. Empirically, however, as mentioned above, estimates based on equation (2) are unsatisfactory due to possible problems of multicollinearity.

Generally, these specifications represent long run equilibri import demand. While the long run effects of the determina the import demand are of interest, the short run adjustment (ports to changes in these variables is also frequently importa pecially in a policy sense.

The simple equilibrium relationships represented by equ (2) through (4) are not suitable for estimation because they the dynamic adjustment behavior of import demand. One of t sic assumptions of these equations is that importers are alw their demand schedule. They imply instantaneous adjustm the part of importers to changes in the relative price of impor real income, such that desired import demand always equals t tual level of imports. However, it is generally recognized th ports do not immediately adjust to their long run equilibrium following a change in any of their determinants.

In his synthesis of the various approaches to the balance o ments, Johnson (1977, p. 225) argues that: "it is not legitim express the demand for imports as a function of only disposa come, say, and the domestic price of imports relative to exp One could, of course, introduce a stock adjustment-term in import demand equation".

To take into account the slow reaction of the economic ag changes in the explanatory variables due to adjustment cos ertia, habit, or lags in perceiving changes, actual level of i observed in any period is commonly expressed as a function lagged dependent variable.

In general, the relaxation of the equilibrium hypothesis import demand function has been achieved by specifying a d ic model within the framework of a distributed lag model wit metrically declining weights, such as Koyck's model. (ternatively, following Almon's model which assumes th distributed lag coefficients lie on an exact polynomial

In the existing literature on import demand modeling, the method of introducing a dynamic specification has been to superimpose a predetermined lag structure on the estimated equation. In general, the partial adjustment specification has been most popular. In some cases, the Almon polynomial method has been utilized (Goldstein & Khan (1985)). The problem with these approaches is that the estimates may be subject to misspecification bias due to the arbitrary truncation of the lag structure.

Tegene (1989) used a distributed lag function, where the lag length was determined by using the final prediction error, that is, the lag length which minimizes the final prediction error was considered the relevant lag length. In general, care must be exercised in the selection of the type of the dynamic specification because it can affect the sign, size and stability of parameter estimates. In this paper, a partial adjustment mechanism is adopted as a method of introducing dynamic strcture in the model of import demand. This approach yields the term M(t-1) in the estimated equations.

From the previous discussion the simple desired import demand function may be written as:

$$m^{\bullet}=\phi_0+\phi_1 y_t+\phi_2 p_t+\varepsilon_t; \qquad (5)$$

Where, m^*= the desired real import demand.

Since m^* is not observable, it is assumed that actual imports adjust partially to the long-run desired level. Thus, only a fraction of the desired change will be realized. Therefore, it takes more than one period for full adjustment of actual imports to their long - run desired level. This is the familiar partial adjustment approach, which could be written, in real form as;

$$(m_t-m_{t-1})=\lambda(m_t^*-m_{t-1});\ \ 0\subset\lambda\subset 1. \qquad (6)$$

Where, λ is the coefficient of adjustment, which shows the speed of adjustment of actual imports to their desired levels.

By substituting (5) into (6) and rearranging, the lagged dependent variable becomes an independent variable as shown i equation (7) below.

$$m_t=\lambda\phi_0+\lambda\phi_1 y_t+\lambda\phi_2 p_t+(1-\lambda)m_{t-1}+\lambda\varepsilon_t; \qquad (7)$$

According to equation (7), there may be a lag in the adju process measured by (1-λ), and the mean adjustment lag wo (1 - λ)/ λ.In essence, equation (7) stipulates that any diversion tual imports from desired imports is corrected partially each Full adjustment to any shock will depend in this case up speed of adjustment. Knowledge of the speed of adjustment sential for macroeconomic policy making as well as calculati various long run elasticities of demand.

Regarding the functional form issue, choice must be ma tween linear and Log-Linear forms. Neither theory nor em research stipulates a specific form of the demand for impor the other. Both linear and log linear formulation of this fu were used in applied research. The choice of the appropriate tional form of the demand for imports is generally left to be a pirical issue and is resolved on the basis of goodness of fi Nonetheless, in some studies, the choice was based on empiri sults established by earlier research or by the application o advanced statistical techniques such as that developed by B Cox (1964).

The empirical evidence in the literature, however, suppo logarithmic form of import demand function. Thursby and T (1984) present evidence in support of log-linear form for t import demand. Khan and Ross (1977) present similar evide the US, Canadian, and Japanese import demand functions. over, Boylan et al. (1980) concluded that the log-linear for the most appropriate formulation for studying the econon

three small European countries, (Ireland, Denmark, and Belgium). More recently, Doroodian et al. (1994) reached the same conclusion for Saudi Arabia.

A comprehensive review of the import demand literature by Marquez (1992), showed that out of 100 studies written over the period 1941-1991, 74 assume a logarithmic formulation. In contrast to the above-mentioned studies, Asseery and Perdikis (1993) obtained mixed results in the case of the GCC countries. Based on their empirical results, they concluded that linear formulation was best suited for Kuwait and Oman, while, a log-linear form was best for Qatar, Saudi Arabia and the United Arab Emirates. Alternatively, Elasmadisy (1995) reported that results of various statistical tests indicated the superiority of the log-linear form for the conventional specifications. Clearly, there is no consensus and the issue remains an empirical one.

Statistical implications of each form are, however, different. For example, the linear specification of the demand for imports implies decreasing price elasticity and increasing income elasticity. Alternatively, the log-linear specification implies constant elasticities. This is one of the reasons why the import demand equation is usually specified in logarithmic form. The logarithmic form allows imports to react proportionally to any rise or fall in the explanatory variables, that is, on the assumption of constant elasticity, the logarithmic form avoids the problem of changes in the elasticities as import quantities change (Goldstein and Khan, (1976)).

Finally, since imports of the GCC States represent a fraction of world imports, the assumption of small country holds. This implies that the supply of imports to the GCC can be assumed infinitely elastic. The plausibility of the infinite import supply elasticity assumption is further strengthened by the highly liberal GCC trade policy. Therefore, quantity demanded of imports is demand determined and price of imports is exogenous. This in essence jus-

tifies the use of single equation estimation procedure in the e
ical determination of the import demand function.

5 - Empirical Results

As mentioned in the previous section, the assumption of ab
of money illusion, or homogeneity in prices implies symme
responses of imports to the foreign and domestic prices. The
import responses can be estimated in terms of relative prices
out in equation (3). This form, necessarilly eases estimation
lems because it reduces multicollinearity and consequently
mizes standard errors. To choose the appropriate functional
we resort to the Box-Cox procedure, which proposes testing f
value of λ in the following formula.

$$M^{\lambda} - 1/\lambda = \alpha_0 + \alpha_1 y^{\lambda} - 1/\lambda + \alpha_2 p^{\lambda} - 1/\lambda + \varepsilon$$

If the estimated value of $\lambda = 0$, the import demand equation
duced toa log-linear form. Alternatively, if $\lambda = 1$the equation re
to a linear form.

In order to empirically determine the specification of the i
demand function in the GCC countries we use the power fu
represented by equation (8) above. The model was estimated
the maximum likelihood procedure. We found that the esti
maximum values of λ for all cases are in general close to z
shown in table (2). This means that we accept the log-linear
of the demand for imports in all the GCC countries.

Table (2): Estimates of Box-Cox Transformation (λ).

Country	Estimated λ	log of likelihood
Bahrain	-0.439	- 35.38***
Kuwait	-0.216	- 91.49***
Oman	0.376	- 39.25***
Qatar	0.316	- 62.53***
Saudi Arabia	0.158	- 171.39***
United Arab Emirates	0.396	- 79.91***

*** Significant at 1% level

As mentioned above, we will apply the partial adjustment scheme. One reason to use the simple partial adjustment scheme is that we use relatively short time series data. Alternative specifications of the dynamic structure in the model mean that the degrees of freedom will be reduced substantially. Kleinbaum et.al. (1988) mention that the weakest requirement is for a minimum of approximately 10 degrees of freedom (or $n-k-1\geq 10$)

Another rule of thumb that has been suggested is for any regression to have at least 5 (or 10) observations for each predictor (i.e. $n\geq 5k$ or $n\geq 10k$). Another reason is that other dynamic schemes require prior arbitrary judgment about the lag length because it is almost impossible to determine the appropriate length.

Concerning the definition of the variables, the choice or a proxy for the price index for domestic tradable goods is one of the most controversial issues of empirical estimation of the demand for imports. The price index of imports is often used to express import

prices. In cases where price indexes are lacking, the price in the major trade partner is usesd, e.g., the US price index. A alternative is to use the average price index of industrial cou or the world price index. Wholesale price index was also use proxy of the price of import substitutes in some instances. sources are mentioned in Appendix 1.

Empirical studies use variety of definitions for the activit iable. Real GDP is used as a measure of the real domestic i (y). Using a utility function to generate the demand for in Senhadji (1997) derived an import demand function where t tivity variable is the gross domestic product minus e

In a study about Australia, Athukorala and Menon (1995) the ratio of stocks to average sales volume, as a measure of g scarcity of domestic supplies, to the main two sets of argu (relative prices and economic activity). They used this variab control variable to capture any cyclical demand effects. Th sults show the importance of allowing for cyclical demand in order to obtain meaningful activity elasticity estimates.

Another empirical issue, which has to be considered, is st Generally, if the estimated coefficients are not stable, estimat port demand functions will be of little help to policy maker stability of the demand for imports is very crucial for ef trade policy. Deliberate trade policy actions will affect policy such as balance of payments and exchange rates. To predic effects with some degree of certainty, the import demand fu must be stable. Instability will make it difficult to predict th nitude and direction of trade policy actions. if import dema the focus of short run stabilization policy, and the demand f ports was unstable, then short run stabilization policy will successful. This is true because different levels of economic ities and prices, in this case, will be consistent with a given d for imports at different points of time.

Import demand specifications presented above by their very nature, entail the use of variables in levels only. Given that most macroeconomic variables tend to be nonstationary, there is the potential danger of capturing spurious relations (Harvey, 1990). This problem is largely ignored in the literature. Nonstationarity invalidates the standard estimation procedures and makes the classical asymptotic theory inapplicable. However, it is conceivable that individual variables are not stationary, but that a linear combination of them is. These variables are then said to be cointegrated. The theory of cointegration reconciles findings of non-stationarity with the possibility of testing relationships among the levels of economic variables, see: Doroodian (1994) for more elaboration on this subject as it applies to import demand equation.

Before estimating levels regressions, it is thus essential to carry out the appropriate tests to ensure all data used are stationary and are of the same order of integration to avoid spurious regression results.

5/1- Stationarity and Cointegration Tests

In light of recent advances in time-series econometrics, we began the estimation process by testing the time-series properties of the data before proceeding to present the estimation results. The diagnostic tests include stationarity and cointegration.

In order to test for the stationarity of the variables included in the model, the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) tests of stationarity were applied to each variable, see: Dickey and Fuller (1979,1981). This procedure determines the stationarity of a variable by applying the Dickey-Fuller unit root test, which reduces to testing the significance of the t statistic. If the resulting t statistic is significant, the null hypothesis of non-stationarity of a variable is rejected and the model can be estimated in levels. If the resulting t statistics are not significant, then the test is repeated for the first difference of the variables. If, again, sta-

tionarity is rejected, differences of higher order are taken a test performed until stationarity is achieved. The critical valu the 1%, 5%, and 10% significance levels are determined to b 2.93 and 2.60 respectively.

Table (3) shows that except for the relative prices in the c Bahrain and Saudi Arabia, all the variables are non-station levels. We repeated the tests for the first difference of the var As shown in the table, the null hypothesis of non-stationarity variables is rejected and thus the estimated demand for ir function must be implemented using the first difference of th iables.

Table (3): Stationarity Tests

variable / country	Levels DF	Levels ADF	1st Difference DF	1st Difference ADF
Bahrain				
real imports	-0.150	-0.431	-5.310***	-8.283***
real gdp	-1.389	-1.902	-5.988 ***	-7.678***
relative prices	-5.242***	-3.293**	-2.207	-1.897
Kuwait				
real imports	-0.685	-0.612	-4.300***	5.932***
real gdp	-0.419	-0.689	-5.750***	-9.944***
relative prices	-0.218	-0.020	-4.182***	-5.441***
Oman				
real imports	0.193	0.033	-2.350**	2.621*
real gdp	1.507	0.635	3.170**	2.682*
relative prices	1.357	0.380	2.739*	2.834*
Qatar				
real imports	0.893	0.442	6.344***	6.021***
real gdp	1.092	0.208	2.826*	3.338**
relative prices	0.501	0.270	5.553***	4.622***
Saudi Arabia				
real imports	1.954	0.894	-2.770*	2.659*
real gdp	1.395	0.753	-5.426***	2.836*
relative prices	4.201**	2.735***	1.662	0.750
United Arab Emirates				
real imports	2.145	0.466	2.948**	2.672**
real gdp	1.065	0.841	3.492**	2.721*
relative prices	5.810***	2.960	3.402**	3.071**

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

Proceeding to check for conintegration among the variables, both DF and ADF tests were applied to the model to be estimated. The critical values for the 1%, 5% and 10% significance levels are determined to be 4.87, 4.11 and 3.73 respectively. As shown in table (4), though the variables are non-stationary, they are co-nintegrated in levels. Therefore, a long run relationship exists among the variables in the model and level estimates can be used, thus, eliminating the need for differencing the data which may destroy the long run relationship among the variable

Table (4): Cointegration Tests

Country	DF	ADF
Bahrain	-3.933**	-3.942*
Kuwait	-6.354***	-4.710**
Oman	-8.351***	-4.560**
Qatar	-5.607***	-3.754*
Saudi Arabia	-3.835**	-5.142***
United Arab Emirates	-5.502***	-3.760*

***, Significant at 1% level
** Significant at 5% level
* Significant at 10% level

5/2 - Model Estimation Results

Utilizing the available data we proceeded to estimate the regression equations for individual GCC countries. Our rationale for not pooling the data to estimate an aggregate import function for the entire GCC members is that these countries are different in many respects despite the existence of some similarities stemming from their dependence on exports of crude oil as the main source

of income. An additional benefit from estimating individual m is that we can make more definitive statements about each cou

In essence, our reported results represent the best regre model estimated among the multitude of forms examined.

The final parsimonious model for each country is listed in (5) along with standard goodness of fit statistics. Since we us logarithmic form for all countries, the reported coefficients c interpreted as elasticities of imports to the corresponding vari

Referring to table (5), it is clear that all the reported regres enjoy a reasonably good degree of fit as exemplified in the hi squared values and F-statistics. Moreover, various coefficie the independent variables are in general significant according t-statistics. Serial correlation was found to exist in the case of rain, Qatar and United Arab Emirates. For this reason regres were corrected for serial correlation of the first order using dreth-Lu grid technique. Clearly, the conventional Cochran cutt technique would not be efficient because the estimated m contained the lagged dependent variable.

The model was found to fit all the countries of GCC, i.e imports are found to depend on real GDP, relative prices lagged real imports. With regards to Bahrain and Qatar, the dy ic structure of the model did not fit well the data of the dema imports. It was found that lagged imports do not significantly the current levels of real imports. Moreover, the results for th of Kuwait and the United Arab Emirates indicate that relativ ces do not significantly affect the demand for imports.

Turning to the actual results, it is obvious that various countries exhibit significantly different responses to th dependent variables. Table (6) summarizes the short run and run elasticities in a compact form. Only in the case of Bahrai income was found to be elastic. Estimated short run elasticit found to be 0.592 for Kuwait, 0.594 for Qatar, 0.237 for Saud

bia and 0.477 for the United Arab Emirates. The results indicate that imports are a necessity in these countries. Almost a unitary income elasticity of the demand for imports was found in the case of Oman. Specifically, the estimated short run elasticity was found to be 0.928, which indicates a transitional state.

Table (5): Regression Results for the Import Demand Function

Country / Ind. Var.	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	United Arab Emirates
C	-1.750	0.037	-1.360	1.122	-0.468	-1.050
	(-2.21)**	(0.045)	(-3.09)***	(1.78)*	(-0.67)	(0.44)
Lrgdp	1.857	0.592	0.928	0.594	0.237	0.477
	(5.57)***	(4.19)***	(3.99)***	(2.42)**	(1.95)**	(1.92)**
Lrelp	-0.198	-0.663	-0.209	-1.848	-0.070	-0.233
	(-2.61)***	(-1.36)	(-2.45)***	(3.74)***	(-1.77)*	(0.39)
$Lrimp_{-1}$	0.065	0.652	0.307	0.363	0.823	0.526
	(0.41)	(5.73)***	(2.10)**	(1.57)	(12.5)***	(2.18)**
RHO	0.500	-----	-----	-3.000	-----	7.000
	(2.43)***	-----	-----	(0.82)	-----	(1.97)**
SSR	0.117	0.674	0.530	0.127	0.431	0.177
SER	0.086	0.179	0.171	0.099	0.143	.099
R^2 Adj.	0.726	0.902	0.978	0.847	0.963	0.962
F-Stat.	13.40	74.604	336.72	30.43	210.38	12.154
DW	1.28	-	-	1.78	-	1.923
Durbin(h)	-	-0.426	1.350	-	1.80	-

Note: t-statistics are reported in parentheses below the estimated coefficients.

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

Long run income elasticity was found to be unitary for the of UAE and almost unitary for Qatar. Demand for imports however, found to be elastic with respect to income in the lon for the rest of GCC contries. Long run income elasticities found to be 1.99 for Bahrain, 1.70 for Kuwait, 1.339 for Oman and Saudi Arabia (see table (6)).

Table (6): Short Run and Long Run Elasticities

	Income Elasticities		Price Elasticities	
Country	Short Run	Long Run	Short Run	Lon
Bahrain	1.857	1.986	-0.198	-0
Kuwait	0.592	1.701	-0.663	-1
Oman	0.928	1.339	-0.209	-0
Qatar	0.594	0.932	-1.848	-2
Saudi Arabia	0.237	1.339	-0.070	-0
UAE	0.477	1.006	-0.233	-0

With regard to the response of the demand for imports t relative prices, we found that except for Qatar, the demand fo ports with respect to relative prices was found to be inel price elasticity for Saudi Arabia was found to be very low ((0.070). In the long run however, price elasticity was found elastic for Kuwait and Qatar, and continued to be inelastic fo rest of GCC.

Finally, it is observed that imports in the majority of countries (i.e. Kuwait, Oman, Qatar and Saudi Arabia) a gradually as evidenced by significant impact of the lagge pendent variable in their estimated equations. However, the of adjustment differs substantially among them. According

ble (7), the speed of adjustment was found to be very slow in the case of Saudi Arabia (about 4.7 years). This means that given a shock to the demand for imports, it will take about 4.7 years for actual levels of imports to fully adjust to their desired levels. The adjustment lag was found to be shorter in the case of Kuwait and UAE, though it still takes more than one year for actual imports to adjust to desired levels. Specifically, the adjustment lag for Kuwait was found to be about 1.9 years, while full adjustment is achieved in 1.1 years in UAE.

Table (7): Coefficients of Adjustment and Mean Adjustment Lags

Country	Coefficient of Adjustment λ	Mean Adjustment Lag (years) $(1-\lambda)/\lambda$
Bahrain	0.935	0.070
Kuwait	0.348	1.873
Oman	0.693	0.443
Qatar	0.637	0.570
Saudi Arabia	0.177	4.650
UAE	0.474	1.110

Vary short adjustment lags were found in the cases of both Oman and Qatar. Estimated adjustment lags were 0.4 and 0.6 years respectively. In the case of Bahrain, almost instantaneous adjustment of actual imports to their desired levels. Finally, figures (1) - (6) in Appendix 2 show the actual and fitted imports using the model we applied to the demand for imports in the GCC countries. It is clear that our estimated regression lines fit the data very well.

6 - Conclusions

In this paper we estimated the import demand equations f various GCC countries using time series data extending over two decades. Several issues were examined and resolved th careful consideration of the estimation results. Among these first, the time series characteristics of the variables and th istence of a long-term relation among them were explored. T the results proved the nonstationarity of the variables, they di firm the existence of a cointegrating vector. Second, the cho the functional form was explored in detail and the empiric dence confirmed that the relative price formulation of the trac import demand function is an appropriate form for the GCC tries.

Moreover, it was established that the log-linear formula superior to the linear form. Third, the results confirmed th for the inclusion of a dynamic structure in the import deman tion to reflect the stock adjustment characteristics. Howev average adjustment lag was found to vary among the various tries.

The empirical results also indicated that the demand for i in all GCC countries (except Bahrain) is inelastic with respec come in the short run. However, this relation becomes highl tic in the long run except for Qatar, which remains inelastic cerning the responsiveness of the demand for imports to the r prices in the short run, it was also found to be relatively inel all GCC countries with the exception of Qatar. In the lor however, only Kuwait and Qatar exhibit an elastic response relative prices while the remaining countries continue to sh inelastic response. These results seem to confirm the nescess ture of imports in the GCC countries. Given the nature and onomic structure of these countries as explained earlier, th not look surprising.

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Appendix 1

Data Sources and Definitions

Imports: nominal imports measured in domestic currency of rEspective countries.
(IMF, International Financial Statistics, Various issues)

Income: gross domestic product GDP, measured in domestic currency of respective countries.
(IMF, Intrnational Financial Statistics, various issues)

Domestic Prices : consumer price indexes. (IMF, International Financial Statistics, various Issues).

Import Prices: import price indexes. (IMF, International Financial Statistics, various issues and UNCTAD, *Handbook of International Trade & Statistics: Supplement.* Various Issues).

Appendix 2

Actual and Fitted Imports

Figure 1. Actual and Fitted Imports

Bahrain

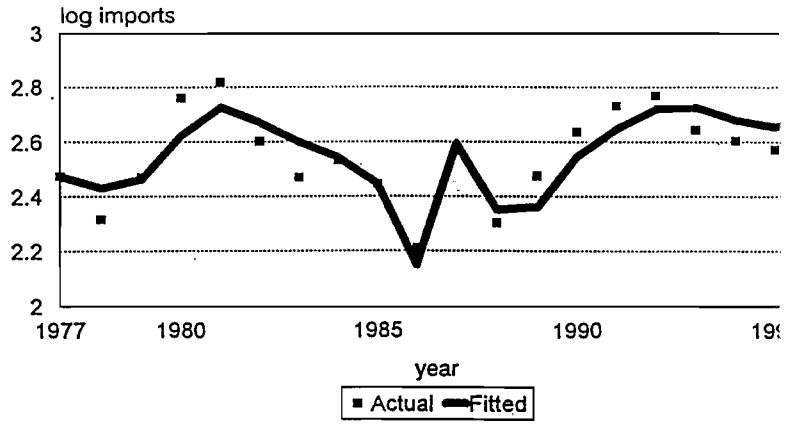

Figure 2. Actual and Fitted Imports

Kuwait

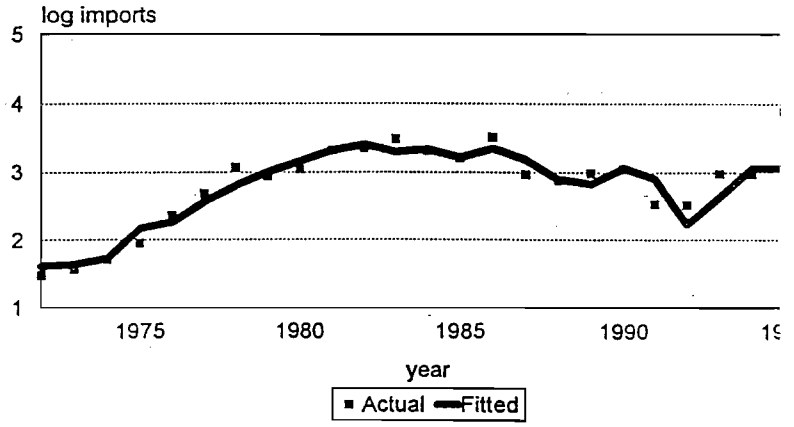

Figure 3. Actual and Fitted Imports

Oman

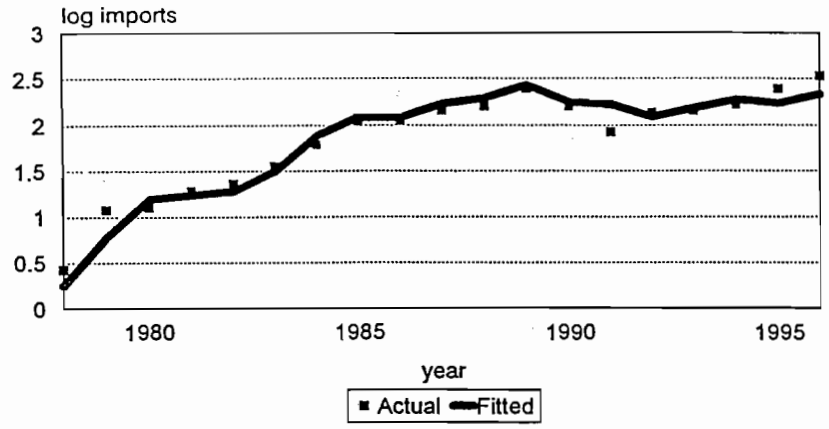

Figure 4. Actual and Fitted Imports

Qatar

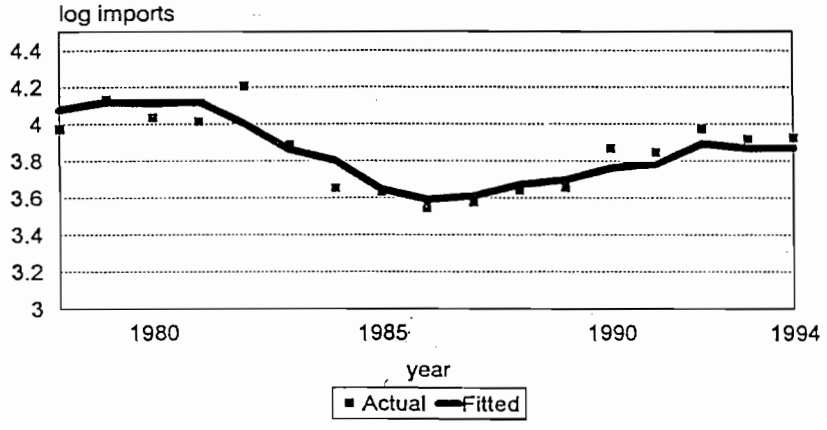

Figure 5. Actual and Fitted Imports

Saudi Arabia

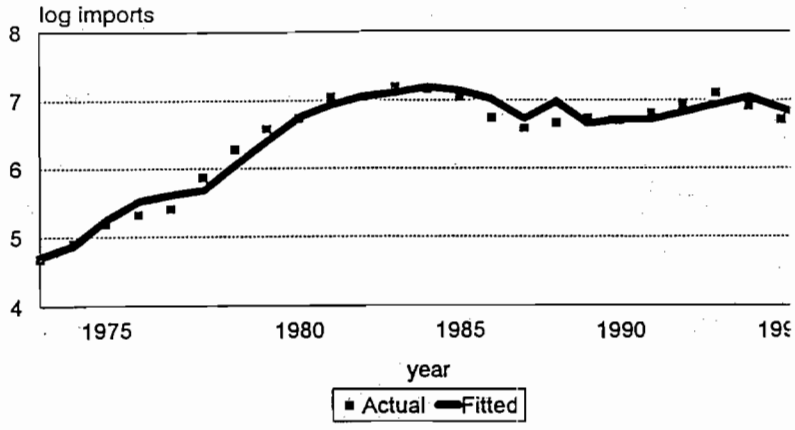

Figure 6. Actual and Fitted Imports

United Arab Emirates