An Extended Model of Import Demand For GCC Countries Applied to Kuwaiti Data.

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I - Introduction

Adopting the familiar underlying theoretical framework of the consumer demand and/or production theory for the determination of trade volumes and prices, estimation of the total import demand function has received a great deal of attention in the empirical literature on international trade.[1] Plausibility of the assumption of infinitely price elastic foreign supply of imports, to a country, promoted the single equation import demand model. The majority of empirical studies on total import demand typically relate the quantity of imports demanded to an activity variable and to imports relative prices defined as the ratio of imports price to the price of domestically produced 'substitutes'. Others have argued that nontradables are separable in use from all tradables so that the demand for imports is independent of the price of nontradables. Accordingly, they have defined relative prices in terms of the domestic price of tradables.[2] Nonetheless, there exist strong empirical evidence that import demand models employed in these studies may not be correctly specified.[3] The immediate criticisms relate to the empirical definitions of the price variable(s) where unduly restrictive assumptions are maintained.[4]

Although of vital importance when it comes to using estimated elasticities, for instance, to valuate the effect of price changes in a partial equilibrium framework, or when comparing elasticity estimates drawn from different sources, little care is generally paid to the question of selecting price variables. The issue of price data selection is important when estimated price effects are being assessed. These are only meaningful to the degree that they are not being dissociated from the structure within

which they were defined. While, in most empirical studies, availability plays a major role in selecting explanatory variables, the description of variables used is often relegated to a brief data appendix or a footnote.

The main contribution of this research is to present a detailed examination of the rather restrictive empirical hypotheses implied by the conventional econometric specifications of the demand for total import used by previous studies on the GCC countries. We define our objectives as: First, to develop a generalized specification of import demand in which prices of imports, of tradables, and of nontradables enter as arguments. Second, to construct separate price indexes for tradables and nontradables that are required for estimating such general import demand model. Third, this general specification is then estimated and the results are utilized in testing hypotheses maintained by the conventional import demand models. Namely: 1) that imports and nontradables are independent (composite) goods; 2) that imports and nontradables are substitutes for each other; 3) that the demand for imports is price homogeneous; 4) that the cross price elasticities of import demand with respect to tradables and nontradables are identical; and 5) that the own and cross price elasticities of the import demand are equal in magnitude and opposite in sign. Annual data from the GCC member country of Kuwait over the period 1970-1989 will be used to carry our tests.

The plan of the paper is as follows: Section II presents a brief review of previous work on import demand in the GCC countries. Section III proposes an extended model of import demand and discusses assumptions maintained by conventional specifications. Section IV describes our methodology to construct separate price indexes for tradables and nontradables in Kuwait. In section V we carry proper statistical tests through in an investigation of the empirical credibility of the assumptions maintained by the conventional import demand specifications relative to the proposed extended model. Section VI discusses import demand elasticity estimates of the extended model and compares with previous estimates. A brief discussion of the policy implications of our results is presented in section VII. Section VIII summarizes and concludes. Definitions of variables and sources of data are given in a data appendix.

II- A Review of the Empirical Literature

Studies on total import demand in the member states of the Gulf Co-operation Council (GCC) can be classified into two groups. In one group, researchers have, seemingly, taken a commonly held view that in developing countries, import demand is price inelastic. Accordingly, they have specified import demand not to depend on prices of any sort. This includes Metwally and Abdel-Rahman (1985), Metwally et al. (1987), and metwally (1987, 1993). In a second group, researchers have adopted a typical traditional specification. This group includes Asseery and Perdikis (1990, 1993) and Elsamadisy (1994, 1995a, 1995b). In this section we present a brief review of the empirical literature on total import demand in the GCC countries as regards different aspects of model specification. Specifically, we discuss the basic empirical specifications adopted, mathematical functional forms employed, short-run dynamics, and some particularities of the GCC country data.

II.1 - The Demand Function: Implicitly assuming that import demand is price inelastic, Metwally and Abdel-Rahman (1985), Metwally et al. (1987), and Metwally (1987, 1993) have used a simple specification of import demand in which the quantity of imports demanded depends only on an activity variable. Letting M^D denotes the quantity of imports, Y the activity variable expressed in real terms, X_t a vector of related variables other than prices, and t denotes time, we write:

$$M_t^D = F(Y_t, X_t) \qquad (I)$$

Asseery and Perdikis (1990, 1993) and Elsamadisy (1994, 1995a) have used a typical conventional specification in which the quantity of imports demanded depends on an activity variable and on relative prices defined as the ratio of the price of imports to an 'overall' domestic price. Letting $P^{MD} = P^M/P^D$ denotes the relative prices of import where P^M is the price of import (in domestic currency) and P^D is the 'overall' domestic price, we have:

$$M_t^D = F(Y_t, P_t^{MD}, X_t) \qquad (II)$$

Counter to the commonly held views, they found the relative prices to have been an important determinant of imports in the "developing" GCC countries. Their results, thus, imply the rejection of the simpler

specification (I). Nonetheless, it is well documented in the literature that (II) probably involves the omission of relevant variables. Thursby the Thursby (1984), using a combination of classical testing procedures, and Thursby (1988), employing a loss function approach find strong evidence that such models are misspecified for data from five industrial countries. The immediate criticism of this literature concerns the choice of appropriate index(es) to measure the price of domestic goods, hence the empirical definition of the price variable they use, where unduly restrictive assumptions are maintained. Specifically, import own and price elasticities are constrained to be equal in magnitude but opposite in sign. Domestically produced goods, both tradables and nontradables, are assumed (imperfect) substitutes for imports. Moreover, the import demand cross price elasticities are constrained to be identical as between the two goods categories (See e.g. Goldstein et. al., 1980).

An alternative specification assumes that nontradables are separable in use from all tradables and accordingly, the demand for imports is independent of the price of nontradables. The rational has been that the economic agent engages in a two stages decision process. In the first stage, total expenditures are allocated between nontradables and all tradables on the basis of their relative prices. In the second stage, expenditures on all tradables (given from first stage) are allocated between imports and domestic tradables on the basis of their relative prices. The implication of this assumption is that, rather than the overall domestic price, only the domestic price of tradable goods would be relevant for the construction of the relative prices of imports. Letting $P^{MT} = P^M/P^T$ where P^T is the domestic price of tradable goods, such specification is written as:

$$M_t^D = F(Y_t, P_t^{MT}, X_t) \qquad (III)$$

Elsamadisy (1995b), applying significance non-nested hypotheses test procedures in a formal comparison of (II) and (III), reported that the J-test developed by Davidson and MacKinnon (1981) and the N-test developed by Pesaran and Deaton (1978) indicated that the two alternative specifications are strongly rejected relative to each other, as being false, for both the static and the dynamic versions of each. Such result suggests that both alternatives are incorrectly specified and another (unspecified) model is appropriate.

II.2- The Functional Form: Due to convenience of estimation procedures and/or the ease of interpretation, most researchers have favored a linear or log-linear specification of the import demand function.[5] The main analytical tool used do discriminate between the two alternative functional forms has been the Box-Cox (1964) transformation. Asseery and Perdikis (1993: 36) have favored the linear version in case of Kuwait and Oman. Nonetheless, Elsamadisy (1995b), applying formal testing procedures of model specification in the presence of alternative non-nested hypotheses developed by MacKinnon et al. (1983) and Bera and McAleer (1982) to the Kuwaiti data, reported that results of both tests indicated the superiority of the log-linear form for the conventional specifications (II) and (III).

II.3- The Short-Run Dynamics: Examining 324 equations for a sample of five countries, Thursby and Thursby (1984:121) reported' .... the models most frequently accepted are those which include dynamic behavior through lagged values of the dependent variable'. In most previous studies on import demand in the GCC countries, authors reported significant Koyck-type lag of adjustment in estimated reduced form equations. Reported estimates of the speed of adjustment, for well specified partial adjustment mechanism, ranged from a low of 0.284 for Kuwait to a high of 0.843 for Bahrain (Metwally, 1993). Asseery and Perdikis (1990) reported speed of adjustment, for Kuwait, of 0.640 and 0.500 for their log-linear and linear forms, respectively. Elsamadisy (1994) reported speed of adjustment, for Kuwait, of 0.731 and 0.766 for the log-linear form of alternative conventional specifications. Estimated speed of adjustment reported by Asseery and Perdikis for the Kuwaiti economy are obviously low, while that reported by Metwally is suspiciously low.

II.4 - Particularities of The GCC Country Data: The GCC countries have experienced drastic fluctuations in oil revenues since the early 1970s oil embargo. The sharp rise in oil prices in late 1973, it is argued, had elevated the market value of oil reserves remarkably in the oil exporting countries, implying these countries to have witnessed a significant increase in their national wealth. Such increase in wealth (or, alternatively, in the permanent income) would be expected to have led to a sharp increase in the demand for imports in those countries. For Kuwait, Elasmadisy, (1995a) reported the log-linear form of the conventional (equilibrium) specification (II) with the GDP deflator as the domestic price to have witnessed an upward shift in its intercept and a downward shift in

its income slope. He also found the first Gulf-War shock to have significantly reduced, temporarily, the import demand in Kuwait. On other hand, in these countries, non-oil GDP is considered more appropriate as a proxy for the activity variable (Elsamadisy 1994; Metwally 1993).

III- An Extended Model of Import Demand

Added to previous empirical evidence from non-GCC data (e.g. Thursby and Thursby, 1984; Thursby, 1988), evidence of the Kuwaiti data indicating the rejection of the alternative conventional specifications (II) - (III) relative to each other (Elsamadisy, 1995b) leads one to suspect either (1) the plausibility of the infinite import supply elasticity assumption; (2) that the traditional equations are misspecified for the Kuwaiti (and possibly other GCC countries) data as regards the variables composing their arguments; (3) the empirical validity of the homogeneity postulate for total import demand in Kuwait; or (4) the propriety of existing data. Suspicion based on argument (1) is excluded on the basis of the smallness of the Kuwaiti economy and the highly liberal Kuwaiti trade policy. Suspicion based on arguments (2) and/or (3) is related to the restrictiveness of the conventional import demand specifications and has, in fact, motivated the present work. Data problems implied by argument (4) are serious and are beyond the scope of this paper. In this section, an extended model of import demand, in which prices of imports, of tradable goods, and of nontradable goods enter as arguments is presented. The alternative conventional specifications (I) - (III), of section II, are shown to be special cases of the proposed specification.

III.1 - The Extended Model: The economic theory of demand states that the quantity demanded of a commodity (either simple or composite) is a function of, among other variables, its own price, prices of other commodities substitutes as well as complements, and an activity (scale) variable. A basic assumption of the demand theory is that economic agents make simultaneous choices between different commodities. When considering total imports as a composite commodity, domestically produced goods are aggregated into two composite commodities, namely tradables and nontradables. As such, an unrestricted import demand function must have all prices of the three (composite) commodities among its arguments. The price elasticities of import demand must not be restricted a priori to be identical in magnitude and/or in sign as between

any pair or prices. A model of total import demand that satisfies these requirements lends itself directly to the testing of prices related hypotheses that are maintained assumptions in previous studies using conventional specifications. Such model has the following specification:

$$M_t^D = f(\underset{Y_t}{\pm}, \bar{P_t^M}, \overset{+}{P_t^T}, \overset{\pm}{P_t^{NT}}, X_t) \qquad (IV)$$

where M^D is the quantity of imports demanded, Y is the activity variable expressed in real terms, P^M is the price of imports in domestic currency, P^T is the domestic price of tradable goods, P^{NT} is the price of nontradables, X_t is a vector of other related variables, and t is time. Theoretically expected signs for the first partial derivatives of M^D with respect to its arguments are indicated by the sign above each respective variable. The derivatives M^D with respect to its own price, P^M, would have a negative sign and that with respect to the domestic price of tradables, P^T, would have positive sign. That with respect to the price of nontradables, P^{NT}, remains an empirical question.[6] That with respect to the activity variable, Y, can be of either sign.[7] It should be noted that the measurement of import price in units of domestic currency introduces exchange rate changes indirectly into the model by expressing all monetary variables in a common currency units.

III.2 - Conventional Models: Let us consider first that demand functions are generally restricted to be homogeneous of degree zero in money income and nominal prices, implying the absence of money illusion. Since the income variable, Y, is in real terms, it follows that the homogeneity postulate is satisfied by imposing price homogeneity on (IV) requiring the sum of price elasticities to be identically zero. This would involve the normalization of prices. Using P^T as the numerare and writing P^{MT} and P^{TT} as short for the relative prices of imports and nontradable goods, we have $P^{MT} = P^M/P^T$ and $P^{MTT} = P^{NT}/P^T$. The price homogeneous version of (IV) is written as:

$$M_t^D = f(\underset{Y_t}{\pm}, \bar{P_t^{MT}}, \overset{\pm}{P_t^{NTT}}, X_t) \qquad (V)$$

It is immediately seen that the alternative conventional specifications of import demand discussed in section II comprise three distinct, but related, special cases of the unrestricted specifications (IV) and/or its price homogeneity restricted version (V). We consider these cases in turn.

Special Case I: The empirical assumption that nontradables are separable in use from all tradables implies that only the domestic price of tradable goods would be relevant for the construction of the relative prices of imports. This implies a zero value for the first partial derivative of M^D with respect to P^{NT} in (IV), yielding:

$$M_t^D = f(\underset{Y_t}{\pm}, P_t^{\bar{M}}, P_t^{\dot{T}}, X_t) \qquad (VI)$$

Combining this hypothesis with the hypothesis of homogeneity in prices yields the conventional specification (III), examined by Elsamadisy (1995b), reprinted as (VII):

$$M_t^D = f(\underset{Y_t}{\pm}, P_t^{\bar{MT}}, X_t) \qquad (VII)$$

Special Case II: In most cases, when it comes to actual work, the researcher runs into the problem that separate domestic price indexes for tradable goods as such do not exist, hence, does not estimate a version of (VII). The actual practice has been to use a readily available proxy variable such as the implicit GDP deflator, the wholesale price index, and/or the consumer price index.[8] This results in casting the price homogeneous specifications (V) and/or (VII) as the conventional specification (II) adopted by Asseery and Perdikis (1990, 1993) and Elsamadisy (1994, 1995a), reprinted as (VIII):

$$M_t^D = f(Y_t^{\pm}, P_t^{\bar{MD}}) \qquad (VIII)$$

Special case III: The most restrictive assumption, adopted by Metwally and Abdel-Rahman (1985), Metwally et al. (1987), and Metwally (1987, 1993), that the demand for imports is prices inelastic implies zero first derivatives of M^D with respect to all prices in (IV) - (VIII) and results in specification (I), reprinted as (IX):

$$M_t^D = f(Y_t^{\pm}, X_t) \qquad (IX)$$

IV- Construction of the Price Indexes.

Econometric estimation of the general specification (IV) and/or some of its constrained versions requires separate price indexes for tradables and

nontradables. Such indexes do not exist for Kuwait, and must be constructed. It should be, however, indicated at the outset that what will be presented here is merely a first attempt at the construction of separate price indexes for tradables and nontradables in Kuwait. These are at best only proxy variables for the true variables. Our approach to the construction of these indexes is based on the division of the economy along sectoral lines into "tradable" and "nontradable" sectors. The "tradable" sector of the economy is defined to include all industries involved in the production of "exportables" and/or "importables". Together, improtables and exportables are the economy's output of tradables. The remainder of the gross domestic product is the economy's output of "nontradables" and the industries concerned are allocated to the "nontradable" sector of the economy.[9] We apply the same procedure used to derive the implicit GDP deflator to actually construct our price indexes. The GDP deflator is essentially derived by dividing the GDP at current prices by its value at constant prices. Likewise, we derive the price index for tradables by dividing the current value of the GDP originating in the tradable sector by its value at constant prices. Similarly, the price index for nontradables is derived by dividing the current value of the GDP originating in the nontradable sector by its value at constant prices. Let Y^{TC} and Y^{NTC} be the gross domestic product originating in the tradable and in the nontradable sectors, at current prices. Let Y^{TF} and Y^{NTF} be their respective values at constant prices. We obtain the price index for tradables as $P^T = Y^{TC}/Y^{TF}$ and that for nontradables as $P^{NT} = Y^{NTC}/Y^{NTF}$

One limitation of these proxy variables involves the classification of the Kuwaiti industries into the tradable and nontradable sectors. In order to obtain the tradable/nontradable break-down of the total output (GDP), every producing sector in the economy has to be allocated to either the tradable or the nontradable sector. The problem lies with the data aggregation at the sectoral level of the economy. The level of aggregation of the existing data might be too high to allow unambiguous classification of industries in one sector or the other. As such, the final outcome is that some tradable (nontradable) output is bound to be included in the nontradable (tradable) sector. Nonetheless, a brief examination of the commodities accounts and other input-output data for the years 1983 and 1987 indicates that the degree of foreign trade participation, as approximated by the ratio of imports or exports to total domestic sales, is substantially higher for the tradable sector of the Kuwaiti economy than the

nontradable sector.[10] Such findings suggest that our classification is consquent. A second limitation of our proxies is that they are, like the GDP deflator, current-weighted price indexes. Base-weighted indexes are usually favored over equivalent current-weighted indexes for the purposes of analyzing price movements. Since we divide the economy along sectoral lines, the tradable and nontradable price measures can be constructed only as the ratio of output at current prices to output at constant prices. These output measures are inherently current-weighted.

V- Empirical Investigation.

Let alone specification (IX), the consequences of specifying (VII) and/or (VIII) instead of (IV) are not ignorable. In specification (VII), the definition of the price variable implies that imports and nontradables are assumed independent goods. Considering specification (VIII), it is immediately seen that the definition of the price variable implies that the own and cross price elasticities of the imports demand function are assumed equal in magnitude but opposite in sign. This, in turn, as the prices of nontradables are components of P^D, implies substituability between imports and nontradables. Furthermore, '....the cross price elasticity of demand for imports is constrained to be identical as between domestic tradable and nontradable goods' (Goldstein and Khan, 1988, p. 1062). Although plausibility of the assumptions of substitutability or independence of imports/nontradables may be seen obvious in some cases, it may not seem so for most of the GCC countries (Kuwait being no exception), where virtually all capital and intermediate inputs of production of nontradables are imported. Such statements must be a testable hypotheses rather than maintained assumptions in the case of any of the GCC countries. On other hand, either (VII) or (VIII) requires price homogeneity to be maintained for specification (IV). While the homogeneity postulate is consistent with the standard theory of demand, it is an empirical question in principle, hence it should rather be tested.

V.1 - The Estimating Equation: We augment the demand model (IV) with a dummy wealth variable, W, and its interaction with the income variable, WY. A positive sign for the wealth variable and a negative sign for the interaction variable are expected. We also include a dummy variable, D, to reflect the shock of the first Gulf war (the Iraqi-Iranian war). A negative effect on imports is expected for the war shock.[11] Writing $X_t = [W_t\ W_tY_t\ \ D_t]$, for the Kuwaiti data, we write the log-linear form of the long-run equilibrium model (IV) as:[12]

$$LnM_t^{D*} = \theta_0 + \theta_1 LnY_t + \theta_2 LnP_t^M + \theta_3 LnP_t^T + \theta_4 LnP_t^{NT} + \theta_5 W_t + \theta_6 W_t Y_t + \theta_7 D_t + u_t \qquad (X)$$

where M_t^{D*} is the desired level of import at time t; θi, i = 1, ... 4 are the long-run elasticities of the import demand with respect to the respective argument; θi, i = 5, ... 7 are the wealth and war shift parameters, respectively. According to the real partial adjustment hypothesis the static long-run equilibrium model (IV) can be cast as a short-run dynamic model by introducing the lagged dependent variable, amogn its arguments. Applying the logarithmic flow partial adjustment mechanism to (X), we have:[13]

$$LnM_t^D = a_0 + a_1 LnY_t + a_2 LnP_t^M + a_3 LnP_t^T + a_4 LnP_t^{NT} + a_5 W_t + a_6 W_t Y_t + a_7 D_t + a_8 LnM_{t-1}^D + u_t \qquad (XI)$$

where a_i i = 1, ... 4. are the short-run elasticities of the import demand with respect to the respective argument and $\lambda = 1 - a_8$ is the speed of adjustment. The long-run elasticities are computed by dividing a short-run elasticity by λ . In what follow, we utilize specification (XI) in examining the empirical credibility of different assumptions maintained by the conventional specifications.[14]

V.2 - Nested Hypotheses: We first identify series of restrictions on the parameters of (XI) that result in the log-linear form(s) of the conventional specifications (VII), (VIII), or (IX):

(1) - Assuming price homogeneity for (IV) requires the sum of all price elasticities to be identically zero. This imposes the restriction that $a_2 + a_3 + a_4 = 0$ on the parameters of (XI). Such restriction would reduce (XI) to the log-linear form of (V) given by:

$$LnM_t^D = c_0 + c_1 LnY_t + c_2 LnP_t^{MT} + c_3 LnP_t^{NTT} + c_4 W_t + c_5 W_t Y_t + c_6 D_t + c_7 LnM_{t-1}^D + u_t \qquad (XII)$$

(2) - Assuming tradables/nontradables separability implies that the demand for imports is independent of the price of nontradables. This implies $a_4 = 0$ and reduces the unrestricted specification (XI) to the log-linear form of the restricted version (VI) written as:

$$LnM_t^D = b_0 + b_1 LnY_t + b_2 LnP_t^M + b_3 LnP_t^T + b_4 W_t + b_5 W_t Y_t + b_6 D_t + b_7 LnM_{t-1}^D + u_t \qquad (XIII)$$

(3) - Such assumption also imposes the restriction that $C_3 = 0$ on the parameters of (XII) and reduces specification (XII) to the log-linear form of specification (VII). Likewise, imposing price homogeneity on the parameters of (XIII) implies that $b_2 + b_3 = 0$ and reduces (XIII) to the log-linear form of specification (VII) given as:

$$LnM_t^D = d_0 + d_1 LnY_t + d_2 LnP_t^{MT} + d_3 W_t + d_4 W_t Y_t + d_5 D_t + d_6 LnM_{t-1}^D + u_t \qquad (XIV)$$

(4) - The actual practice of using an overall domestic price index results in reducing (XI) and/or (XII) to the log-linear form of the more familiar conventional specification (VIII) given as:

$$LnM_t^D = e_0 + e_1 LnY_t + e_2 LnP_t^{MD} + e_3 W_t + e_4 W_t Y_t + e_5 D_t + e_6 LnM_{t-1}^D + u_t \qquad (XV)$$

Model (XV) is not, however, naturally nested within the extended model (XI). Nonetheless, if it is postulated that the over all price index, P^D, is the so-caled "true" cost of living index, then, assuming that the aggregator function satisfies certain regularity conditions, the overall price index is given as a fixed weight Divisia (1926) price index the Divisia weights of which being the relative shares of tradable and nontradable goods in total GDP (See e.g., Diewert, 1976). Where s is the relative share of the nontradable sector in the gross domestic product at current prices, the discrete form of this index is given by the Tornqvist (1936) price index and is constructed as:

$$LnP^D = s.LnP^{NT} + (1 - s).LnP^T \qquad (XVIa)$$

(5) - If, in addition to price homogeneity, construction (XVIa) is also postulated, then it is seen that the conventional model (XV) can be nested within the unrestricted specification (XI). One can take either of three routs to reach this conclusion: a) obtain (XV) by imposing the restriction $C_3 = sc_2$ on the parameters of the price homogeneity restricted model (XII); or b) impose the restriction that $s = 0.5$ on (XVIa) and the restriction $a_4 =$

$a_3.(s/1-s)$ on parameters of the unrestricted model (XI) to get (XVI) as:

$$LnM_t^D = f_0 + f_1 LnY_t + f_2 LnP_t^M + f_3 LnP_t^D + f_4 W_t + f_5 W_t Y_t + f_6 D_t + f_7 LnM_{t-1}^D + u_t \qquad (XVI)$$

Then impose the restriction $f_3 = -f_2$ on the parameters of (XVI) to get (XV); or c) obtain (XV) from (XI) by imposing the pair of restrictions that $a_3 = -a_2 (1 - s)$ and $a_4 = -sa_2$ on the parameters of (XI) at once.

(6) - The most restrictive assumption that import demand is prices inelastic imposes the restrictions that all prices coefficients in the above models are identically zero and reduces any of them to the log-linear form of (IX) given as:

$$LnM_t^D = g_0 + g_1 LnY_t + g_2 W_t + g_3 W_t Y_t + g_4 D_t + g_5 LnM_{t-1}^D + u_t \qquad (XVII)$$

V.3 - Testing Strategy: The relationships between the extended specification (XI) and the restricted specifications (XII) - (XVII) are conveniently summarized in table 1 below. It is apparent from restrictions listed that we can identify at least three sequences of nested models in the sense that each succeeding model is a restricted version of the prior. The

Table 1
Relationships Between Specifications and Summary of Parameter Restrictions.

MODEL2	XI	XII	XIII	XIV	XV	XVI	XVII
XI							
XII	$a_2 + a_3 + a_4 = 0$						
XIII	$a_4 = 0$						
XIV	$a_4 = 0,\ and\ a_2 = a_3$	$c_3 = 0$	$b_2 = b_3$				
XV	$a_4 = -sa_2, and\ a_3 = -(1-s)a_2$	$c_3 = -sc_2$				$f_3 = -f_2$	
XVI	$a_4 = a_3(s/1-s)$						
XVII	$a_2 = a_3 = a_4 = 0$	$c_2 = c_3 = 0$	$b_2 = b_3 = 0$	$d_2 = 0$	$e_2 = 0$	$f_2 = f_3 = 0$	

first is the sequence (XI) - (XIII) - (XIV) - (XVII); the second is (XI) - (XII) - (XV) - (XVII), and the third is (XI) - (XVI) - (XV) - (XVII).[15] Thus formal statistical significance tests of nested hypotheses can be performed to choose empirically between component models of each sequence. Where appropriate, the variance-covariance matrix of the estimated coefficients can be utilized in performing a simple or a generalized students-t-test on the value(s) of the restricted coefficient(s). Alternatively, the maximum likelihood ratio criterion can be employed to test a model specification against its restricted version(s). As is well known, in a likelihood ratio test a comparison is made between the values of the likelihood functions of the unrestricted model, $L(\lambda_u)$, and the restricted model, $L(\lambda_R)$. Twice the value of the difference $[L(\lambda_u) - L(\lambda_R)]$, is distributed as $\chi 2$ with degrees of freedoms equal to the number of restrictions imposed. In each case, if the tested hypothesis is rejected there is no need to proceed, since all hypotheses nested within the rejected hypothesis are rejected a fortiori.

V.4 - Estimation Results: The OLS estimates and key regression statistics for the unrestricted equation (XI) and its immediate constrained versions (XII), (XIII), and (XVI) are reported in table 2.[16] The Jarque-Bera (1987) normality test statistic was insignificant and the augmented Dickey-Fuller test is highly significant, indicating no lack of normality. Durbin's-h statistics indicated the absence of serial correlation among OLS residuals.The ARCH test indicated no evidence of autoregressive conditional hetroscedasticity. In all regressions, the overall goodness of fit of the models is exceedingly close. The signs of the explanatory variables are consistent with a priori expectations. Except for model (XII), all the individual variables contribute significantly to the explanation of the behavior of the quantity of imports demanded.

With regard to (XI), the coefficient of adjustment of 71.55% is significantly greater than zero and (significantly) smaller than unity, hence indicating no adjustment mechanism misspecification. The short-run income elasticity of the demand for imports carried a highly significant correct positive sign. The coefficient on the interaction term, a_6, carried a highly significant negative sign indicating a downward shift in the income slope of the import demand function following the oil boom of the mid 1970s. The wealth dummy variable, W, carried a highly significant positive sign, hence indicating a decisive positive upward shift in the import demand function around mid 1970s. The war shock dummy carried a highly significant negative sign, indicating temporarily decline in import.[17]

Table 2
OLS Regression Results

Model	Equation XI	Equation XII	Equation XIII	Equation XVI
Variable	**Estimated Coeff.**	**Estimated Coeff.**	**Estimated Coeff.**	**Estimated Coeff.**
Constant	-7.86142 (-6.783)	-3.03793 (-1.560)	-6,06199 (-5.645)	-7.23096 (-5.135)
LN(Yt)	1.69032 (15.320)	1.04077 (3.850)	1.48801 (10.955)	1.64106 (8.523)
Ln(PtM)	-.163666 (-2.878)		-.315644 (-3.059)	-.385333 (-2.840)
Ln (PtT)	.153643 (6.942)		.155764 (5.967)	
Ln PtNT	-3.341979 (-3.351)			
Ln PtMT		-.011963 (-.105)		
Ln PtNTT		-.189091 (-1.704)		
Ln PtD				.167754 (3.970)
Wt	3.66737 (4.03 9)	2.88488 (1.438)	5.66134 (4.37212)	6.68757 (4.024)
WtLnYt	-.460224 (-3.785)	-.352150 (-1.291)	-.721317 (-4.195)	-.858716 (-3.866)
Dt	-.177239 (-8.782)	-.160261 (-6.627)	-.106832 (-6.876)	-.071674 (-3.520)
LnMt-1D	.284463 (4.315)	.323133 (4.607)	.272894 (3.690)	.273250 (2.695)
Reg. Stat.				
SEE	**.047496**	**.059069**	**.061699**	**.070926**
F Stat.	**356.516**	**262.786**	**240.728**	**181.785**
Adj. R-sqd.	**.993711**	**.990273**	**.989387**	**.985976**
D-h	**-1.26340**	**.324897**	**.254683**	**.397415**
AIC.	**-2.95083**	**-2.52468**	**-2.43755**	**-2.15881**
SBIC.	**-5.34134**	**-4.96489**	**-4.87777**	**-4.59903**
LLF.	**37.0329**	**31.9844**	**31.1567**	**28.5087**

Students t-statistics are in parentheses.

V.5 - Testing Results: It was specificized, as our third objective, to test the following hypotheses maintained by the conventional import demand models: 1) that imports and nontradables are independent goods; 2) that imports and nontradables are substitutes for each other; 3) that the demand for imorts is price homogeneous; 4) that the cross price elasticities of import demand with respect to tradables and nontradables are identical; and 5) that the own and cross price elasticities of the imports demand are equal in magnitude and opposite in sign. We now examine the results of testing these hypotheses orderly.

The relevance of the price of nontradables: The empirical hypothesis that nontradable goods are separable in use from all importable goods can be tested by testing the null hypothesis that the coefficient on the nontradables price variable in (XI) is not significantly different from zero. Comparing regressions (XI) and (XIII), the standard error of the estimate (SEE), the adjusted coefficient of determination, the Akaike Information Criterion (AIC) and the Schwarz-Bayes Information Criterion (SBIC) reveal that the removal of the price of nontradables has, somewhat, worsened the quality of the regression. Results reported in table 2 indicate that the students t-statistic for the exclusion of the price of nontradables, P^{NT}, of 3.351 is significant at the 1% level. Twice the value of the log-likelihood difference, for testing (XI) against (XIII), $[L(\lambda_{XI}) - (\lambda_{XIII})]$ is 11.752 $\gg \chi^2$ (1, 0.99). Results of both tests suggest that the restriction $a_4 = 0$ is decisively rejected. Accordingly, it is concluded that import demand, in Kuwait, is not independent of the price of nontradables.

Import/Nontradables Substitutability: The highly significant negative sign on the coefficient of the price of nontradable goods in (XI), combined with the above result of the maximum likelihood ratio test of model (XI) against its restricted version, model (XIII), indicates a decisive rejection of the assumption that nontradables substitute for imports. Consequently, the price elasticity of demand for total imports should not be constrained to be equal as between tradable and nontradable goods. Such consideration argues against the use of the GDP deflator as the sole domestic price. Since specification (XIII) is rejected, there is no point in proceeding to test its restricted versions (XIV) and/or (XVII).[18]

Price Homogeneity of Import Demand: Price homogeneity of (XI) can be empirically tested by testing the null hypothesis that the sum of all price coefficients is identically zero. Comparing regressions (XII) and (XI),

the standard error of the estimate (SEE), the adjusted coefficient of determination, the Akaike Information Criterion (AIC) and the Schwarz-Bayes Information Criterion (SBIC) reveal that imposing price homogeneity has particularly worsened the quality of our estimates of the price elasticities. The t-statistic for the general linear hypothesis Ho: $a_2 + a_3 + a_4 = 0$, applied to coefficients of (XI), is -3.7177 (p value $\ll 0.01$). Results reported in table 2 indicate that the value of twice the log-likelihood difference, for testing (XI) against (XII), $[L(\lambda_{XI}) - L(\lambda_{XII})]$ is $10.097 \gg \chi^2$ (1, 0.99). Both tests indicate that the price homogeneity restriction is decisively rejected for the Kuwaiti data. Accordingly, we see no necessity of specifying and import demand equation on which parameters the homogeneity restriction is imposed. This result strongly argues against the use of relative prices as price variables in the demand function. Since specification (XII) is rejected, there is no point in proceeding to test its restricted versions (XIV), (XV), and/or (XVII).

Identical Cross Price Elasticities: Equality of the cross price elasticities of import demand with respect to tradables and nontradables impose the restriction that $a_4 = a_3(s/1-s)$ on the parameters of (XI) coupled with the restriction that $s = 0.5$ in equation (XVIa). Consequently (XVI) implies that $a_3 = a_4$ in (XI). We test the credibility of the assumption that the two cross price elasticities are identical by testing (XVI) against (XI). The computed t -statistic for the general linear hypothesis $a_3 - a_4 = 0$ is 5.21 which is highly significant. Resutls reported in table 2 indicate that the value of twice the log-likelihood difference $[L(\lambda_{XI}) - L(\lambda_{XVI})] \gg \chi^2(1,$ 0.99). Results of both tests indicate a decisive rejection of the restriction. Since specification (XVI) is rejected, there is no point in proceeding to test its restricted versions (XVII) since it is rejected a fortiori.

Identical Own And cross Price Elasticities: The assumption that the own and cross price elasticities of the imports demand are equal in magnitude and opposite in sign is implemented in models (XIV) and/or (XV). Both models were rejected a fortiori implying such assumption cannot be justified for the Kuwaiti data.

Zero Prices Elasticities: The most restrictive model (XVII) was rejected a fortiori when testing our three identified sequences of hypotheses nested within the extended model (XI).

To conclude, rejection of the price homogeneity hypothesis for import demand implies the rejection of relative prices and requires import price

elasticities to be estimated separately. Rejection of the empirical hypothesis of separability of nontradables from all tradables implies that all three prices must be included as arguments of the import demand function. This, in turn, implies the clear (a fortiori) rejection of all the conventional import demand specifications adopted by previous studies on Kuwait relative to the extended specification introduced in this study implying its superiority.

VI - Import Demand Elasticities.

Our estimates of the import income elasticity suggest that Kuwait has an income elastic import demand. The estimated short-run income elasticity for the pre-boom years is 1.70 approximately. Across the mid 1970s abrupt rise in oil prices (hence, in the market value of oil reserves and consequently in the national wealth), short-run income elasticity is estimated to has dropped to 1.23. The estimated long-run income elasticity has dropped from 2.36 to 1.72 across the oil prices hike. The down shift in import income elasticity implies that what might have been considered luxurious before the upward shift in income and wealth, have been considered necessary thereafter. Such result is consistent with economic intuition.[19]

Turning to price elasticities, imports own price elasticity carries a significant expected negative sign. The tradables price elasticity carries the correct expected positive sign and is highly significant. Not surprisingly, the nontradable goods price elasticity turns out to carry a highly significant negative sign implying complementarity between imports and nontradables. For Kuwait and other GCC countries, this runs para-economic intuition. Due to the narrowness of the production base for tradable goods in Kuwait, most importables are not domestically produced and hence, producers of nontradables depend heavily on imports for their needs of intermediate and capital goods. Ceteris-paribus, an exogenous increase in the price of nontradables reduces the quantity demanded and hence equilibrium output. This induces a downfall in the derived demand for imports by producers of nontraders, hence a reduction in the quantity of total imports demanded, and vice versa. The magnitude of the estimated price elasticities indicate that Kuwait has a prices inelastic demand for import in the short-run as well as in the long-run. The relatively low elasticity with respect to the prices of imports and domestic tradables relates to the low substitution between domestic and foreign goods. It may also be a reflection of the importance of government subsidies in the domestic markets for imported goods. On other hand, import demand in Kuwait is more sensitive to changes in the price of nontradables than for

changes in the price for tradables or/and in the price of imports. While, in absolute value, the estimated import elasticity with respect to the price of tradable goods is almost equal to that with respect to the import own price, it is less than half the estimated import elasticity with respect to the price of nontradables.

Import Elasticities Compared: Clear-cut rejection of the conventional model specifications for the Kuwaiti data implies that income and/or price elasticities obtained from estimating such specifications for the economy of Kuwait [e.g. Asseery and Perdikis (1990, 1993) and Elsamadisy (1994, 1995a)] are rendered biased due to model(s) misspecification. Needless to say, income elasticity estimates obtained from any restricted version of such specifications [e.g. Metwally and Abdel-Rahman (1985), and Metwally (1987, 1993)] are also rendered biased.

Table 3 compares estimates of the speed of adjustment as well as the demand income and prices elasticities obtained from the unrestricted model of this study with estimates obtained in some of the previous studies. Our estimate of the speed of adjustment of 0.716 is notably higher than the 0.50 estimated by Asseery and Perdikis (1990), the 0.31 estimated by Metwally and Abdel-Rahman (1985). and/or the 0.28 estimated by Metwally (1993). Our estiamte is much more consistent with the liberal trade policy of Kuwait.

We observe that our estimates of the price elasticities tend to be lower as compared with previous estimates while our estimate of the income elasticity tend to be higher. Like in most previous studies, our analysis assumes that the international supply of Kuwaiti imports is perfectly price elastic. However, it is important to recall that if import supply becomes inelastic, single equation estimates of the price elasticity of demand may be biased downward. Import supply can become less price elastic due to those factors which can affect supply elasticity such as quotas, embargoes, etc. Nonetheless, Kuwait has always maintained a liberal import policy. Quantitative restrictions and/or quotas have not been instruments of the Kuwaiti trade policy. Coupled with the obvious smallness of the Kuwaiti economy, this assures the empirical plausibility of the infinitely elastic import supply assumption. We have no serious doubts about our prices elasticity estimates being biased downward. On the contrary, clear misspecification of the conventional models promotes the claim that previous estimates of price elasticities are rather biased upward.

Table 3
Some Elasticities Estimates Compared.

Author Period of Estiamte	Model Used	Long-Run Elasticities?	Y	PM	PT	PNT
This Study / 70-74	IV	0.716	2.362	-0.229	0.215	-0.478
/ 75-89			1.719	-0.229	0.215	-0.478
Asseery & Perdikis, 90/ 70-85	VIII	0.640	1.288	-0.722	0.722	0.722
Asseery & Perdikis, 93 / 63-85	VIII	NA	1.551	-0.784	0.784	0.784
Metwally & A. Rahman, 85 / 70-82	IX	0.309	1.356	0.0	0.0	0.0
Metwally, 1993 /74-81	IX	0.284	1.159	0.0	0.0	0.0
82/89			1.556	0.0	0.0	0.0
Elsamadisy, 94 / 70-75	VIII	NA	1.960	-0.145	0.145	0.145
76-87			1.287	-0.145	0.145	0.145

VII - Policy Implications

The GCC countries, Kuwait is no exception, seem to have been falling in an import trap. Having (highly) income-elastic/price-inelastic import demand, expenditures on imports have been growing at a much faster rate than export revenues. The rapid increase in oil revenues in the 1970s and ealry 1980s transformed public finances allowing for expanded government role in the provision of infrastructure, free social services and capital expenditures. On the one hand, the narrowness of the domestic production base, the effective control of government expenditure over economic activities, and complementarity between imports and nontradables resulted in most of the economic programs formulated in the aftermath of the oil boom involving heavy dependence on imports. On the other hand, patterns of consumption and imports have changed following the abrupt increase in oil revenues. It has been, evidently, difficult to return to the old patterns after the collapse of oil prices and revenues.[20] The availability of other income sources such as income from investments

overseas and/or accumulated reserves seem to have provided for a steady growth in imports in times of fluctuating and even declining oil revenues.

On one hand, in light of the economic conditions surrounding the GCC economies (particularly that of Kuwait) over the short and medium-runs, such policy cannot be maintained. Easing the pressure on the balance of payment in the future years is a must. On other hand, Reliable estimates of total import demand elasticities are imperative for policy decisions and are basic tools for planners, specially during the years preceding to the full implementation of the results of the last round of the General Agreement on Tariffs and Trade (GATT) under the newly founded World Trade Organization (WTO). Based on results of the statistical inference drawn in this study, we feel that the new estimates contained in this paper, even though our objective was a rather methodological one, are more reasonable and consistent with theoretical expectations and/or economic intuition. The results of this study point to the following policy prescriptions:

(1) The management of import demand is to be viewed as part of a comprehensive stabilization plan. As a part of this stragegy, price and trade policies must be coordinated to make domestically produced tradables more competitive, and thus stimulate production. Diversification of the economy and import substitution must be taken seriously.

(2) Imports and nontradables being coplements, reducing the import content of government spending via fiscal contraction and/or changing composition of government purchases away from nontradables to domestic tradables would be effective in curbing imports.

(3) Given a highly (non-oil) income elastic import demand, introducing income taxes would be effective in curbing consumption, and hence, imports.

(4) The KD basket pegged exchange rate system combines some of the characteristics of fixed and flexible exchange rates. The basket is believed to be only adhered to over the medium and longer term. An active policy of real exchange rate management should be accompanied by aggressive import-substitution to stimulate the demand for domestic tradables. An active monetary policy may be useful in managing the nominal exchange rate in the short-run.

VIII - Summary And Conclusions.

While the present empirical research has benefited from previous

works on the GCC countries and shared some of their features, it questioned the econometric specifications of the import demand function they used, specifically the empirical definition of the price variable they employed. In most previous work, estimates of the price elasticity of demand for total imports were based on relative prices. The use of relative prices implicitly restricts aggregate import demand to be homogeneous of degree zero in income and all prices. The relative price measures are defined as the ratio of the price of imports to a 'sole' domestic price. The use of an overall domestic price carries the implications that imports substitute, and substitute equally, with tradable and nontradable goods. The use of the domestic price of tradables as the 'sole' domestic price assumes independence of import from the price of nontradables.

Using data from the GCC country of Kuwait, both conventional model specifications were tested and rejected relative to each oher as being false (Elsamadisy, 1995b). Rejection of the two compared model specifications suggested that both alternatives are incorrectly specified and that a third (unspecified) model might be correct for the Kuwaiti data. Motivated by these results and other results obtained by earlier researchers (e.g. Thursby and Thursby, 1984; thursby, 1988), restrictions implied by either specification were removed in the present study. An extended model specification, in which prices of imports, of tradable goods, and of nontradable goods enter as arguments, was proposed and estimated using our own constructed separate price indexes for tradable and nontradable goods in Kuwait.

Three sequences of nested hypotheses of model specification were identified via the imposition of series of constraints, leading to the conventional alternatives. Implied nested hypotheses were sequentially tested. The main result of this research is that all of the prices related assumptions maintained by the alternative conventional specifications are strongly rejected. Namely, that imports and nontradables are independent goods; that imports and nontradables are substitutes for each other; that the demand for imports is price homogeneous; that the cross price elasticities of import demand with respect to tradables and nontradables are identical; and that the own and cross price elasticities of the import demand are equal in magnitude and opposite in sign. An interesting result of estimating our unrestricted specification emerged that the price of nontradable goods appears to has been a significant determinant of the demand for total imports and carries a highly significant negative sign

suggesting complementarity between imports and nontradables in Kuwait.

Our results have some particulalry important implications: First, the apparently good absolute performance of the examined conventional model specifications, as obtained in this and in previous studies on the GCC economies, seems insufficient for either to be regarded correct representation of the data. Second, aggregate import demand should not be restricted for price homogeneity on a priori grounds. Such consideration strongly argues against the use of relative prices as price variables in the demand function for total imports in Kuwait and, possibly, other GCC countries. Third, nontradable goods can neither presumed to substitute for nor be independent from imports, in general, and in Kuwait and, possibly, in other GCC countries in particular. The narrowness of the production base in these countries may lead to heavy dependence of industries producers of nontradables on imports for intermediate inputs and/or producer's durables, hence, implying complementarity (rather than independence or substitutability) between imports and nontradables. This leads one to conclude that the empirical hypothesis of separability of nontradables from all tradables does not seem to be consistent with data from the GCC countries. Fourth, the price elasticity of demand for total imports should neither be constrained to be identical in sign and/or in magnitude as between tradable and nontradable goods, nor be constrained to be identical in magnitude to the import own price elasticity.

Even though our objective was methodological rather than empirical, the findings of this research have wide-ranging policy implications that were briefly discussed in section VII.

Data Appendix

The aggregate economic activity variable used in this study is the real non-oil gross domestic product as a proxy for the income variable, Y. (See e.g. Metwally et al., 1987; Metwally (1993); Nyatepe-Coo, 1994).

The quantity of imports demanded, M^D, is proxied by the constant (1984 prices) volume of total imports. The price of imports, PM, is derived as the ratio of the value of imports at current prices to the value of imports at the 1984 (constant) prices.

The overall domestic price index, P^D, is the implicit GDP deflator which is derived as the ratio of the GDP at current prices to the GDP at the 1984 (constant) prices.

The price index of tradable goods, P^T, is constructed as the ratio of the current prices to the 1984 (constant) prices of the gross domestic product originated in the tradables sector of the economy. Likewise, the price index of nontradable goods, P^{NT}, is constructed as the ratio of the current prices to the 1984 (constant) prices of the gross domestic product originated in the nontradables sector of the economy.

The dummy wealth variable, W, takes on the value of unity for the years 1975-1989 and zero otherwise. The war-shock dummy variable equals one in 1981 and zero otherwise.

The data used in this paper are annual observations for the period 1970-1989. All variables (except dummy variables) are defined in domestic currency (KD) units. The basic sources of the data are tables (1) - (4) and (8) - (9) of the National Accounts Statistics 1970-1989, Central Statistical Office, Ministry of planning, The State of Kuwait, 1994.

Foot Notes

1- References are numerous. Of the recent studies see e.g. Nyatepe-Coo (1994), Abebayehu (1989), Deyak et. al. (1989), Sarmad (1988), Melo and vogt (1984), Thursby and Thursby (1984), Warner Kreinin (1983), and Goldstein et. al. (1980). Those deal with the GCC countries include Asseery and Perdikis (1990, 1993), Elsamadisy (1994, 1995a, 1995b), Metwelly and Abdel-Rahman (1985), Metwally et al. (1987), and Metwally (1993).

2- A nontradable commodity is one that is not internationally traded for whatever range of relative prices.

3- See e.g. Thursby and Thursby (1984), Thursby (1988), Elsamadisy (1995b), and Goldstein et.al. (1980).

4- For example, the import own and cross price elasticities are constrained to be equal in magnitude but opposite in sign. Domestically produced goods, both tradales and nontradables, are assumed (imperfect) substitutes for imports. Moreover, the import demand cross price elasticities are constrained to be identical as between the two goods categories. The restrcitivenes of this definition of the price variable has been recognized as early as 1970 by Leamer and Stern (1970).

5- Though there is no theoretical basis for preferring one to the other, it is generally suggested that the linear specification is more useful for prediction, while the log-linear form is more appropriate for estimating elasticities.

6- Using separate price indexes for tradables and nontradables, Murray and Ginman (1976), working with US data, report import/nontradables positive cross price elasticity. Goldstein et al. (1980) using data from ten industrial countries report cross price elasticities that are positive for the USA, and Canada, negative for Sweden, and insignificant for the rest of their sample.

7- If imports are viewed within the framework of perfect substitution, Ala. Johnson (1958), an increase in both the cyclical and the secular values of real income could increase domestic production faster than consumption causing imports to decrease.

8- Nonetheless, these indexes contain nontrivial shares of nontradables. Examples of empirical studies that use the GDP deflator include Elsamadisy (1994, 1995a, 1995b), Goldstein et. al. (1980), Goldstein and Khan (1976), and Heien (1968). Examples of empirical studies that use the wholesale price index include Sarmad (1988), Khan and Ross (1975), Samuelson (1973), and Taplin (1973). Asseery and Perdikis (1990) use the consumer price index.

9- Specifically, we define the tradables sector of the Kuwaiti economy to consist of: agriculture and fishing; mining and quarrying; and manufacturing. The nontradable sector is defined to include the following industries: electricity, gas, and warer; construction; wholesale and retail trade, hotels and restaurants; transport, storage and communication; finance, insurance, real estate, and business services; and community , social and personal services.

10- See The National Accounts & Input-Output Tables (1983), Central Statistical Office, Ministry of Planning, Kuwait, august 1992 and The National Accounts Statistics 1970-2989, Central Statistical Office, Ministry of Planning, Kuwait, February 1994.

11- See the data appendix for variables definitions.

12- See section II.4.

13- Thursby and Thursby (1984) found that the most frquently accepted models, in their sample, are those including dynamic behavior through lagged values of the dependent variable. In most previous studies on import demand in the GCC countries, authors reported significant Koyck-type lag of adjustment in estimated reduced form equations.

14- I am indebted to unanimous referee who has pointed out that since imports are major part of tradables there may be strong correlation between P^M and P^T resulting in a problem of multicollinearity in the extended model. There are several rules of thumb that have been suggested in the literature to detect when multicollinearity can be considered a serious problem. Lawrence R. Klein (1962, p. 101) wrote: «Intercorrelation of variables is not necessarily a problem unless it is high relative to the overall degree of multiple correlation.» By Klein's rule

multicollinearity would be regarded as a problem in our case if $R^2_{MD} < R^2_{PM,T}$ where R^2_{MD} is the squared multiple correlation coefficient between the dependent variable, M^D, and the explanatory variables (the coefficient of determination) and $R^2_{PM,T}$, is the squared correlation coefficient between the two prices P^M and P^T. We have $R^2_{MD} = 0.48$ and $R^2_{PM,T} = 0.99651$ indicating no serious problem of collinearity between P^M and P^T.

15- The sequence (XI) - (XII) - (XIV) - (XVII) is also a sequence of nested models.

16- Since, as will be indicated soon, models (XIV), (XV), and (XVII) are rejected a fortiori relative to the extended model (XI), we only report the OLS estiamtes and regression statistics for models (XI) - (XIII) and (XVI) in table 2.

17- All results reported in this section hold qualitatively true for the long-run equilibrium versions of all the specicfications tested. All results are available from the author on request.

18- A test of (XIV) is a test of the price homogeneity restriction in (XIII). The most restricted model (XVII) can be empirically tested by testing the null hypothesis that the coefficient on the rleative prices variable in (XIV) is not significantly different from zero.

19- Assuming no discontinuities, income elasticity decreases gradually as income increases with unitary income elasticity identifying an income level that separates the luxury stage from the necessity stage for a given commodity.

20- See e.g. Elsamadisy (1994) and Metwally (1987).

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Studies on total import demand in the GCC countries can be classified into two groups. In one group, researchers have taken the view that in developing countries, import demand is price inelastic and specified import demand not to depend on prices of any sort. In a second group, researchers have adopted traditional specifications and included relative prices in their models. Nonetheless, there exist empirical evidence that models employed in these studies are incorrectly specified. The immediate criticism concerns the empirical definition of the price variable.

This paper presents a detailed examination of the empirical hypotheses implied by specifications used by previous studies on the GCC countries. A generalized specification of import demand in which prices of imports, of tradables, and of nontradables enter as arguments is developed. Separate price indexes required for estimating such model are constructed. Sequences of nested hypotheses of model specification were identified via the imposition of series of constraints leading to the conventional alternatives. Implied hypotheses were sequentially tested. The main inference drawn is that all of the identified prices related assumptions maintained by conventional specifications are decisively rejected. An interesting result emerged that, in Kuwait, imports and nontradables are rather complements.