Dual Foreign Currency Markets and the Role of Expectations: Evidence from the Pacific Basin Countries

by

Panayiotis F. Diamandis[1], Georgios P. Kouretas[2] and Leonidas Zarangas[3]

November 2004

Abstract

This paper analyzes the role of expectations of the government policy in the official foreign currency market in determining the black market premium. We use data for the recent float from six emerging markets of the Pacific Basin where active black markets for foreign currency exist, namely, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. To test the impact of anticipated and unanticipated shocks to the official exchange rate on the black market premium, we employ the two-step procedure developed by Barro (1977) and modified by Hoffman *et al*. (1984). The main finding of our analysis is that anticipated and unanticipated shocks to the official exchange rate have an impact on the black market premium in all six Pacific Basin countries. These results suggest that portfolio balance models provide the suitable theoretical framework for analyzing the behaviour of the black market premium in the markets for foreign currency in the Pacific Basin countries. Furthermore, this implies that economic agents in these countries are sensitive to expected returns in foreign exchange.

Key Words: Black market premium, I(2) cointegration analysis, anticipated shocks, expectations, portfolio balance models

JEL Classification : F31, F33

*Part of this paper was written while the second author was Visiting Fellow at the Department of Economics, European University Institute, San Domenico di Fiesole, Italy. The hospitality of EUI and the Robert Schuman Centre is gratefully acknowledged. The second author acknowledges generous financial support from EUI. This paper has benefited from comments during workshops at Athens University of Economics and Business, European University Institute, University of Crete and University of Cyprus. We would also like to thank without implicating Michael Artis, Dimitris Georgoutsos, Costas Karfakis, Soren Johansen, Katarina Juselius and Dimitris Moschos for many helpful comments and discussions.

[1] Department of Business Administration, Athens University of Economics and Business, GR-10434, Athens, Greece.

[2] Department of Economics, University of Crete, University Campus, GR-74100, Rethymno, Greece, Fax (28310) 77406, email: kouretas@econ.soc.uoc.gr (corresponding author)

3 Department of Finance and Auditing, Technological Educational Institute of Epirus, 210 Ioanninon Ave., GR-48100, Preveza, Greece.

1. Introduction

The existence of parallel or `black` markets, particularly for US dollars, is a well known feature of many developing countries and countries where trade and capital control exist. Foreign exchange and trade controls are a major factor in the `parallel` or `black` market for foreign currency. When access to the official foreign exchange market is limited, then those who need foreign exchange in order to make international transactions of goods, services and assets will have an incentive to find an alternative source. Thus, the development of excess demand for foreign currency at the official rate gives an incentive to those who have an excess supply of foreign currency to sell it illegally at a price higher than the official rate. Thus, the existence of exchange rate controls causes a divergence between the equilibrium rate and the official rate and this leads to the emergence of a parallel or `black` market for foreign exchange in the country (see Edwards, 1989; Agenor, 1992; Montiel, Agenor and Haque, 1993; Kiguel and O'Connell, 1995; and Phylaktis, 1996).

The size of this market varies from country to country and depends on the type of exchange and trade restrictions imposed and the degree to which these restrictions are enforced by the authorities (see Edwards, 1989; Montiel, Agenor and Haque, 1993). Recent evidence suggests that black markets have increased in size and sophistication in many countries, in relation to capital movements. As a result, over the last two decades a substantial body of literature has been developed on the issue of modelling and the macroeconomic implications of parallel markets for foreign currency [Agenor 1992; Kiguel and O'Connell, 1995; and Phylaktis, 1996 among others provide an extensive theoretical and empirical analysis of these markets as well as of the determinants of the black market premia in a variety of countries].

A `parallel` or `black` market for US dollars has operated for years in several Pacific Basin countries, namely Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. Specifically, in the Philippines, Singapore and Malaysia the black market operates continuously since the 1940s. The persistence of the existence of black markets has been the outcome of various of foreign-exchange controls in force and the administratively set of the exchange rate by the monetary authorities as well as of social and political unrest, and economic turbulence. Thus, in the Philippines and Thailand exchange controls have been implemented during the period under examination, whereas in the Philippines the emergence of the black market for foreign currency was further supported by the outright theft of millions of US dollars of foreign support and assistance payments, and by the funding of capital flight which arose from fear of dictatorship, of confiscation of assets and of blocking of bank accounts. Furthermore, in Thailand the development of the parallel market was linked to narcotics-related activities, (Phylaktis and Kassimatis, 1994; Moore and Phylaktis, 2000).

In Korea black markets emerged by strict foreign-exchange controls, which have been partially lifted following the liberalization programs on foreign exchange markets that this country implemented in 1988. Furthermore, in Korea the operation of the black market was supported through sustained capital flight along with the widespread corruption which dominated most sectors of political and economic life.

Singapore and Malaysia, where foreign-exchange controls were abolished in the late 1970s has also experienced the presence of a limited black market. With respect to Malaysia the market was supported by capital flight from Indonesia, while the black economy which existed for tax-evasion purposes boosted the demand for black dollars. In Singapore, the demand for black dollars was created by immigrants from India (mostly Muslims) who sent collected foreign currency to their families India though the black market channels. Furthermore, in Indonesia although no capital controls existed, the emergence of the black market for dollars resulted from a set of import restriction measures imposed, and that created incentives to smuggle goods and therefore raised the demand for black-market dollars. This demand was further amplified by the imposition of an exchange tax on export proceeds which diverted foreign currency to the black market. Finally, the black market in Indonesia was further supported by significant amounts of money coming from corruption as well as by capital flight initiated by politicians securing their own wealth, (Phylaktis and Kassimatis, 1994).

Figures 1a-6a show the evolution of the parallel and official drachma-dollar exchange rate from 1974 to 1993, while Figures 1b-6b show the evolution of the parallel market premium, the percentage differential between the black market and official exchange rate, for the same period.[1] As expected, the black market rate exhibited greater volatility than the official rate since it was freely determined in the market responding to actual and anticipated changes in economic conditions. Exchange rate arrangements were not unified in the area during the period under examination. Singapore and Malaysia, placed their effective rate of their currencies on a controlled floating basis in the early 1970s. The other four economies of our sample

[1] Price data on black market for foreign currency are often delayed to be realised and this is the reason for not using more recent observations. However, the aim of this paper is not the dataset itself. The focus of the paper is to model and understand the workings of the black market in the Pacific Basin countries (where the black market still exist) and what policy conclusions can be drawn from this analysis which can help us to understand similar positions in countries of other regions. This is what is accomplished by the present study. Furthermore, the development of new econometric methodologies provide a better framework for the study of an already known data set used in the past, but we are now offered the likelihood to obtain richer conclusions and better modelling of this data set as well as to apply these methodologies to black market exchange rate series from other countries where such a market is still in operation. The use of a particular data set that in many cases is very old is something very common in time series analysis. A good example is the use of data from the 1920s which has been used extensively by many researchers in attempt to get better understanding of a flexible exchange rate system or to validate the market efficiency hypothesis. Another good example is the use of century long data used to examine the validity of PPP.

continued to link their currencies to the US dollar after its floating in 1971, and to control their exchange rates by reducing the gold content of their currencies. Indonesia and Thailand in 1978, Korea in 1980 and the Philippines in 1984, finally abolished the fixed exchange regime with the adoption of a controlled floating effective exchange rate. We also find interesting to note that the are cases during which the black market rate was below the official rate, indicating a negative black market premium (e.g. Thailand). Although not the regular case, negative premiums arise during periods when commercial banks are forced not to accept foreign currency without proper identification of the seller. In that case the seller was willing to undersell his foreign currency in the black market. (Dornbusch, *et al*., 1983). In the case of the Pasific Basin countries as the analysis above made clear negative premiums could have emerged because of the widespread corruption, a substantial black market economy, and drug-related activities.

In this paper, we attempt to gain a better understanding of the black market premium, by examining dual exchange rate systems in the six Pacific Basin countries. To this end we employ variables that are found in the monetary and portfolio-balance models of exchange-rate determination to forecast the official exchange rate. We then use information derived from this forecast to analyze how anticipated and unanticipated changes in the official exchange rate influence the level of the black market premium in Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. To test the impact of anticipated and unanticipated shocks to the official exchange rate on the black market premium, we apply the two-step procedure developed by Barro (1977) and extended by Hoffman *et al*. (1984).

The main finding of this analysis is that both anticipated and unanticipated shocks to the official exchange rate have an impact on the black market premium in Indonesia, Korea Malaysia, the Philippines, Singapore and Thailand. These results suggest that portfolio balance models may be appropriate for understanding the behaviour of the black market premium in countries dual markets for foreign currency exist.

The rest of the paper is organized as follows. Section 2 outlines the theoretical and methodological issues relevant to our study. Section 3 presents the econometric methodology. Section 4 presents and discusses the empirical results. Section 5 concludes the paper.

2. Models of Black Markets and the Role of Expectations

The analysis of the workings of the dual foreign currency markets has led to the development of alternative theoretical models over the last twenty years. The theory of international trade has provide the first class of such models that focus on the central role that transactions demand for foreign exchange play for the evolution of a black or “parallel” market fore foreign currency (mainly that of US dollars). In these models the black market for foreign currency represents the demand for foreign currency by agents mainly to purchase imports outside the official market and the supply of foreign currency resulted from sources such as smuggling and underinvoincing of exports (Sheikh, 1976, 1989; and Pitt, 1984).

The second class of models relies on the monetary approach to the exchange rate determination. Within this framework it is assumed that the demand for foreign currency on the black markets arises purely on portfolio diversification considerations. The significance of the monetary factors on the behaviour of the black market exchange rate has been confirmed for a number of developing countries by several studies (Blejer, (1978); Edwards, (1988); Van den Berg and Jayanetti, (1993); Bahmani-Oskooee, (1995); and Kouretas and Zarangas, (1998)).

A final class of models is the portfolio balance model that was initially developed by Dornbusch *et al*. (1983) and extended by Phylaktis (1992). These models extend the standard portfolio balance by combining the flow considerations for black market dollars (real trade models) with the central features of the monetary models which emphasize the role of assets in the determination of the parallel market exchange rates. Empirical support of the portfolio models to explain the determinants of black market premium has been provided by Dornbusch *et al*. (1983), Phylaktis (1992), Phillips (1986), Yin and Stoever (1994) and Phylaktis and Manalis (1995) for several developing countries.

A common characteristic of these models is that they mainly analyze the levels of the official and black market exchange rates and not so much on the black market premium. Empirical work on these two series has paid significant attention of the issue of market efficiency, i.e. whether agents use information from one exchange market to predict the future path of exchange rates in the other. Booth and Mustafa, (1991), Agenor and Taylor (1993), Phylaktis and Kassimatis, (1994), Moore and Phylaktis, (2000) and Kouretas and Zarangas (2001a,b) are among many studies that test the efficient market hypothesis for several countries. In addition, Phylaktis and Kassimatis (1997) and Kanas and Kouretas (2001) have examined issues concerning the volatility of the two exchange rate series for several Pasific Basin countries and Greece, respectively.

Moreover, most of the theory on modelling the premium has paid much attention on its behaviour but less attention on its determinants. Figures 1b-6b show that the black market premia exhibit significant variation across and over time for all the Pacific-Basin countries under examination. Edwards (1989, 1998, 1999) and Montiel *et al*., (1993) argue that the size of the black market premium partially depends on the likelihood of detection and the severity of penalties imposed on individual found to be engaging in illegal transaction. Changes in the probability of detection and the magnitude of sanctions will therefore cause the premium to vary.

Expectations about government policy with respect to the level of the official exchange rate is another important determinant of the level of the premium. Modelling the premium as an asset price that responds quickly to news and variations in relative returns calls for the role of agents' expectations to be important. Such a modelling is done in the portfolio balance models put forward by Dornbusch *et al*. (1983) and Phylaktis (1992) that we presented above. Within this framework, possible determinants of the premium are considered to be the effective yield on foreign currency denominated assets, expectations of official devaluation, and the official exchange rate. These models predict that the premium rises with expectations of depreciation of the official exchange rate, while at the time of actual devaluation the premium falls toward zero, (Phylaktis and Kassimatis, 1994; Phylaktis, 1996 and Moore and Phylaktis, 2000). In addition, Agenor and Taylor (1993), Kamin (1993), Edwards (1994) and Gervais and Larue (2001) assume that expectations of official devaluation due to inflation and the consequent reduction in official exchange reserves lead to an increase in the black market premium. When the devaluation actually takes place, the premium falls.

Several main characteristics emerge from the models explaining the black market premium. First, these models suggest that expectations of future official exchange rate devaluation lead to increases in the premium. Second, these models suggest that at the time of devaluation the level of the premium tends to be eliminated. Finally, these models show that expected official devaluation results in movements in the premium. Actual devaluation of the official exchange rate reduces the level of the premium as opposed to an increase of the premium when markets anticipate a devaluation but actual devaluation is postponed by the government.

In this paper we employ an econometric approach that focuses on the important role expectations, and in particular expectations about the official exchange rate, play in determining the black market premium. This two-step methodology amounts to forecast official exchange rate series in the first stage and then we test whether forecasts of movements in the official series affect the premium. Therefore, application of this methodology will help us to draw conclusions about the ability of governments to influence the level of the black market premium.

3. Econometric Methodology

To test the impact of anticipated and unanticipated shocks to the official exchange rate on the black market premium, we apply the two-step procedure developed by Barro (1977) and extended by Hoffman *et al*. (1984). Barro (1977) originally developed this methodology to examine the impact of anticipated and unanticipated demand shocks on the economy. Furthermore, Fackler and Parker (1990) and Rush (1985) used this procedure to investigate the influence of anticipated and unanticipated monetary shocks on U.S. output during long historical periods.[2]

According to the Hoffman *et al*. (1984) procedure we initially construct a forecasting construction for the official exchange rate and we assume that the

[2] Pagan (1984) as well as Murphy and Topel (1985) pointed out that Barro's (1977) two-step procedure estimates incorrect test statistics due to the application of generated regressors in the second step. Pozo and Wheeler (1999) have employed this procedure to examine the impact of expectations on official exchange rate devaluation on black market premium for four Latin American countries.

predicted values from this equation are measures of anticipated shocks, while the residuals from this equation are taken as measures of unanticipated shocks. The second step involves a regression between the black market premium on a constant and current and lagged values of anticipated and unanticipated shocks. The statistical significance of anticipated and unanticipated shocks of the official exchange rate on the premium is tested using *F*-tests.

To estimate the forecasting equations used in this analysis we initially assume that the official exchange rate in country i depends on a constant and lagged values of the domestic of the domestic price level (P^i), of the black market exchange rate (B^i), the official exchange rate (O^i), domestic money (M^i), exports (XP^i), imports (MP^i) , U.S. prices (P^{US}), and the U.S. money supply (M^{US}). Lagged black and official exchange rates are included because this information is available to economic agents at the time expectations are formed. Lagged values of the other variables, which are also available to economic agents when they make their forecasts, are included because they are commonly found in asset models of exchange rate determination.[3] In its most general form, the forecasting equation for the official exchange rate in country i is

$$\begin{aligned} O_t^i = f(&P_{t-1}^i, P_{t-2}^i, \ldots\ldots, B_{t-1}^i, B_{t-2}^i, \ldots\ldots, O_{t-1}^i, O_{t-2}^i, \ldots\ldots, M_{t-1}^i, M_{t-2}^i, \ldots\ldots, \\ &XP_{t-1}^i, XP_{t-2}^i, \ldots\ldots, MP_{t-1}^i, MP_{t-2}^i, \ldots\ldots, P_{t-1}^{US}, P_{t-2}^{US}, \ldots, M_{t-1}^{US}, M_{t-2}^{US}, \ldots\ldots) \end{aligned} \quad (1)$$

The predicted values from the forecasting equations were taken to be the anticipated movements in the official exchange rate, while the residuals from this equation were taken to reflect the unanticipated official exchange rate. We define the anticipated official exchange rate in country i as A^i and the unanticipated official exchange rate as U^i. A^i and U^i were used in an equation that estimated the black market premium for country $i(\rho^i)$ of the following form:

$$\rho_t^i = a + b_0 A_t^i + b_t A_{t-1}^i + ... + b_{12} A_{t-12} + c_0 U_t^i + c_1 U_{t-1}^i + ... + c_{12} U_{t-12}^i + e_t \qquad (2)$$

Joint significance of the b_j indicates that A^i influences ρ^i, while joint significance of the c_j indicates that U^i influences ρ^i

4. Empirical Results

The data used in this paper is monthly and covers the period from January 1974 to December 1993 (which is the last available observation) and the countries under examination are, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. The parallel (black) market exchange rates were taken from the monthly series in various issues of the ***World Currency Yearbook*** (1976-1993), and its predecessor, ***Pick's Currency Yearbook*** (1968-1975). The data for the official exchange rates were obtained from the CD-ROM edition of the IMF's ***International Financial Statistics***. The exchange rates are end-of-month observations and are all expressed as national currency units per U.S. dollar. The price indices for all six Pacific Basin countries and the U.S. are the consumer price indices. M1 is the monetary aggregate for all countries. Both the consumer prices and the monetary variables are taken from IMF's ***International Financial Statistics***. Finally, exports from each of these countries to the U.S. in millions of U.S. dollars and imports of

[3] The inclusion of lagged values of O^i and B^i is justified on the grounds that these values are known to the economic agents when they form their expectations of the current period's O^i.

each of these countries from the U.S. in millions of U.S. dollars were obtained from IMF's ***Direction of Trade Statistics***.

As we explained in section 3, the Hoffman *et al*. (1984) two-step procedure requires the estimation of a forecasting equation for the official exchange rate and then in the second step we estimate an equation of the black market premium using as independent variables the forecasts of the official exchange rate and the residuals from the first equation. It is clear that the estimation of both equations employ data which is likely to be non-stationary. Therefore, it is necessary to test for the presence of one or possibly two unit roots in the variables under consideration, namely the official exchange rate, the black market exchange rate, the domestic consumer price, the domestic money supply, exports, imports as well as the U.S. consumer price and the U.S. money supply.

To examine, whether the series under consideration are stationary, we apply the Elliot *et al*. (1996) GLS augmented Dickey-Fuller test (DF-GLS_u) and Ng and Perron (2001) GLS versions of the modified Phillips-Perron (1988) tests (MZ_a^{GLS} and MZ_t^{GLS}). The null hypothesis is that of a unit root against the alternative that the initial observation is drawn from its unconditional distribution and uses GLS-detrending as proposed by Elliott *et al*. (1996) and extended by Elliott (1999), to maximize power, and a modified selection criterion to select the lag truncation parameter in order to minimize size distortion. In the GLS procedure of Elliot *et al*. (1996), the standard unit root tests (without trend) are applied after the series are first detrended under the local alternative $\rho = 1 + \alpha / T$. This was found to provide substantial power gains for the DF-GLS_u test resulting to power functions that lie just under the asymptotic power envelope. Ng and Perron (2001) find similar gains for the MZ_a^{GLS} and MZ_t^{GLS} tests. They also found that a modification of the AIC criterion

(MIC), give rise to substantial size improvements over alternative selection rules such as BIC. For robustness, we then apply the Kwiatkowski *et al*. (1992) KPSS test for the null hypothesis of level or trend stationarity against the alternative of non-stationarity. The results of the unit root and stationarity tests are presented in Table 1. The results show that we are unable to reject the null hypothesis of non-stationarity with the DF-GLS_u and MZ_a^{GLS} and MZ_t^{GLS} tests and we reject the null hypothesis of stationarity with the KPSS test for the levels of both series. The results are reversed when we take the first difference of each exchange rate series which leads us to the conclusion that all variables are realizations of $I(1)$ processes.[4]

The second step in our analysis deals with the issue of detecting cointegration for the set of the variables in the forecasting equation (1). The starting point of the cointegration analysis is Johansen (1988) and Johansen and Juselius (1990).[5] Furthermore, Johansen (1992, 1995, 1997) developed a testing procedure, which has been extended by Paruolo (1996) and Rahbek *et al*. (1999) that allows us to sequentially test, according to the Pantula (1989) principle, for the presence of $I(2)$ and $I(1)$ components in a multivariate framework. In order for the procedure to be valid we have to check that the assumptions underlying the model are satisfied. In particular we verify that the estimated residuals do not deviate from being Gaussian white noise errors. A structure of eleven lags was chosen based on several univariate misspecification tests.

Specifically, the multivariate LB test for serial correlation up to the 36rd order and the multivariate LM tests for first and fourth order residual autocorrelations are not significant, whereas multivariate normality is clearly violated. Normality can be

[4] Table 1 reports the unit root and stationarity tests for the Indonesian Rupiah-US dollar case. Similar results have been obtained for all other cases but to save space they are available upon request.

rejected as a result of skewness (third moment) or excess kurtosis (fourth moment). Since the properties of the cointegration estimators are more sensitive to deviations from normality due to skewness than to excess kurtosis we report the univariate Jarque-Bera test statistics together with the third and fourth moment around the mean. It turns out that the rejection of normality is essentially due to excess kurtosis, and hence not so serious for the estimation results. The presence of non-normality may be attributed to the fact that the official exchange rates were administratively determined throughout the period under consideration as well as to the short-term interest rates, signifying both the high volatility of money stock in both countries. The ARCH(12) tests for twelfth order autoregressive heteroscedasticity and is rejected for all equations. Again cointegration estimates are not very sensitive to ARCH effects.[6] The R^2 measures the improvement in explanatory power relative to the random walk (with drift) hypothesis, i.e. $\Delta x_t = \mu + \varepsilon_t$. They show that with this information set we can explain quite a large proportion of the variation in the exchange rates and the money supply. Thus, we note that our conditional VAR model is well-specified. Table 2 reports the univariate and multivariate misspecification tests.[7]

Table 3 presents the results of the formal tests for the joint determination of the cointegration rank and the presence of $I(2)$ components in our system. We have included in the estimation procedure eleven centered seasonal dummies, which are necessary to account for short-run effects which could otherwise violate the Gaussian

---

[5] Johansen (1988) and Johansen and Juselius (1990) multivariate cointegration methodology has been extensively used in numerous econometric applications and therefore we do not discuss it to save space.

[6] Gonzalo (1994) shows that the performance of the maximum likelihood estimator of the cointegrating vectors is little affected by non-normal errors. Lee and Tse (1996) have shown similar results when conditional heteroskedasticity is present.

[7] Table 2 reports the univariate and multivariate residual misspecification tests for the Indonesian Rupiah-US dollar case. Similar results have been obtained for all other cases but to save space they are available upon request.

assumption. Specifically, Table 3 reports the trace test statistics for all possible values of r and $s_1 = p - r - s_2$, where r is the rank of the cointegration space and s_1 is the number of $I(1)$, trends under the assumption that the data contain linear but not quadratic trends. The 95% quantiles of the asymptotic test distributions are taken from Paruolo (1996, Table 5) and reproduced underneath the calculated test values. Starting from the most restricted hypothesis {r = 0, s_1 = 0, s_2 = 8}, where s_2 is the number of $I(2)$ components, and testing less and less restricted hypotheses, it is shown that essentially all $I(2)$ hypotheses can be rejected at the 5% level for all six Pasific basin countries. The last column of Table 3 reports the standard Johansen's trace test, Q_r.[8]

Table 4 reports the results for the growth rate models for the seven Pacific-Basin countries. The analysis of these results reveals that, unanticipated shocks to the official exchange rate influence the black market premium in Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. This result is consistent with asset models which suggest that news is quickly incorporated into prices, such as the black market premium. More interestingly, the results show that anticipated shocks to the official exchange rate influence the black market premium in Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. Given the prediction of the portfolio-balance model that the premium responds to expected return differentials, then this model seems to hold for all six Pacific Basin foreign currency markets.

This result implies that given fluctuations in expected returns for domestic and foreign assets are significant, economic agents reallocate their portfolios. This seems to imply that they choose a strategy that leads to the choice of assets denominated in

[8] A small sample adjustment has been made in the Trace test statistics, Q_r, for the $I(1)$ analysis

$$-2\ln Q = -(T - kp)\sum_{i=r_{0+1}}^{k}\ln(1 - \hat{\lambda}_i)$$ as suggested by Reimers (1992)

both currencies. Therefore, economic agents' preferences appear to be guided by changes in expected returns as measured by anticipated official exchange-rate changes and lead portfolio managers to use the black market in these countries for hedging against foreign exchange risk.

5. Concluding Remarks

This paper has focused on the official and black market for foreign currency in six Pacific basin countries during the period 1974-1993. Our purpose was to analyze the role of agents' expectations about the government policy and the official market for foreign currency. The portfolio balance model of the exchange rate determination provided the theoretical framework to explain the movements of the black market premium in the parallel market for US dollars for the period under investigation. The econometric analysis was based on the two-step methodology suggested by Hoffman *et al*. (1984) which allowed to test the impact of unanticipated and anticipated shocks to the official exchange rate on the black market premium.

The main finding of our analysis is that both the anticipated and unanticipated shocks to the official exchange rate had an impact on the black market premium in Indonesia, Korea, Malaysia, the Philippines and Thailand. This result suggests that portfolio balance models is the appropriate framework for analyzing the behaviour of the black market premium for these six Asian foreign currency markets. Economic agents with portfolios included the currencies of these countries appeared to be sensitive to changes in anticipated returns of foreign exhange.

References

Agenor, P.R., 1992, Parallel Currency Markets in Developing Countries: Theory, Evidence and Policy Implications, Essays in International Finance, Princeton University, No. 188.

Agenor, P.R. and M.P. Taylor, 1993, Analyzing credibility in high-inflation countries: A new approach, Economic Journal, 103, 329-336.

Agenor, P.R. and M.P. Taylor, 1993, The causality between official and parallel foreign exchange rates in developing countries, Applied Financial Economics, 3, 255-266.

Blejer, M.L. 1978, Exchange rate restrictions and the monetary approach to the exchange rate, in J.A. Frankel and H.G. Johnson (eds.) The Economics of the Exchange Rates: Selected Studies, Reading: MA.

Booth, G.C. and Mustafa, C., "Long-run dynamics of black and official exchange rates", *Journal of International Money and Finance*, October 1991, 392-405.

Barro, R.J. 1977, Unanticipated money growth and unemployment in the United States, American Economic Review, 67, 101-115.

Direction of Trade Statistics, Washington, DC: International Monetary Fund, various issues.

Doornik, J. A. and H. Hansen, 1994, A practical test for univariate and multivariate normality, Discussion Paper, Nuffield College.

Dornbusch, R., D.V. Dantas, C. Pechman, R. Rocha and D. Simoes, The black market for dollars in Brazil, The Quarterly Journal of Economics, 98, 25-40.

Edwards, S., 1988, Real and monetary determinants of real exchange rate behaviour: Theory and evidence from developing countries, Journal of Development Economics, 29,

Edwards, S., 1989, Exchange controls, devaluations, and real exchange rates: The Latin American experience, Economic Development and Cultural Change, 37, 231-254.

Edwards, S., 1994, The political economy of inflation and stabilization in developing countries, Economic Development and Cultural Change, 42, 235-266.

Edwards, S., 1998, Capital inflows into Latin America : A stop-go story, NBER Working Paper 6441.

Edwards, S., 1999, How effective are capital controls?, Journal of Economic Perspectives, 13, 65-84.

Edwards, S. and P. J. Montiel, 1989, Devaluation crises and the macroeconomic consequences of postponed adjustment in developing countries, International Monetary Fund Staff Papers, 36, 875-904.

Elliott, G., 1999, Efficient tests for a unit root when the initial observation is drawn from its unconditional distribution, International Economic Review, 44, 767-784.

Elliott, G., J.T. Rothenberg and J.H. Stock, 1996, Efficient tests for an autoregressive unit root, Econometrica, 64, 813-836.

Fackler, J. S. and R. E. Parker, Anticipated and unanticipated money and output: 1873-1930, Economic Inquiry, 28, 774-787.

Gervais, J-P. and B. Larue, 2001, Do reductions in black market exchange rate premia cause inflation?, Empirical Economics, 26, 525-551.

Gonzalo, J., “Comparison of five alternative methods of estimating long-run equilibrium relationships”, *Journal of Econometrics*, June 1994, 203-233.

Hoffman, D.L., S.A. Low and D.E. Schlagenhauf, 1984, Tests of rationality, neutrality and market efficiency: A Monte Carlo analysis of alternative test statistics, Journal of Monetary Economics, 14, 339-363.

International Financial Statistics, Washington, DC: International Monetary Fund, various issues.

Johansen, S., 1988, Statistical analysis of cointegrating vectors, Journal of Economic Dynamics and Control, 12, 231-254.

Johansen, S., 1991, Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models, Econometrica, 59, 1551-1180.

Johansen, S., 1992, A representation of vector autoregressive processes integrated of order 2, Econometric Theory, 8, 188-202.

Johansen, S., 1995, A Statistical Analysis of Cointegration for I(2) Variables, Econometric Theory, 11, 25-29.

Johansen, S., 1997, A Likelihood Analysis of the I(2) Model, Scandinavian Journal of Statistics, 24, 433-462.

Johansen, S. and K. Juselius, 1990, Maximum likelihood estimation and inference on cointegration - with applications to the demand for money, Oxford Bulletin of Economics and Statistics, 52, 169-210.

Kamin, S., 1993, Devaluation, exchange controls, and black markets for foreign exchange in developing countries, Journal of Development Economics, 40, 151-169.

Kanas, A., and G.P. Kouretas, 2001, Black and Official Exchange Rate Volatility and Foreign Exchange Controls: Evidence from Greece, International Journal of Finance and Economics, 6, 13-25.

Kiguel, M., and O'Connell S., "Parallel foreign exchange markets in developing countries: Experience and policy lessons", *The World Bank Research Observer*, February 1995 , 21-52.

Kouretas, G.P. and L.P. Zarangas, 1998, A cointegration analysis of the official and parallel foreign exchange markets for dollars in Greece, International Journal of Finance and Economics, 3, 261-276.

Kouretas, G.P. and L.P. Zarangas, 2001a, Black and official exchange rates in Greece: An analysis of their long-run dynamics, Journal of Multinational Financial Management, 11, 295-314.

Kouretas, G.P. and L. Zarangas, 2001a, Long-run purchasing power parity and structural change: The official and parallel foreign exchange markets for dollars in Greece, International Economic Journal, 15, 109-128.

Kwiatkowski, D., P.C.B. Phillips, P. Schmidt and Y. Shin, 1992, Journal of Econometrics, Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?, Journal of Econometrics, 54, 159-178.

Montiel, P.J., P-R Agenor and N. Ul Haque, 1993, Informal Financial Markets in Developing Countries, Oxford: Blackwell Publishers, 26-41.

Ng, S. and P. Perron, 2001, Lag length selection and the construction of unit root tests with good size and power, Econometrica, 69, 1519-1554.

Moore, M.J. and K. Phylaktis, 2000, Black and official exchange rates in the Pacific Basin: Some tests of dynamic behaviour, Applied Financial Economics, 10, 361-369.

Murphy, K. M. and R. H. Topel, 1985, Estimation and inference in two-step econometric models, Journal of Business and Economic Statistics, 3, 370-379.

Pagan, A., 1984, Econometric issues in the analysis of regressions with generated regressors, International Economic Review, 25, 221-247.

Pantula, S. G., 1989, Testing for unit roots in time series data, Econometric Theory, 5, 256-271.

Paruolo, P., 1996, On the determination of integration indices in I(2) systems, Journal of Econometrics, 72, 313-356.

Phylaktis, K., 1992, The black market for dollars in Chile, Journal of Development Economics, 37, 155-172.

Phylaktis, K., 1996, Black market for foreign currency: A survey of theoretical and empirical issues, Financial Markets, Institutions & Instruments, 5, 102-124.

Phylaktis, K., and Y. Kassimatis, 1994, Black and official exchange rates in the Pacific Basin countries: An analysis of their long-run dynamics, Applied Economics, 26, 399-407.

Phylaktis, K., and Y. Kassimatis, 1997, Black and official exchange rate volatility and foreign exchange controls, Applied Financial Economics, 7, 15-24.

Pozo, S., and M. Wheeler, 1999, Expectations and the black market premium, Review of International Economics, 7, 245-253.

Rahbek, A.H., C. Konsted and C. Jorgensen, 1999, Trend-Stationarity in the I(2) cointegration model, Journal of Econometrics, 90, 265-289.

Reimers, H-E., "Comparison of Tests for Multivariate Co-integration", *Statistical Papers*, March 1992, 335-359.

Rush, M., 1985, Unexpected monetary disturbances during the gold standard era, Journal of Monetary economics, 15, 302-321.

World Currency Yearbook, Brooklyn: International Currency Analysis Inc., various issues.

Table 1: Unit Roots and Stationarity Tests

Indonesian Rupiah - Dollar

Variables	DF-GLS$_u$ t_μ	t_τ	MZ_a^{GLS}	MZ_t^{GLS}	KPSS-tests η_μ	η_τ
xpus	-2.111 [8]	-2.342 [5]	-1.112 [8]	-1.003 [6]	1.435	0.803
Δxpus	-13.06 [3]	-12.11 [3]	-36.22 [5]	-1.12 [5]	0.044	0.027
mpus	-1.665 [7]	-1.545 [7]	-1.366 [5]	-1.389 [5]	1.378	0.222
Δmpus	-24.77 [0]	-23.99 [0]	-35.11 [3]	-1.82 [3]	0.031	0.055
ofex	-0.451 [1]	-1.355 [1]	-0.412 [4]	-1.115 [3]	2.014	0.288
Δofex	-4.385 [9]	-4.390 [9]	-15.34 [5]	-0.99 [5]	0.111	0.123
blex	-0.622 [11]	-1.982 [11]	-0.995 [5]	-1.250 [3]	2.884	0.092
Δblex	-7.745 [4]	-7.563 [4]	-15.44 [5]	-1.44 [6]	0.225	0.067
pd	-0.766 [12]	-2.278 [12]	-0.302 [4]	-1.696 [4]	2.229	0.133
Δpd	-9.332 [3]	-8.921 [3]	-17.56 [3]	-17.32 [3]	0.261	0.111
pus	-2.531 [8]	-2.335 [8]	-2.989 [9]	-1.889 [9]	2.992	0.411
Δpus	-3.377 [4]	-7.688 [4]	-14.22 [7]	-6.332 [7]	0.234	0.098
M1	-0.703 [11]	-2.668 [11]	-0.346 [6]	-1.350 [6]	2.998	0.177
Δm1	-26.62 [1]	-23.32 [1]	-31.66 [4]	-34.55 [4]	0.089	0.101
M1us	-1.545 [10]	-2.121 [10]	-3.558 [5]	-0.802 [5]	2.776	0.609
Δm1us	-3.557 [3]	-6.227 [3]	-17.22 [5]	-20.25 [5]	0.318	0.135

Notes: xpus, mpus, ofex, blex, pd, pus, M1 and M1us are, respectively, the price of exports to the US, the price of imports from US, the official and parallel exchange rates, the Indonesian cpi, the US cpi, the Indonesian M1 and the US M1. Δ indicate first differences.

- The DF-GLS$_u$ is due to Elliot et al. (1996) and Elliott (1999) is a test with an unconditional alternative hypothesis. The standard Dickey-Fuller tests are detrended (with constant or constant and trend). The critical values for the DF-GLS$_u$ test at the 5% significance level are:-2.73 (with constant) and -3.17 (with constant and trend), respectively (Elliott,1999).
- MZ_a and MZ_t are the Ng and Perron (2001) GLS versions of the Phillips-Perron tests. The critical values at 5% significance level are: -8.10 and -1.98 (with constant), respectively (Ng and Perron, 2001, Table 1).
- η_μ and η_τ are the KPSS test statistics for level and trend stationarity respectively (Kwiatkowski *et al*. 1992). For the computation of theses statistics a Newey and West (1994) robust kernel estimate of the "long-run" variance is used. The kernel estimator is constructed using a quadratic spectral kernel with VAR(l) pre-whitening and automatic data-dependent bandwidth selection [see, Newey and West, 1994 for details]. The 5% critical values for level and trend stationarity are 0461 and 0.148 respectiveley, and they are taken from Sephton (1995, Table 2).

(*) indicates significance at the 95% confidence level.

Table 2. Residual misspecification tests of the model with $k = 11$

(a) Univariate Residual Diagnostics

Eq.	σ_ε	LB(36)	ARCH(12)	η_3	η_4	NORM(4)	R^2
$\Delta(xpus)$	0.029	24.13	11.55	-0.56	3.34	3.56	0.434
$\Delta(mpus)$	0.042	26.87	16.34	0.87	6.59	4.12	0.457
$\Delta(ofex)$	0.019	31.59	1.22	-0.22	2.71	39.54*	0.789
$\Delta(blex)$	0.022	29.12	3.12	-0.48	2.66	3.77	0.827
$\Delta(pd)$	0.006	24.78	10.25	0.08	4.45	0.12	0.576
$\Delta(pus)$	0.009	19.56	9.89	0.12	4.89	0.45	0.634
$\Delta(M1)$	0.033	20.11	5.23	0.33	5.22	2.01	0.809
$\Delta(M1us)$	0.052	17.32	7.56	0.41	5.90	2.67	0.799

Notes: σ_ε is the standard error of the residuals, η_3 and η_4 are the skewness and kurtosis statistics. LB is the Ljung-Box test statistic for residual autocorrelation, ARCH is the test for heteroscedastic residuals, and NORM the Jarque-Bera test for normality. The ARCH and NORM statistics are distributed as χ^2 with 12 and 4 degrees of freedom, respectively and the LB statistic is distributed as χ^2 with 36 degrees of freedom. (*) denotes significance at the 5% level.

(b) Multivariate Residuals Diagnostics

L-B(1600)	LM(1)	LM(4)	χ^2 (14)
891.22(0.04)	45.11(0.08)	28.56(0.04)	100.34(0.00)

Notes: L-B is the multivariate version of the Ljung-Box test for autocorrelation based on the estimated auto- and cross- correlations of the first [T/4=60] lags distributed as a χ^2 with 1600 degrees of freedom. LM(1) and LM(4) are the tests for first- and fourth-order autocorrelation distributed as χ^2 with 36 degrees of freedom and χ^2 is a normality test which is a multivariate version of the Shenton-Bowman (1977) test modified in Doornik and Hansen (1994). Numbers in parentheses refer to marginal significance levels.

Table 3. Testing the Rank of the I(2) and the I(1) Model

Testing the joint hypothesis $H(s_1 \cap r)$

Indonesian Rupiah - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	1152.9 *441.5*	942.4 *397.4*	795.0 *356.5*	676.4 *317.9*	576.8 *283.3*	489.4 *252.3*	425.1 *225.6*	368.3 *202.2*	350.6 *182.6*
7	1		895.4 *351.6*	725.7 *311.2*	586.8 *274.0*	469.9 *241.2*	378.2 *211.6*	309.2 *186.1*	252.1 *164.6*	239.5 *146.8*
6	2			691.8 *269.2*	528.1 *233.8*	401.9 *202.8*	304.1 *174.9*	219.3 *151.3*	156.2 *130.9*	146.7 *115.4*
5	3				504.2 *198.2*	362.75 *167.9*	253.0 *142.2*	169.3 *119.8*	103.5 *101.5*	89.2 *87.2*
4	4					322.4 *137.0*	209.5 *113.0*	125.8 *92.2*	78.2 *75.3*	68.6 *62.8*
3	5						204.9 *86.7*	107.7 *68.2*	57.3 *53.2*	45.6 *42.7*
2	6							99.3 *47.6*	39.6 *34.4*	26.0 *25.4*
1	7								45.1 *19.9*	14.4 *12.5*
s_2		8	7	6	5	4	3	2	1	

Korean Won - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	989.4 *441.5*	813.5 *397.4*	688.3 *356.5*	566.7 *317.9*	471.8 *283.3*	392.7 *252.3*	334.7 *225.6*	284.2 *202.2*	265.4 *182.6*
7	1		710.6 *351.6*	564.2 *311.2*	445.4 *274.0*	362.9 *241.2*	285.0 *211.6*	231.1 *186.1*	194.2 *164.6*	177.3 *146.8*
6	2			519.1 *269.2*	401.4 *233.8*	313.0 *202.8*	241.8 *174.9*	193.7 *151.3*	148.1 *130.9*	124.7 *115.4*
5	3				345.9 *198.2*	237.5 *167.9*	166.0 *142.2*	127.5 *119.8*	104.1 *101.5*	95.3 *87.2*
4	4					206.2 *137.0*	116.3 *113.0*	99.1 *92.2*	85.8 *75.3*	68.2 *62.8*
3	5						128.5 *86.7*	73.5 *68.2*	62.4 *53.2*	55.0 *42.7*
2	6							89.2 *47.6*	41.3 *34.4*	28.0 *25.4*
1	7								28.7 *19.9*	15.4 *12.5*
s_2		8	7	6	5	4	3	2	1	

Testing the joint hypothesis $H(s_1 \cap r)$

Malaysian Ringgit - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	953.6 *441.5*	834.1 *397.4*	766.4 *356.5*	622.1 *317.9*	569.7 *283.3*	495.9 *252.3*	423.2 *225.6*	363.2 *202.2*	352.0 *182.6*
7	1		803.2 *351.6*	719.3 *311.2*	577.1 *274.0*	449.7 *241.2*	365.5 *211.6*	306.3 *186.1*	255.0 *164.6*	244.5 *146.8*
6	2			683.1 *269.2*	505.3 *233.8*	399.7 *202.8*	308.3 *174.9*	222.4 *151.3*	153.8 *130.9*	144.2 *115.4*
5	3				476.5 *198.2*	362.7 *167.9*	246.5 *142.2*	158.7 *119.8*	103.9 *101.5*	99.2 *87.2*
4	4					302.3 *137.0*	207.9 *113.0*	119.0 *92.2*	80.6 *75.3*	68.6 *62.8*
3	5						199.7 *86.7*	107.4 *68.2*	57.3 *53.2*	50.6 *42.7*
2	6							95.2 *47.6*	37.8 *34.4*	27.5 *25.4*
1	7								43.2 *19.9*	17.5 *12.5*
s_2		8	7	6	5	4	3	2	1	

Philippines Peso - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	1015.6 *441.5*	855.2 *397.4*	705.8 *356.5*	598.3 *317.9*	464.3 *283.3*	386.3 *252.3*	328.2 *225.6*	277.9 *202.2*	233.9 *182.6*
7	1		698.7 *351.6*	555.5 *311.2*	438.6 *274.0*	354.5 *241.2*	285.0 *211.6*	218.1 *186.1*	178.8 *164.6*	156.1 *146.8*
6	2			501.2 *269.2*	397.2 *233.8*	305.0 *202.8*	234.2 *174.9*	183.8 *151.3*	143.2 *130.9*	127.6 *115.4*
5	3				333.1 *198.2*	230.4 *167.9*	163.5 *142.2*	125.8 *119.8*	105.5 *101.5*	92.1 *87.2*
4	4					199.2 *137.0*	119.2 *113.0*	98.5 *92.2*	79.8 *75.3*	66.1 *62.8*
3	5						122.4 *86.7*	77.8 *68.2*	61.5 *53.2*	55.0 *42.7*
2	6							78.4 *47.6*	44.2 *34.4*	28.0 *25.4*
1	7								23.3 *19.9*	15.8 *12.5*
s_2		8	7	6	5	4	3	2	1	

Testing the joint hypothesis $H(s_1 \cap r)$

Singapore Dollar - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	1003.4 *441.5*	833.5 *397.4*	777.6 *356.5*	667.9 *317.9*	588.7 *283.3*	476.0 *252.3*	411.1 *225.6*	349.8 *202.2*	300.6 *182.6*
7	1		800.1 *351.6*	713.6 *311.2*	544.2 *274.0*	433.5 *241.2*	303.7 *211.6*	288.0 *186.1*	245.6 *164.6*	200.2 *146.8*
6	2			650.3 *269.2*	511.1 *233.8*	388.6 *202.8*	255.7 *174.9*	200.2 *151.3*	152.1 *130.9*	135.4 *115.4*
5	3				478.3 *198.2*	333.9 *167.9*	253.0 *142.2*	150.6 *119.8*	105.9 *101.5*	99.0 *87.2*
4	4					298.4 *137.0*	188.6 *113.0*	115.7 *92.2*	82.3 *75.3*	65.5 *62.8*
3	5						156.2 *86.7*	90.2 *68.2*	67.1 *53.2*	50.6 *42.7*
2	6							90.0 *47.6*	40.3 *34.4*	29.2 *25.4*
1	7								32.3 *19.9*	20.1 *12.5*
s_2		8	7	6	5	4	3	2	1	

Testing the joint hypothesis $H(s_1 \cap r)$

Thailand Baht - Dollar

p-r	r	$Q(s_1 \cap r / H_0)$								Q_r
8	0	996.0 *441.5*	899.1 *397.4*	777.6 *356.5*	687.9 *317.9*	548.5 *283.3*	433.6 *252.3*	398.1 *225.6*	335.1 *202.2*	290.2 *182.6*
7	1		811.1 *351.6*	712.5 *311.2*	590.4 *274.0*	450.6 *241.2*	370.8 *211.6*	302.2 *186.1*	250.7 *164.6*	220.4 *146.8*
6	2			605.4 *269.2*	510.5 *233.8*	387.4 *202.8*	288.6 *174.9*	212.9 *151.3*	170.1 *130.9*	133.2 *115.4*
5	3				440.2 *198.2*	315.6 *167.9*	283.2 *142.2*	157.8 *119.8*	106.3 *101.5*	98.3 *87.2*
4	4					288.3 *137.0*	203.5 *113.0*	111.4 *92.2*	93.2 *75.3*	74.2 *62.8*
3	5						167.2 *86.7*	90.4 *68.2*	58.8 *53.2*	61.5 *42.7*
2	6							77.3 *47.6*	44.5 *34.4*	36.4 *25.4*
1	7								33.6 *19.9*	20.2 *12.5*
s_2		8	7	6	5	4	3	2	1	

Notes: *p* is the number of variables, *r* is the rank of the cointegration space, s_1 is the number of *I*(1) components and s_2 is the number of *I*(2) components. The numbers in italics are the 95% critical values (Rahbek, *et al*., 1999, Table 1). For all tests a structure of three lags for each forecasting equation was chosen according to a likelihood ratio test, corrected for the degrees of freedom (Sims, 1980) and the Ljung-Box Q statistic for detecting serial correlation in the residuals of the equations of the VAR. A model with an unrestricted constant in the VAR equation and a deterministic trend restricted in the cointegrating vector is estimated for all cases according to the Johansen (1992) testing methodology.

Table 4. First Difference Models: Marginal Significance Level of F-statistics

Country	Unanticipated Official exchange rate	Anticipated Official exchange rate
Indonesia	0.0198	0.0104
Korea	0.0221	0.0126
Malaysia	0.0155	0.0143
Philippines	0.0177	0.0115
Singapore	0.0194	0.0188
Thailand	0.0185	0.0112

Note: Each of the reported marginal significance levels is calculated from a black market premium equation estimated with a lag length of 12 months.

Indonesian Rupiah – U.S. Dollar

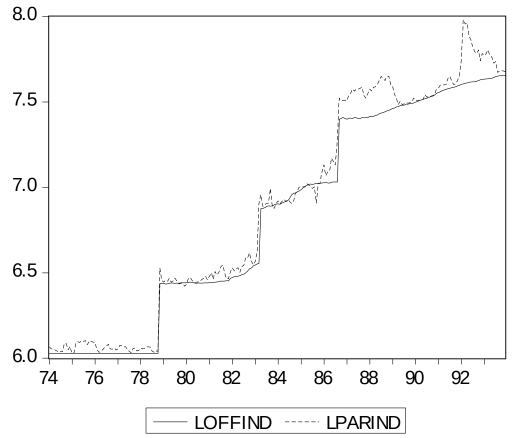

Figure 1(a). The official and black market exchange rates

Korean Won – U.S. Dollar

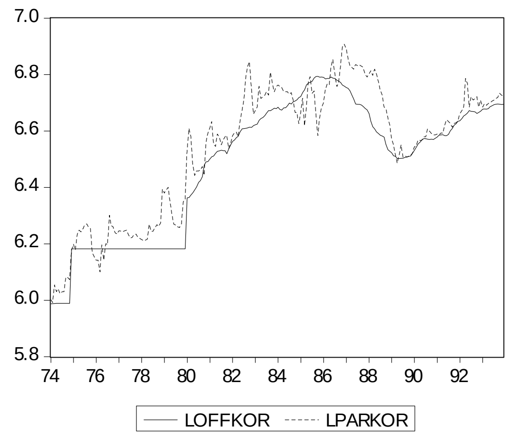

Figure 1(b). The official and black market rates

Malaysian Ringgit – U.S. Dollar

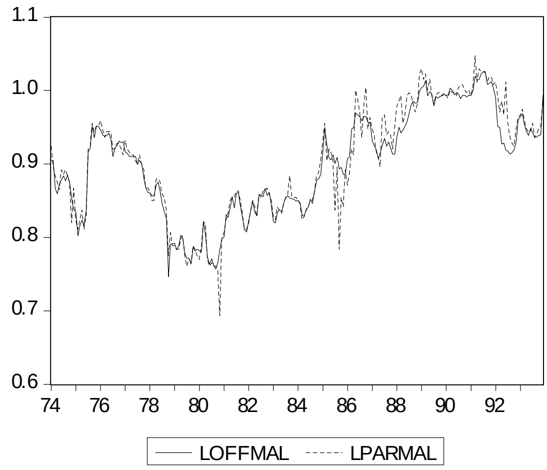

Figure 1(c). The official and black market exchange rates

Philippines Peso – U.S. Dollar

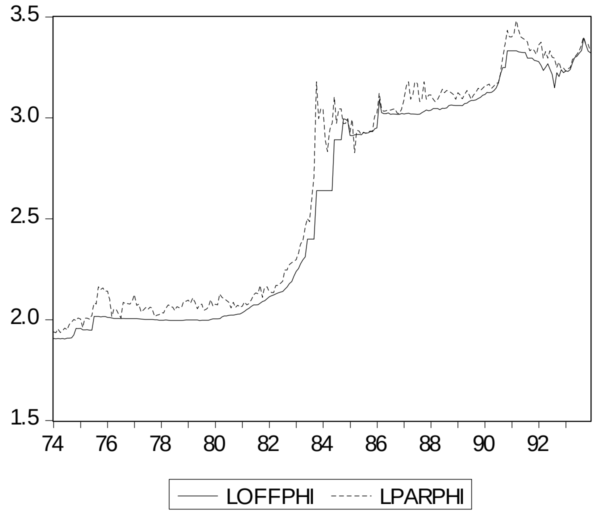

Figure 1(d). The official and black market exchange rates

Singapore Dollar – U.S. Dollar

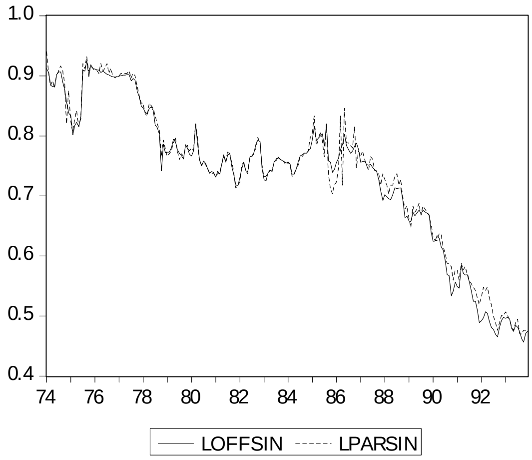

Figure 1(e). The official and black market exchange rates

Thailand Baht – U.S. Dollar

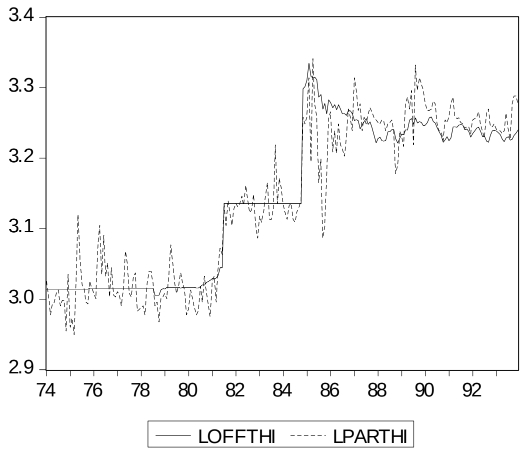

Figure 1(g). The official and black exchange rates

Indonesian Rupiah – U.S. Dollar

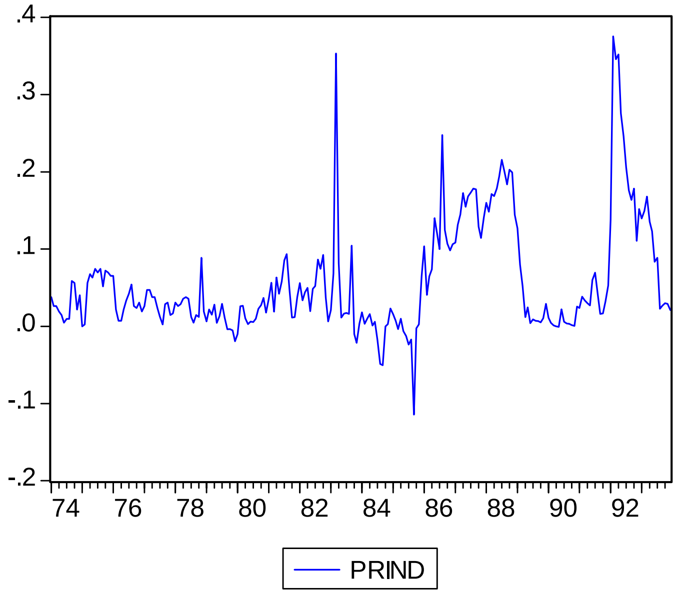

Figure 2(a). The black market premium

Korean Won – U.S. Dollar

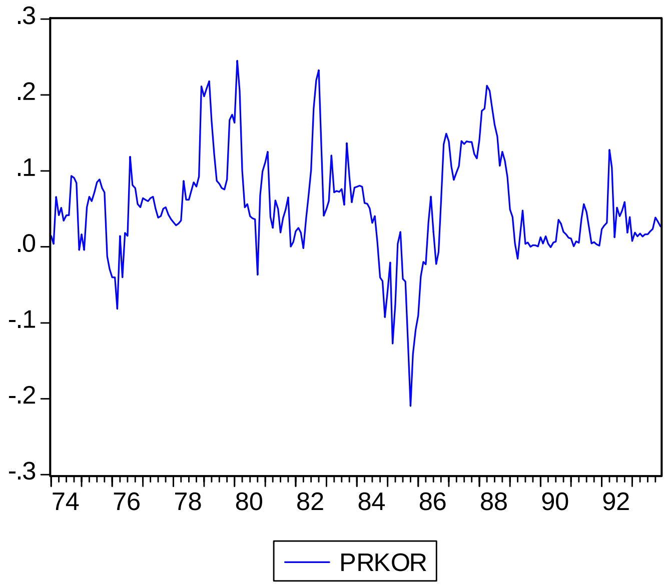

Figure 2(b). The black market premium

Malaysian Ringgit – U.S. Dollar

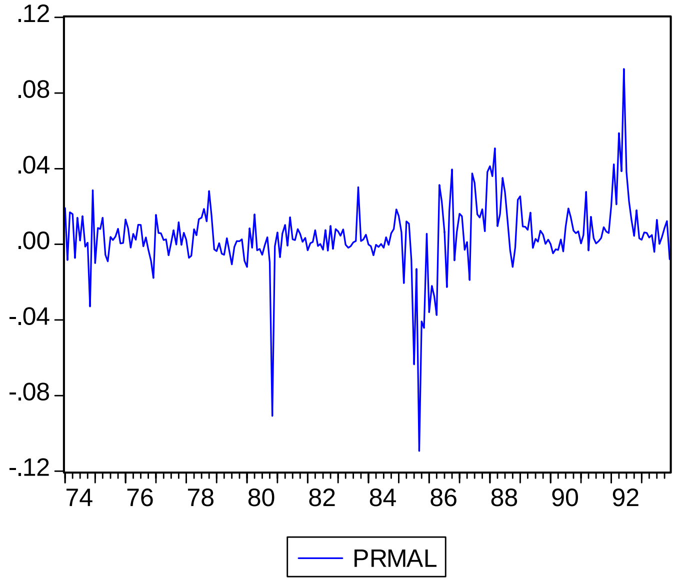

Figure 2(c). The black market premium

Philippines Peso – U.S. Dollar

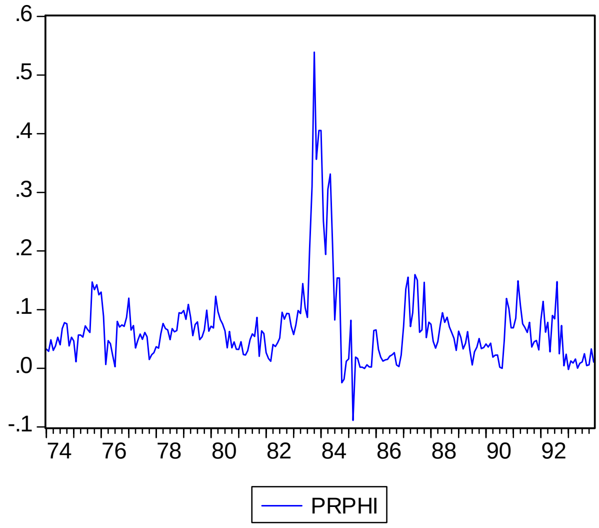

Figure 2(d). The black market premium

Singapore Dollar – U.S. Dollar

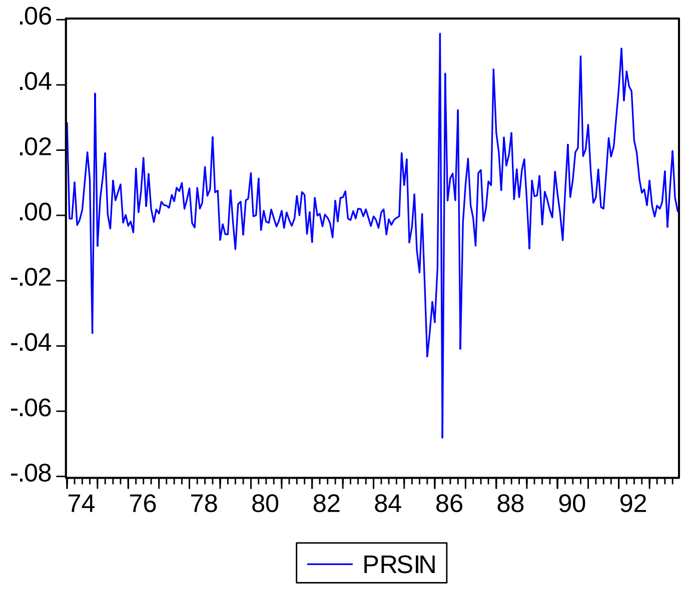

Figure 2(e). The black market premium

Thailand Baht – U.S. Dollar

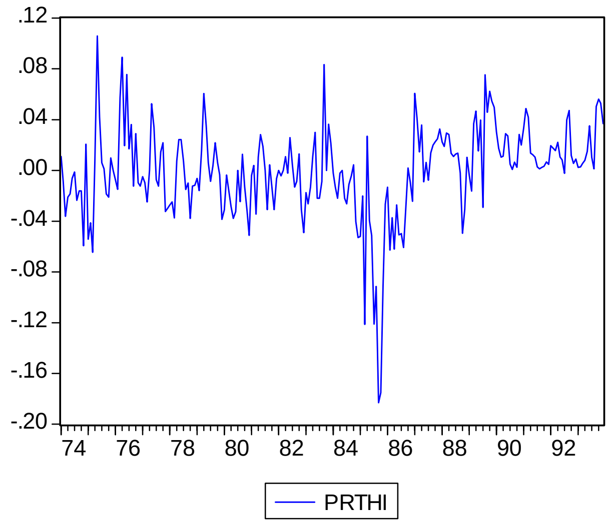

Figure 2(g). The black market premium