

A Standard Test of The Currency Substitution Hypothesis for The Kuwaiti Economy

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I — Introduction

There has been growing interest over the last two decades in analyzing and testing for the relevance of international monetary and financial developments to the demand for domestic money balances in a formally open economy. Nonetheless, many studies on open economies, in examining the demand for money, assume that residents hold three assets: domestic “bonds”, foreign “bonds,” and domestic “money”, however, has been the argument that in today’s integrated world, residents often extended to include foreign money and financial assets as well. Accordingly, the role of the expected rate of change in the exchange rate in a demand function for domestic money balances has received considerable attention in the literature as it became eloquent during the period of floating exchange rates. (1)

Few authors have tested the currency substitution hypothesis (CSH) for developing countries, and most of their work focused on Latin American countries. Arize (1991), Ortiz (1983), Marques (1987b), Fasano-Filho (1986), Rogers (1992), Melvin and Ladman (1991), and Blejer (1978) can be referred to. Even fewer authors have tested the currency substitution hypothesis for developing Middle Eastern countries. El-Erian (1988) and Marashdeh (1994) are example. To this author’s best of knowledge, there are two studies that incorporate a measure of expected exchange rate or its (expected) rate of change in a money demand

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model for Kuwait, neither of which can be characterised as a model of currency substitution. Al-loughani and Moosa (1993), using monthly Kuwaiti data over the period January 1980 to June 1990, have tested for cointegration of the covered differential rate of return with different types of deposits with domestic commercial banks. They found that only the demand for domestic currency time deposits is cointegrated with the covered differential rate of return, and concluded (p. 178) that interest and exchange rate policy is not (or has not been) effective (if not important) in combating capital outflows or repatriating capital. Elsamadisy (1994), using quarterly Kuwaiti data over the period 1982:3 – 1990:2, has estimated a statically significant elasticity of the demand for real cash money balances with respect to the expected exchange rate of 4-2. He concluded that when the Kuwaiti Dinar (KD) depreciates the public in Kuwait expect further KD depreciation, i. e. expectations are negative; and/or there exist a degree of currency substitution (CS) in Kuwait. The public responds (to an increase in the exchange rate) by reducing its demand for real cash, and vice versa, hence putting more pressure on the domestic interest rates in the same direction of an open market operation, thus, enhancing the effectiveness of monetary policy.²

The objective of this paper is to estimate a standard model of currency substitution for the developing small open economy of Kuwait under the Kuwaiti Dinar's exchange rate currency basket peg system using quarterly data over the period 1983-1989. Testing for the existence of currency substitution in Kuwait provides valuable information for the assessment of the effectiveness of policies formulated by the Central Bank to counteract international monetary and/or financial developments. This would be a useful first exercise towards a clear understanding of the Kuwaiti experience as well as an additional examination of the robustness of the currency substitution hypothesis across countries with different economic and institutional frameworks.

The paper is organized as follows: Section II describes the evolution of the present Kuwaiti Dinar (KD) exchange rate system. Section III presents a brief discussion of the currency substitution

hypothesis (CSH), its implications under alternative exchange rate regimes and discusses the relevancy of the currency substitution hypothesis to Kuwait. The standard model of CS is the subject of section IV. An empirical investigation is carried out and results are presented and discussed in section V. Section VI discusses policy implications of our results. A summary and some concluding remarks are given in section VI. Appendixes A and B deal with data issues.

II — The Currency Substitution Hypothesis

The CS hypothesis states that the domestic demand for domestic money depends negatively on the expected rate of depreciation of home currency relative to the reference currency⁴. Some contributors to the currency substitution literature, including Miles (1978), Gorton and Roper (1981), and McKinnon (1982) have argued that currency substitution has important implications for the working of flexible exchange rates. If the degree of currency substitution is high small changes in the money supply would induce large changes in the exchange rate. Therefore, significant currency substitution would seriously undermine the ability of flexible exchange rate regime to provide for money independence⁶.

Assuming investors can borrow in all currencies, Thomas (1985) has argued that when currencies are substitute the connections between them are real rather than financial, and that 'The implied channel for currency substitution is much less likely to be important in practice (p. 352). On the other hand, relaxing the Gorton and Roper (1981) assumptions of purchasing power parity (ppp) holding at every moment in time and of perfect commodity price flexibility, Koustas and Ng (1991), adopting the Dornbusch (1976) model as extended by Frenkel and Rodrigues (1982 p. 50), have concluded that 'currency substitution enhances exchange rate stability by reducing exchange rate overshooting and speeding up convergence to the steady state along a perfect foresight path.

Assuming the level of wealth remains constant during a period of adjustment (towards new equilibrium), Arango and Nadiri (1981) have argued that if the demand for domestic cash balances depends negatively on expected depreciation of the home currency or/and on foreign interest rates, then the effects of changes in the exchange rate expectations or/and in foreign interest rates on the domestic money market are partly offset by adjustments in real cash balances within the domestic economy, hence enhancing counteractive monetary policy measures.

In today's integrated world, in as much as the major currencies fluctuate versus each other, volatility of the exchange rates of pegged currencies cannot be avoided. Such volatility of home currency exchange rate might have important potential implications for the conduct of domestic monetary-exchange rate policies in case it exerts significant influence on the demand for domestic money balances, particularly, in small open economies. The relevance of the currency substitution hypothesis for Kuwait is not, therefore, so much related to the choice of fixed versus floating exchange rates, but rather to its implications for the short-run monetary and/or exchange rate policy. Accordingly, currency substitution is considered of great concern for the conduct of monetary and/or exchange rate policy in Kuwait. Hence empirical investigation of the relevance of the rate of depreciation of the KD exchange rate to the money demand function in Kuwait is, undoubtedly, an important research task.

III — The KD Exchange Rate

Following independence, the Kuwaiti Dinar was put for circulation on the first day of April, 1961, replacing the Gulf Rupee. The Central Bank of Kuwait (CBK) was established on June 30th, 1968. Article (15) of the new act under which the Bank was established, specified securing the stability and free convertibility of the Kuwaiti currency, next to its issuance, as the main objectives of the CBK. Such a function was easily performed till mid-1972 under the Bretton Woods-Smithsonian regime by having the KD pegged to the Pound Sterling under the Sterling Area Agreement.

Since the collapse of the Bretton Woods-Smithsonian international monetary order and the switch from fixed to relatively more flexible exchange rates, most developing countries have chosen to operate a form of currency peg system. Currencies are either pegged to a major currency or to a basket of major currencies. Beginning March 1975, the CBK has resolved to adopt a "weighted currency basket approach" to determine the KD exchange rate against major currencies. The KD exchange rate against the US dollar is being determined by the exchange rates of the currencies of these countries which have trade and/or financial relations with Kuwait 3. The cross rates for all other countries are computed accordingly.

Thus, the KD basket pegged exchange rate system is a hybrid one that combines some of the characteristics of fixed and flexible exchange rates. By not disclosing the composition of the basket the CBK retains a highly flexible instrument allowing the authorities to adjust the exchange rate against market trends whenever deemed necessary to preclude or curb speculation. The basket is, therefore believed to be only adhered to over the medium and longer term and, as a matter of policy, cannot be assumed to represent the sole basis for the determination of the Central Bank's daily fixing operations 4. While the CBK stands by defending the KD exchange rate in terms of the currency basket, inevitable fluctuations against individual currencies consequential to fluctuations of the major currencies against one another are tolerable. Consequently, though the KD has enjoyed a relatively stable exchange rate against the currency basket over the years, it has been relatively fluctuating against individual currencies.

IV — The Standard Model of C.S.

There is a general agreement among scholars that real cash balances are held for transaction purposes as well as a form of wealth 7. In a standard conventional formulation of the money demand model it is postulated that aggregate desired real domestic cash holdings m^* , would be a function of a domestic scale variable, y , and a set of variables, x , representing the opportunity

costs of holding money relative to alternative financial or real assets. The components of the opportunity cost vector, x , are conventionally approximated by a (set of) domestic interest rate (s) and/or the rate of domestic inflation (actual or expected), where it is assumed that cash money balances bear zero interest to its holders. That is:

$$m^* = f(y, x_-)$$

where $m^* = (M^*/P)$, M^* is the desired nominal holdings and p is the level of the price index.

As has been suggested by Viren (1990), it may seem better to test the currency substitution hypothesis with the rate of return on foreign currency holdings as the sole measure of international opportunity cost⁸. In such case when considering currency substitution, the list of possible components of the opportunity cost vector (x) in the money demand function (1) should be, therefore, extended to include the expected change in the exchange rate as well. Let r^d be a measure of the domestic interest rate and R^e be the expected rate of change in the exchange rate (defined as the price of a unit of foreign currency expressed in units of domestic currency). Then the standard currency substitution model specification of the demand function for money balances can be written as⁹.

$$m^* = g(y, r^d, R^e)$$

The sign over each variable denotes the theoretically expected effect. Actually, equation (2) has been the standard specification employed in empirical tests; see e.g. Viren (1990), Marquez (1987 a, 1987 b), Fasano-Filho (1986), and Bordo and Choudhri (1982). An expansion of economic activities would result in increasing the cash money balances required to meet the greater transactions needs provided for by higher level of transactions volume. A rise (fall) in the domestic rate of interest would induce holders of domestic cash money balances to move out of (into) cash money and into (out of) domestic financial assets, resulting in a reduction (an increase) in the desired real money holdings. Since the expected rate of return on foreign money would equal its expected rate of

appreciation 10, then a rise (fall) in these expectations would induce cash money holders out of (into) domestic cash money into (out of) foreign cash money hence reducing (increasing) the desired holdings of domestic cash money balances 11.

Consider a log-linear functional form for the money demand function that is double-log with respect to the scale variable, y , and semi-log with respect to the opportunity cost variables, 12 the equilibrium model (2) is specified as:

$$\ln \text{In}m_{t*} = y_0 + y_1 \ln y_t + y_2 r_t^d + y_3 R_t^e + u_t$$

where $\ln$ abbreviates natural logarithm," other variables are previously defined above, U_t is a classical disturbance term 13, y_1 is the long-run elasticity of m^*t with respect to the scale variable, y_2 and y_3 are the first derivatives of $\ln m^*t$ with respect to the domestic interest rate and the expected rate of depreciation of the home currency, respectively 14.

Forward markets for foreign currencies are none-existent in Kuwait. Hence a forward exchange rate that measures the expected future spot rate is not available 15. Therefore, we are left with the alternative of modeling the expectations process in the foreign exchange rate market of Kuwait. Since expectations are, usually, formulated as a weighted average of current and Past values of the variable under consideration, we explicitly impose a distributed lag structure on the rate of appreciation of the exchange rate and let the data determine the nature of the weights. Hence, assuming partly rational expectations 16 on the part of holders of domestic cash balances, we write the expected rate of change in the exchange rate as:

$$R_t^e + 1 = \sum_i a_i R_{t-i} + n_{t+1}, \quad i = 0, 1, \dots, n, \quad 4$$

$$R_t = (e_t/e_{t-1}) - 1 \quad 5$$

where R_t is the rate of change in the exchange rate in period t and

et is the level of the spot exchange rate index and $n_t + 1$ is the stochastic term.

Adopting the real partial adjustment hypothesis (RPAH), the long-run (equilibrium) static model of equation (3) can be cast in a short-run dynamic real partial adjustment model (RPAM) by introducing the lagged dependent variable, $m_t - 1$, into the demand function according to the following partial adjustment mechanism¹⁷.

$$\ln m_t - \ln m_{t-1} = \lambda (\ln m_t^* - \ln m_{t-1}) \quad \lambda = (0, 1)$$

Which implies that the adjustment in actual real cash money holdings, m_t that takes place at time t is a fraction, ... of the gap between the desired holdings at that period and the actual holdings at time $t-1$. Combining (3) with (6) we get:

$$\ln m_t = \lambda y_0 + \lambda y_1 \ln y_t + \lambda y_2 R^{ny^d}_t + \lambda y_3 R^{ny^e}_{t+1} + (1 - \lambda) \ln m_{t-1} + \lambda u_t$$

Equation (7) specifies the short-run demand for real cash balances where a short-run elasticity of the real cash balances, m_t with respect to a given independent variable is equal to ... times the corresponding long run elasticity. The speed of adjustment of actual real cash balances, m_t , to their desired values, m_t^* can be calculated from the co-efficient of the lagged dependent variable, $\ln m_{t-1}$.

Substituting for R_e from (4), and reparametrizing, we rewrite equation (7) as:

$$\ln m_t = 0_0 + 0_1 \ln y_t + 0_2 r^d_t + \sum_j 0_3 j R_{t-j} + 0_4 \ln m_t + n_t$$

$$0_1 = \lambda y_1, i = 0, 1, 2, \text{ and } 0_3 i = \lambda y_3 a_i \text{ and } 0_4 = (1 - \lambda)$$

V-Empirical results

The quantity of money demanded m_t is the money stock, narrowly defined, deflated by the consumer price index. The scale variable, y_t , is proxied by the real domestic government ex-

penditure. The exchange rate variable is measured by the price of one US\$ in Kuwaiti Fills, and the domestic interest rate, r_t^d , is rate on three months inter-bank KD deposits. Detailed description of the variables and data sources are given in appendix A.

In estimating specifications (8), it was assumed that the distributed lag co-efficients on the expected rate of depreciation of the KD lie on a polynomial curve of third degree with neither end constraint¹⁸. In selecting the optimum number of lags we considered the significance of all estimated co-efficients, the size of the adjusted co-efficient of determination (R^2), the Durbins-h statistic and other auto cor-relation diagnostics, and sufficiency of degrees of freedom. In most satisfactory results are presented. In ordinary least squares (OLS) estimation of (8), Breuch-Pagan (1979) test indicated no evidence of heteroskedasticity, ARCH test indicated no evidence of autoregressive conditional heteroscedasticity, Jarque-Bera (1987) normality test statistics were insignificant, the augmented Dickey-Fueller test is highly significant (indicating rejection of the unit root.random walk hypothesis). Durbin's h-statistic (1970) confirmed the absence of serial correlation among the residuals, and the Breusch-Godfrey LM test for general autocorrelation as well as the Ljung-Box Q statistic are very highly insignificant. Estimation results of the standard currency substitution model of money demand (2) as specified by equation (8) are shown as regression 1 in table 1.

Table 1 — OLS Estimates of Equation (8)
Regression1

Variable	Coefficient	S. Error	t Statistic	P Value
Constant	0.556144	0.2135-06	2.60482	(020)
Log (y)	0.130040	0.034894	3.72670	(.002)
rd	-0.0072439	0.003111	-2.32852	(.034)
Log (mt-1)	0.797946	0.025929	30.7741	(.000)
Rt	-0.088501	0.078644	-1.12533	(.278)
Rt-1	-0.097930	0.035588	-2.75175	(.015)
Rt-2	-0.083568	0.038251	-2.18472	(.045)
Rt-4	-0.128965	0.053545	-2.40855	(.029)

* Standard errors are White (1980) heteroskedastic-consistent estimates.

The overall goodness of fit of the model is very well indeed as indicated by values of R^2 , SEE, and the F value for testing the null hypothesis that all right-hand side variables, as a group, except the constant term, have zero co-efficients (zero slopes). The signs of the explanatory variables are consistent with the a priori theoretical expectations. The sum of the co-efficients on the lagged variables carry the correct (negative) sign. Except for the current depreciation rate, R_t , which has a negative sign but is not stastically significant, all other individual variables contribute significantly to the explanation of the behaviour of real cash balances.

Table II – OLS Regression Statistics For Equation (8)

Number of observations	=23
Std. error of regression	= .022363
Adjusted R-squared	= .934781
Durbin's h	= -.894590 (.371)
Breusch/Godfrey LM: AR/MA1	= .603112 (.437)
Breusch/Godfrey LM: AR/MA2	= .727436 (.695)
Ljung-Box Q-statistica 1	= .853868 (.355)
Ljung-Box Q-statistic 2	= 1.13892 (.566)
Augmented Dickey-Fuller	= -5.25652 (.002)
ARCH test	= .518369 (.472)
Breusch-Pagan het.test	= 10.0381 (.123)
Jarque-Bera normality test	= 3.46355 (.177)
F-statistic (zero slopes)	= 46.0463 (.000)

P-values are between brackets.

Testing for the significance of R_t^e is to test for the sum of the co-efficients on the lagged variables $R_{t-i} = 0, \dots, 3$ being significantly different from zero. To perform this test, the general t-test statistic for the linear hypothesis, given by:

$$i = (w'B - w'B_0) / \sqrt{s^2(w'(x'x)^{-1}w)}$$

where β is the vector of co-efficient estimates of the model, B_0 is

the vector of co-efficients of the null hypothesis, x is the matrix of regressors in the model, s is the standard error of regression, and w is a linear vector constraint on B . The t-statistic for the null hypothesis,

$H_0: \beta_3 = 0$ was computed as $t^* = \beta_3 \sqrt{s^2 (x'x)^{-1} \beta_3}$, where i is a four element row vector of one's, β_3 is the vector of co-efficients on the current and lagged appreciation rates, x is the matrix of regressors in the model, and s is the standard error of regression.

The computed value for the t-statistic in (9) is $t^* = 2.8 - 2.552 = t(18, 0.01)$ Hence implying a **highly significant currency substitution effect for the model specification** (8). This result is consistent with the negative elasticity of exchange rate expectations obtained by Elsamadisy (1994) and is supportive of his conjecture that a degree of currency substitution may have existed in Kuwait over the study period. The short-run elasticity of the demand for cash balances with respect to the expected rate of depreciation of the KD is -0.0012, calculated at the sample means for the relevant variables. The long-run elasticity is estimated as 0.006.

As for the other explanatory variables, weighted by the sample averages, the estimated co-efficient implies a short-run elasticity of the demand for money with respect to the domestic short-term deposit interest rate of -0.0535, and an equilibrium elasticity of -0.265. The short-run elasticity with respect to the government expenditure is given by the estimated coefficient of 0.13 and the long-run elasticity is approximately 0.644. The coefficient of the lagged dependent variable is highly significant and highly significantly smaller than unity ($t^* = 7.79$). Our estimate for the speed of adjustment ($1 - \beta_4$) = 0.202, lies within accepted estimates in the literature.

VI-Policy Implications.

The implications of such result for the making and/or the conduct of monetary policy in Kuwait are of vital importance to Kuwaiti decision makers indeed.

A monetary expansion (via e.g. an open market operation) de-

signed to lower domestic interest rates would result, *ceteris-paribus*, in a capital outflow putting upward pressure on the KD exchange rate. Since exchange rate expectations in Kuwait are negative 19, a depreciation KD would lead the public to expect further KD depreciation, hence a reduction in the demand for domestic real cash balances due the Currency Substitution effect. This implies more decline in domestic interest rate than accounted for by the CBK.

An increase in the foreign interest rates, other things being equal, induces capital out-flow. To counteract such development, the CBK would take measures to arise domestic interest rates. Such measures as monetary contraction would tend to put upward pressure on the KD exchange rate stimulating expectations of more KD appreciation (exchange rate decline). Due to the CS effect, such expectations would manifest itself in rising the demand for domestic cash balances implying domestic interest rates further increase than originally accounted for by the CBK.

The CBK may decide to manipulate the composition or/and the weights of the currency basket to choke abnormal demand for foreign currency (ies) 20 and/or to curb speculations by rising the KD exchange rate (i.e. depreciation of the KD leading, therefore, to a reduction in the demand for domestic money which puts downward pressure on domestic interest rates resulting in capital-out-flow that, eventually, leads to more KD depreciation. And vice versa.

The existence of currency substitution in the demand for money enhances the effectiveness of counteractive monetary policy. If the Central Bank of Kuwait ignores the currency substitution impact on the demand for money, it can overshoot its' targets.

Certain features of our stated results should be noted however. First, the standard model of CS given in (2) implicitly assumes the expected rate of change in the exchange rate has a zero indirect (assets substitution) effect 21. That is specification (2) implicitly assumes perfect foreign/domestic assets substitutability. Specification (8), therefore, attributes the share of assets substitution effects in explaining variations in the demand for domestic cash money (if exists) to other variables considered in that model. Particularly, the expected rate of change in the exchange rate and the

domestic interest rate. It might be, therefore, considered restrictive in the sense that it only allows the analysis of currency substitution in isolation from the more general process of financial assets substitution.

Second, since our proxy for the transactions volume (i.e. the scale variable) is the real government expenditure, its long-run more demand elasticity is not the familiarly estimated income elasticity of the demand for cash balances. Hence it does not, necessarily, has specific implications for scale economies in the demand for real cash balances in Kuwait over the study period.

Finally, testing the stability of the demand function provides us with an additional test of the appropriateness of our present specification, including the employed definition of money. Following an abnormal surge in the demand for the US dollar that had very much exceeded the commercial demand, the Central Bank of Kuwait (CBK) has introduced a two tier exchange rate in April 1984, which has been in effect since then. We thought, therefore, to detect the presence of any structural instability in our reported results due to this regulation. The sample was split at 1984:4 with the number of observations in the earlier sub period less than the number of regressors in the estimated equation. There are several ways as well as testing procedures to test for structural change. However, since the error term of the estimated equation seems well behaved, the test procedure outlined in Johnston (1984, p. 220) was employed. The calculated test statistics is $F^*=0.640$ for model specification (13) implying no evidence of structural change.

VII-Summary and Concluding Remark

A modest attempt has been made to test for the existence of currency substitution in the small open economy of Kuwait under the current KD currency basket peg system, in the framework of the demand function for real cash money balances. A standard model of currency substitution was employed, and the test was carried over using quarterly data over the period 1983-1989. When the standard specification of the money demand that in-

cludes only the expected rate of change in the exchange rate as the sole measure of international opportunity costs of holding real domestic cash balance was estimated, the expected rate of KD depreciation carried a negative sign and was highly significant variable in the money demand function. This suggests that the currency substitution seems to be of clear practical importance, hence enhancing the effectiveness of the CBK's policy to counteract the effects of international monetary and/or financial developments. It is, thus, occluded that the CBK might has been able to peruse its targets over the study period in the short-run at least. Furthermore, it is possible that if the CBK might has been able to peruse its targets over the study period in the short-run at least. Furthermore, it is possible that if the CBK ignores the currency substitution effect it might overshoot its targets. However, since specification (2) implicitly assumes perfect foreign/domestic assets substitutability, it might be considered restrictive in the sense that it only allows the analysis of currency substitution in isolation from the more general process of financial assets substitution. Since they may need to be modified when modelling domestic money/foreign assets substiutability, the results of this study should be taken with a great deal of care.

Appendix A: Variables and Data Sources

The dependent variable: A matter that requires special attention is the definition of money. The problem is more complex in the case of an open economy than in a closed one. Decisions are required concerning the treatment of the foreigners holdings of domestic money balances and the holdings of foreign money balances by domestic residents. On the basis that the Kuwaiti Dinar is not a major currency, foreign residents 23 holdings should be negligible and hence will be ignored. Data on demand deposits denominated in foreign currency are not regularly published, and data on publics holdings of foreign currencies do not exist. The empirical analysis in this paper is, therefore, based entirely on a fairly standard narrow definition of money adopted by the Central Bank of Kuwait (CBK).

The interest rates: Prior to December of 1988, it was the practice of the CBK to, indirectly, impose ceilings on domestic currency deposits rates 24. Under noticeable pressures resulting from capital outflow and transfers of KD deposits to foreign currency deposits with domestic commercial banks due to foreign/domestic interest rates wide differentials, the interest rates were tied to the discount rate announced regularly by the central bank 25... Though deposits rates are not published in Kuwait they have, however, been correlated with the inter-bank rates (hence flexible) below ceilings. Thus the KD three months deposits rate at commercial banks is used in this study as the domestic interest rate variable.

The scale variable: For Kuwait, like most countries other than the United States, data limitations generally preclude the use of wealth as the constraint, hence choices are practically restricted to either permanent or measured income, where the former is conventionally computed as a weighted average of current and past values of the latter. Still, a quarterly series on measured income for Kuwait does not exist. Therefore we are bound to approximate the level of domestic economic activity otherwise. We use quarterly domestic government expenditure as a proxy 26.

The exchange rate variable is the level of bilateral spot exchange rate defined as the price of a foreign currency in terms of domestic currency. The US \$ is chosen as a reference currency and its exchange rate in Kuwaiti Fills per one US\$ is used as a proxy.

Data sources and definitions: Data on domestic cash money balances are taken from the Monthly Monetary Review published by the Central Bank of Kuwait (several issues). The consumer price index was calculated from it's monthly levels taken from the Annual Statistical Abstract published by the Central Statistical Office (CSO) of the Kuwaiti Ministry of Planning. Data on domestic short-term deposits interest rate and on the US\$ spot exchange rate are taken from "The Kuwaiti Dinar, Money and Capital Markets. Review 1989", published by The National Bank of Kuwait. In what follows we briefly define the variables used in the study and their construction.

(i) M_t is the stock of nominal cash balances (demand deposits, denominated in Kuwaiti Dinar, at commercial banks plus currency holdings of all non-banks but government), seasonally unadjusted, end of period (millions of Kuwaiti Dinars) M_t is real stock of cash money balances. M_t is deflated by the consumer price index (1789 = 100)

(ii) r_t^d is domestic short-term interest rate measured by the average of monthly rates paid on the three-month inter-bank time deposits.

(iii) R_t is the rate of appreciation of the exchange rate (that is the rate of depreciation of the domestic currency) constructed as the rate of change in the price index of the US dollar. To obtain quarterly figure at equivalent annual rates, the following formula is applied:

$$R_t = \{e_t/e_{t-1}\}^4 - 1 \} \times 100,$$

where e_t is the level of the US dollar exchange rate index. The exchange rate is measured as the price of one US dollar in Kuwaiti fills. (one Kuwaiti = 1000 Kuwaiti fills).

(iv) The scale variable, y_t , is approximated by the quarterly real government expenditure as a proxy for the level of economic activity in Kuwait.

Appendix B: On the Scale Variable

The appropriate measure of current income, which is conventionally used as a proxy for the volume of transactions, would be the non-oil gross domestic product. However, quarterly series do not exist for GDP in Kuwait. But quarterly series on Government expenditure is published regularly by the CBK. Government expenditure is the main determinant of the level of economic activity in Kuwait (and in the other Gulf oil States, indeed). The coefficient of correlation between the non-oil GDP and the government expenditure, computed from annual data over the period

1970-1989, is 0.98. To further make the point for using government expenditure as a scale variable in the money demand function in Kuwait, we present results of regressing non-oil GDP on government expenditure as the explanatory variable. Employing Chow test, structural change was detected at 1982 in both intercept and slope. To correct for this, a dummy variable takes the value of zero before 1982 and the value of unity from 1983-1989 was used as suggested by Johnston (1984, pp. 227-228) and Madala (1992, pp. 312-314). Following is the OLS estimates of the corrected equation, where G is government expenditure and non-oil GDP is the dependent variable.

Variable	Co efficient	S. Error	t-statistic
Constant	1.13895	.123620	9.21333
Dummy	-.203100	.038570	-5.26572
Log (G)	.981660	.022724	43.1988
Dummy * Log (*G)	.013860	.0058642	2.36358

Regression Statistics

Std. error of regression	= .064486
R-squared	= .99446
Adjusted R-squared	= .993405
Chow test	= .119770 (.973)
F-statistic (Zero slopes)	= 954.977 (.000)

Foot Notes

1. Empirical literature addressing the questions of demand for money in open economies and explicitly considering currency substitution include Arango and Nadiri (1981), Bordo and Choudhri (1982), Ortiz (1983). Viren (1990), Arize (1991), and Leventakis (1993). Results of this literature are mixed.

2. Expectations are not necessarily negative every where. The sign of the elasticity of the demand for domestic real cash money balances with respect to expected exchange rate is an empirical question. For example, Bahamani-Oskooee and Malixi (7. p. 1379) found this elasticity to be positive in the cases of Egypt and Ko-

rea, insignificant in the cases of the Dominical Republic and India, and negative in the cases of Brazil, Greece, Mexico, Turkey, and the rest of their thirteen countries sample.

3. The basket is, naturally, dominated by the US dollar.

4. See The National Bank of Kuwait. The Kuwaiti Dinar, Money and capital markets review, 1989, paragraph 4.

5. Such hypothesis is easily motivated: if domestic and foreign currencies are substitutes then the relevant rate of return (that is the expected rate of depreciation of domestic currency or, to say the same the expected rate of appreciation of the foreign currency) should be a stastically significant variable in both of the two estimated demand functions. See e.g. Poloz (1984). The relaxation of the uni-currency-country assumption allows currency questions to be separated from questions dealing primarily with international trade. Examples of models that allow for currency substitution are: Gardner (1986), Girton and Roper (1981), Kareken and Wallace (1981), and Lapan and Enders (1980). The theoretical implications of currency substitution have also been explored by Boyer (1978), King et al. (1978). Boyer and Kingston (1987), and Poloz (1984). For more information on the currency substitution hypothesis and its implications see also e.g. Arango and Nadiri (1981), Bordo and Choudri (1982), and Leventakis (1993).

6. Since the elasticity of substitution between domestic and foreign currencies is likely to be greater under floating rather than fixed exchange rates, then if currency substitution is empirically relevant one of the strongest arguments for floating exchange rates is seriously weakened. See Batten and Hafer (1984) for more elaboration. One of the main reasons that monetarists have advocated, since Milton Friedman (1953) and Harry Johnson (1972) of The Chicago School, flexible exchange rates was to eliminate supply side monetary substitutability which can incapacitate the domestic monetary policy.

7. In Kuwait like many other developing countries, it is mainly the currency that fulfills the transactions role. Demand deposits are held — at least partly — for their safety and sometimes, because

the holder does not wish to receive interest for, may be, religious reasons. See also Darrat (1986-13).

8. See Viren (1990) p. 1592. This would imply that the covered interest rate parity condition strictly holds.

9. Crockett and Evans (1980); Khan (1982 a, 1982b), and Bahmani-Oskooee and Malixi (1991) have, among others, argued that interest rates are unsatisfactory and impractical measures of the opportunity costs of holding money balances. Such argument gained support of results obtained by Fair (1987) who found the interest rate elasticity to be insignificant in most of his country sample. It also gains partial support of results obtained by Metwally (1989) who found the interest rate elasticity to be insignificant in all of his twelve contemporary Islamic countries sample. Kuwait is contradistinguished however. In preliminary estimations for this study the domestic rate of inflation measured by the growth rate of the consumer price index price index proved statically insignificant and was dropped out. This result comes at no surprise. Inflation in Kuwait has been mild over our study period. According to Salih (1993, p. 439), the average rate of inflation in the Gulf countries, measured by the rate of growth of the consumer price index, has been 5% per annum over the period 1970-1990. It has averaged only 1% in the late 1980's. Also see Elsamadisy (1993 a. 1993b).

10. Assuming that foreign cash money balances earn no interest.

11. The cross elasticity of the demand for domestic money with respect to the rate of return on foreign money would provide a measure of the degree of currency substitution.

12. This specification avoids the problems of the demand for cash balances being undefined when the expected rate of change in the exchange rates takes on a zero or negative value (see Klien, 1974). Furthermore, it allows the absolute value of the elasticities of the interest rates and the exchange rate expectations to vary positively with their levels.

13. That is U is distributed as $N(Q, O^2.I)$

14. The computation of the elasticities of the desired cash money

holdings, M_t , with respect to the appreciation rate and/or the interest rates requires weighting the estimated coefficient with the corresponding variable level.

15. According to the simple efficient market hypothesis, the expected future spot rate is measured by the forward exchange rate. The expected future spot rate differs from the realized future spot rate by a forecast error that is a white noise. This hypothesis is supported by considerable empirical evidence. Tests of that hypothesis are not possible for Kuwait.

16. see Sargent. (1973)

17. The partial adjustment hypothesis has been intensively employed by scholars estimating money demand. Among the numerous studies in the literature, Arize (1991), Viren (1990), Rossi (1989), Metwally (1989), Ahmed and Rafiq (1987) are a few examples. It is clear, from the literature surveyed that there is no clear-cut case for using the real rather than the nominal partial adjustment model. For fruitful discussion of both specifications see Goldfeld (1973, 1976), White (1978), Heller and Khan (1979), Laumas and Spencer (1980), Spencer (1985), and Goldfeld and Sichel (1987, 1990). The choice between the two models has therefore to be made on empirical grounds. In preliminary estimation, results indicated that the RPAM fit the data slightly better.

18. That is we employ the Almon (1965) rather than the more restrictive Koyck (1954) scheme.

19. See Elsamadisy (1994)

20. As was done in 1984

21. See. e.g. Leventakis (1993)

22. In the sense that it proceeds normally as implied by the test statistics shown in tables II and IV.

23. i.e. residents of foreign countries

24. Ceilings were explicitly imposed on the lending rates

25. The Central Bank of Kuwait. The Economic Report, 1988 pp.

26. The government expenditure has been the main determinant of the non-oil GDP in Kuwait over the last twenty years. See appendix B for details.

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سلسلة الدراسات الاجتماعية والعمالية

سلسلة علمية متخصصة تعنى بنشر الب
والدراسات الخاصة بالقضايا العم
والاجتماعية بدول مجلس التعاون الخا

تصدر عن

المكتب التنفيذي لمجلس وزراء العمل والشؤون الاجتماعية
بدول مجلس التعاون لدول الخليج العربية

الإشراف العام
كامل صالح الصالح

صدر العدد الأول منها في ديسمبر 1983. وتناولت الأعداد الصادرة منها حتى ا
الموضوعات الخاصة برعاية الفئات الخاصة من أحداث ومعاقين ومسنين والقضايا الاجتما
الخاصة بالشباب والطفولة والمربيات الأجنيات والتنشئة الاجتماعية ودور الأسرة وك
العمل الاجتماعي والحركة التعاونية والقيم الاجتماعية وأزمة الخليج .. كما تناو
التشريعات الخاصة بالعمل والتأمينات الاجتماعية والقضايا المتعلقة بالاستخدام الاء
والانتاجية واحصاءات العمل والسلامة المهنية والتصنيف المهني وتفتيش العمل .. الخ

الإشتراكات

في الدول العربية : للأفراد : (5,3) دينار بحريني (10 دولارات امريكية)
: للمؤسسات : (7) دنانير بحرينية (20 دولاراً امريكياً)

في الدول الأجنبية : للأفراد : (5,5) دينار بحريني (15 دولاراً امريكية)
: للمؤسسات : (11) دينار بحريني (30 دولاراً امريكياً)

المراسلات

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توجه مراسلات الإشتراكات إلى العنوان التالي: المكتب التنفيذي :