
FOREIGN CURRENCY SUBSTITUTION IN JORDAN

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ABSTRACT

The major goal of the study is to investigate the extent of currency substitution and the factors influencing it in Jordan. A theoretical model has been developed and used for econometric analysis covering the period between 1980-1994. The empirical results lend support to the theoretical model used for estimation. Factors such as domestic interest rate, foreign interest rate, and policy change are significantly affecting currency substitution and accounted for most of its variations. However, the elasticity of currency substitution is found to be low (less than one). Furthermore, the results show that the crises of the JD that started in 1988 and the subsequent floating of the exchange rates had contributed significantly to the phenomena of currency substitution in Jordan. In particular, the policy shift toward floating the JD has almost doubled the elasticity of money substitution. This effect of increasing foreign currency substitution in Jordan has significant impact on the effectiveness of monetary policy. The formulation of monetary policy under floating exchange rates must be reconsidered to explicitly accounts for monetary dependence rather than monetary independence.

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احلال العملات في الاردن

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ملخص

تهدف هذه الدراسة إلى استقصاء مدى إحلال العملات الأجنبية والعوامل المحددة لها في الأردن. تم تطوير نموذج نظري ليستخدم في التحليل القياسي للفترة ١٩٨٠-١٩٩٤. وتبين نتائج التحليل القياسي أن العوامل المحددة لإحلال العملات من ناحية نظرية كأسعار الفوائد المحلية والأجنبية والتغيرات في السياسات الحكومية تفسر بدرجة عالية ظاهرة إحلال العملات في الأردن. ولكن كانت مرونة إحلال العملات الأجنبية متدنية (٤٥٪) خلال فترة الدراسة الإجمالية. بالإضافة إلى ذلك فإن نتائج التحليل البياني والقياسي تشير إلى مساهمة هامة للتطورات التي حدثت في أعقاب أزمة الدينار الأردني في عام ١٩٨٩ في كل من مستوى ومرونة إحلال العملات الأجنبية. وبالتحديد فإن التحول نحو سياسة التعويم قد أدى إلى مضاعفة مرونة إحلال العملات الأجنبية في الأردن.

Introduction

Many researchers have followed the standard monetary theory of money demand and estimated a domestic currency demand ignoring foreign asset money demand and the possibility of substituting foreign currency for domestic currency⁽¹⁾. This is equal to assume that Jordanians hold only Jordanian Dinar and hold nothing of any of the foreign currencies for either transaction or speculative or precautionary purposes. However this assumption contradicts the prediction of the portfolio theory that individuals and firms, when faced with uncertainty about the future, will tend to diversify their currency asset holdings in order to reduce the risk of capital losses.

This tendency toward currency diversification implies that a country's money becomes internationalized as it finds its way into the money balances of foreigners in addition to domestic residents. This makes the results and conclusions of traditional monetary models may no longer be valid. Currency substitution raises several economic issues particularly about the implications of currency substitutions for the practicing and effectiveness of monetary, and exchange rate policies. In particular, economists believe that currency substitution will lead to the following effects⁽²⁾ :

- 1- It contributes to weakening of fiscal policy by widening the possibilities for tax avoidance and reducing the yield of the inflation tax.
- 2- It reduces the authority's control over domestic liquidity by enlarging the component over which the authorities have little direct influence and by reducing the stability of money demand.
- 3- It weakens the effectiveness of exchange rate policy by reducing the contractionary effect of a given devaluation on domestic

(1) (قطان، ١٩٧١).

(2) (الأرياني، ١٩٨٨).

spending. Currency substitution tends to reduce the impact on private sector wealth resulting from any given devaluation, since it leaves positive effects on the foreign currency portion of real balances for private sector.

In view of these policy implications of currency substitution, this paper is an attempt to investigate the extent of this phenomenon in Jordan and to identify the economic factors behind it.

Theoretical Analysis of Currency Substitution

Currency substitution occurs when individuals of a country can hold both domestic and foreign currency balances and the levels of these balances change in response to changes in other economic variables. Those individuals may be foreign traders border residents, tourists, multinational's corporations, parents of students studying abroad, etc.⁽³⁾

Currency substitution occurs both in the supply and demand sides. Currency substitution from the supply side depends on the country's exchange rate policy. If the country fixes its currency exchange rate it makes its domestic currency a perfect substitute for foreign currency on the supply side of the market. Therefore, such exchange rate policy makes the country's monetary policy impotent. This study concentrates on the adjustments of the demand side of the market; it focuses on the tendency of the domestic residents to substitute foreign currency balances for domestic currency balances⁽⁴⁾

While the fixed exchange rate allows these adjustments to occur by exchanging supplies of currencies through the central bank, these adjustments could also occur through changing demand for currencies in the private foreign exchange markets. Private individuals in country A can

(3) (Girton روبر and Roper ١٩٨١ جيرتون) .

(4) (Miles مائلس 1978).

simply sell units of either domestic or foreign currencies directly to individual in country B in exchange for goods or bonds without requiring any services of the central bank. This conclusion has an important implication for the theory of flexible exchange rates. One of the traditional arguments for flexible exchange rates is that it allows a country to insulate its monetary policy of other countries. Such insulation is assumed to occur because under perfectly flexible exchange rates the central bank agrees not to intervene in the foreign exchange market. This illuminates the substitution of currencies on the supply side.

To identify the economic factors that are determining currency substitution we use a simple model of domestic and foreign money demand with the aim of reaching a composite reduced form demand for money function. This function will be used for further econometric and quantitative analysis of currency substitution in Jordan*.

For the purpose of simplifying algebra we use the separable version of the well-known Keynesian function of money demand to represent monetary equilibrium in domestic and foreign countries:

$$MS = MD = M = P \cdot k(i) \cdot Y \quad (1)$$

$$MS^* = MD^* = M^* = P^* \cdot k^*(i^*) \cdot Y^* \quad (2)$$

* The basic components of the model can be found in most international economics texts. See for example W. Enders and H. Lapan, *International Economics*, Prentice-Hall Inc., NJ, 1987, pp. 353-360. Also see B. V. Yarbrough and R. M. Yarbrough, *The World Economy, Trade and Finance*, The Dryden Press, Chicago, 1991, pp. 426-429.

Where:

MS and MD are nominal supply and demand of domestic money balances, P is the price level, Y is the level of real income and $k(i)$ reflects the nominal interest sensitivity of money demand. The strike above the variable denotes the foreign country variable.

To complete the model we assume that both commodity and covered interest arbitrage hold. That is:

$$P = e P^* \quad (3)$$

$$(1 + i) = (1 + i^*) \left(\frac{F}{e} \right) \quad (4)$$

Where all variables are as defined before, e is the domestic currency per unit of foreign currency exchange rate, and F is the forward exchange rate.

Substituting equations 3 and 4 into equation 1 and 2 yields the following reduced form:

$$\frac{M}{eM^*} = \left(\frac{F}{e} \right) \left(\frac{k}{k^*} \right) \left(\frac{1 + i^*}{1 + i} \right) \left(\frac{Y}{Y^*} \right) \quad (5)$$

However, since the study concentrates on the long run aspect of currency substitution (it uses annual data) the scale variables (income or wealth) are assumed to play no role in determining currency substitution⁽⁶⁾. Transferring into logarithms and adding the disturbance term (u) the final general reduced form to be estimated becomes*:

$$\log \left(\frac{M}{eM^*} \right) = \log \left(\frac{k}{k^*} \right) + B_1 \cdot \log \left(\frac{1 + i^*}{1 + i} \right) + B_2 \cdot \log \left(\frac{F}{e} \right) + u \quad (6)$$

(6) (El-Erian ^{الاريتي}, 1988)

* Although the structural equations of the model are different, the final reduced form estimated in this study is almost identical to the one estimated by M. Miles, 1978, p 434.

Where:

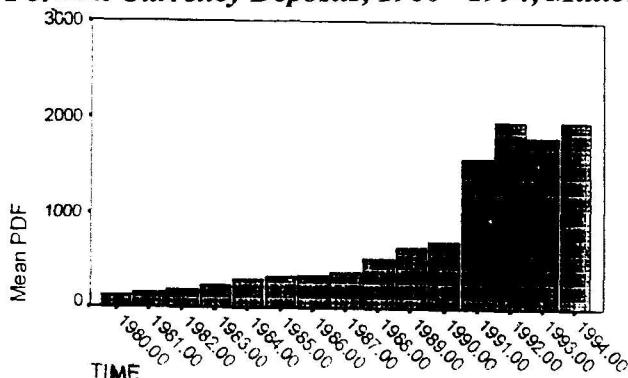
B_1 and B_2 are unknown parameters.

This functional form allows the direct estimation of the elasticity of currency substitution as the coefficient of the interest ratio B_1 .

Currency Substitution in Jordan

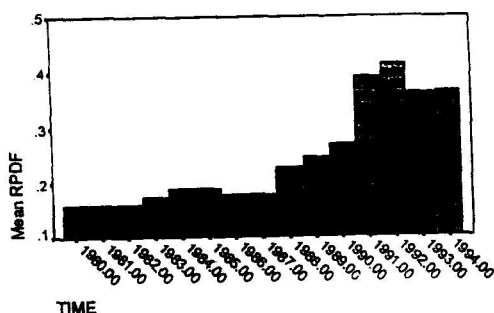
Although the theoretical concept of currency substitution is relatively easy to define its measurement is not. Following the very widely used approach currency substitution is measured by residents relative holdings of foreign currency deposits in domestically located banks ⁽⁷⁾. Clearly this measurement ignores deposits in banks abroad and of non-bank transactions. To the extent that such deposits and transaction are not trivial, this measure will tend to underestimate the magnitude of currency substitution in Jordan. Lack of data about both kinds of transactions prevents any precise measurement of such underestimation. Currency substitution of the private sector in Jordan as measured by the level of Foreign currency deposits has expanded significantly during the last few years. As shown in Figure 1, residents' holdings of foreign currency had increased from 129.2 mill. JDs in 1980 to 1667.1 mill. JD in 1992. This amounts to an average annual rate of increase equal to 14.2 percent. Furthermore, figure 1 shows a significant shift in foreign currency deposits beginning in 1989 and accelerating through 1994.

Figure (1):
Foreign Currency Deposits, 1980 - 1994, Million JD



Source : Central Bank of Jordan, Monthly Statistical Bulletin, Various Issues. Amman , Jordan

Figure (2):
Foreign Currency Deposits as Percentage of Total Domestic Deposits, 1980-1994.



Source : Central Bank of Jordan, Monthly Statistical Bulletin, Various Issues. Amman , Jordan

It appears that the crises of the JD that started in 1989 and the following substantial depreciation of the Dinar had played a major role in that shift.

The high rate of growth in foreign currency holdings has had significant impact on the ratio of foreign to domestic currency holdings as shown in Figure 2. The ratio has increased from an average of 17% for the period 1980-87 to an average of 32% for the period 1988-94. The ratio reached its peak of 41% in 1992.

To further substantiate this graphical analysis we turn now to the econometric analysis of currency substitution based on the theoretical model presented earlier in this study.

The reduced form equation 6 is fitted for the period 1980-1994. It was not possible to extend the sample to cover the period before 1980 due

to the lack of data on foreign currency deposits and domestic rate of lending. The exchange rate expectation is not considered in the estimation because for most of the study period the JD's exchange rates were fixed. However the crises of the JD that started in late 1988 had imposed a strong downward pressure on the value of the JD and led to substantial devaluation of the JD. The continuous pressure on the JD has forced the monetary authority to shift toward floating the JD since late 1989. To account for such policy change a shift variable taking the value of 1 in 1989 and after and zero otherwise is included in the estimated reduced form. Furthermore, following many researchers it is assumed that ratio of money demand elasticity is fixed in the long run and therefore is reflected in the estimated constant term of equation 6. The opportunity costs of holding domestic balances in JD's and US\$ are measured by the one year lending rates in Jordan and US respectively. It is assumed that the long run lending rates closely reflects the cost of borrowing money⁽⁸⁾ The result of estimation is presented in Table 1. All estimated coefficients are statistically significant at the 99% confidence level and all carry the correct expected sign. When the model fitted for the entire period the explanatory power was the highest at 93%. The results of estimation show that all independent variables are important in explaining currency substitution in Jordan. The coefficient of the interest ratio although statistically significant came low at 0.45 indicating to inelastic currency substitution in Jordan. The negative sign of the policy shift variable indicates that the crises of the JD and the subsequent policy shift toward floating exchange rate regime had led to substantial foreign currency substitution in Jordan after 1988.

(8) (Miles مائيس 1978).

Table 1
Estimates of the Determinants of Currency
Substitution in Jordan.

	Constant	Interest Ratio	Shift	R²	D-W	F-Test
Entire Period (1980-1994)	1.6 (36.8)	0.45 (4.4)	-0.3 (-3.4)	93	2.25	78
Fixed (1980-1988)	1.63 (35.8)	0.33 (2.6)		48	1.82	6.5
Floating (1988-1994)	1.38 (20.2)	0.61 (4.5)		80	1.97	20.5

Note:

All coefficients were estimated using OLS; R² is the coefficient of determination; D-W is the Durbin-Watson statistic; t-statistics in parentheses.

To compare the phenomena of currency substitution in Jordan during fixed rates regime and floating rates regime the study period is divided into two sub-periods: the first covering the period 1980-1988 (fixed regime), and the second covering the period 1988-1994 (floating regime). Although currency substitution was inelastic in both sub-periods the elasticity is almost doubled during the floating period compared to the fixed period (it increased from 0.33 to 0.6). An explanation for such result can go as follows: during the period of fixed rates the public does not have to substitute between currencies in private markets since the government is already making currencies perfect substitutes on the supply side. Alternatively, during floating rate period the public will have to resort to performing all of its substitution through private markets.

Conclusions

The results show that the crises of the JD that started in 1988 and the subsequent floating of the exchange rates had contributed significantly to the phenomena of currency substitution in Jordan. The statistical significance of the estimated coefficients confirms the theoretical determinants of currency substitution. Furthermore, the results indicate that currency substitution was inelastic with respect to the interest ratio. In the other hand the policy shift toward floating the JD seems to be contributing significantly to increasing the elasticity of money substitution. This effect of increasing foreign currency substitution in Jordan has significant impact on the effectiveness of monetary policy. The formulation of monetary policy under floating exchange rates must be reconsidered to explicitly accounts for monetary dependence rather than monetary independence.

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