E C O N O M I C S   B U L L E T I N

Could Changes in Black Market Exchange Rates be Expansionary in LDCs?

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Abstract

Many of the previous studies that tried to assess the contractionay or expansionary effects of depreciations or devaluations in less developed countries (LDCs) used official exchange rate data and concluded that devaluations are contractionary in LDCs. However, due to capital controls, there is a black market for foreign exchange in many of the LDCs. In this paper when we use black market rates over the period 1975-1998 from 29 LDCs in a panel model, we find that devaluations are expansionary. Thus, for an effective exchange rate policy the official and black market exchange rates should be unified.

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I. Introduction

An important policy to gain international competitiveness in many less developed countries (LDCs) is said to be devaluation of their currency. Indeed, sometimes the International Monetary Fund considers the policy as a pre-condition for extending loans to these countries. By making exports cheaper in terms of foreign currency, we would expect devaluation or depreciation to stimulate exports. Furthermore, since devaluation also makes imports expensive in terms of domestic currency, we expect some substitution of domestic goods for imports. All in all, the aggregate demand is expected to increase, helping domestic economic activity to also increase. However, devaluation or depreciation has a side effect. Since it is inflationary, we would expect an increase in the cost of imported inputs, which in turn, contributes to the cost of production. This increased cost, in turn, decreases aggregate supply. Therefore, the ultimate impact on domestic production will depend on the extent of changes in both aggregate demand and aggregate supply. If aggregate supply declines more than the expansion in the aggregate demand, devaluation is said to be contractionary.

Bahmani-Oskooee and Miteza (2003) who provide a comprehensive review of the theoretical and empirical studies conclude that in most LDCs devaluations are contractionary. Empirical studies reviewed by Bahmani-Oskooee and Miteza (2003) all employed official exchange rate data in their analysis. However, due to restrictions on capital flows there exist black markets for foreign currencies in many less developed countries. Since black market exchange rates are perceived to be good proxies for floating rates, we suspect that they may have a favorable effect on domestic output. Indeed, Bahmani-Oskooee (1993) in the case of Iran, Luintel (2000) in the case of Asia, and Nagayasu (2002) in the case of Africa have shown that Purchasing Power Parity is supported relatively more often when black market exchange rates are used. Furthermore, Bahmani-Oskooee and Tanku (2007) have shown that speed of adjustment between changes in the exchange rate and relative prices is faster when the black market rate is considered as compared to the official exchange rate. This implies that changes in foreign prices are transmitted to changes in domestic prices relatively more through the adjustment in the black market exchange rates as compared to official rates. The same will be true if we consider changes in the prices of imported inputs, implying that contractionary or expansionary effects of movements in the black market exchange rates will be more pronounced than those of the official rates. Thus, it is the main purpose of this paper to assess the effects on domestic output of changes in the black market rates. To this end, we introduce the model and the method in section II and report the empirical results in section III. Section IV provides our concluding remarks. Data definitions and sources are cited in an appendix.

II. The Model and Methodology[1]

Previous research that tried to assess the contractionary effects of devaluation or depreciation on output included three policy variables that are said to be the most important tools in affecting domestic output. These policy variables are E, denoting the exchange rate; M, a measure of monetary policy, and G, a measure of fiscal policy. Thus, following Edwards (1986) and Bahmani-Oskooee and Miteza (2006) we specify our model by the following equation:

$$LogY_{it} = \alpha + \beta LogE_{it} + \delta LogM_{it} + \lambda LogG_{it} + \varepsilon_{it} \qquad (1)$$

where all right-hand side variables are defined above. The left-hand side variable *Y* is a measure of real GDP and ε is an error term. If expansionary monetary or fiscal policies are to have positive effects on output in the long run, estimates of δ and λ should be positive. Furthermore, as the appendix shows, E is defined as the number of units of country i's currency per unit of the U.S. dollar. Thus, if an increase in E or a depreciation of domestic currency is to be expansionary, an estimate of β should be positive. For contractionary devaluations, therefore, we would expect an estimate of β to be negative.

The next question is how to estimate the model outlined by (1). Since the real GDP data comes only annually, the most efficient estimate of (1) would be the one that uses many observations. Since this is not possible at individual country level, we adhere to panel data that pools data across as many countries as possible, and over time. However, before we estimate (1) by any panel estimation technique, we must establish that the variables in (1) are

[1] The methodology in this paper closely follows that of Bahmani-Oskooee et al. (2002).

indeed cointegrated. The common practice here is to rely upon Engle-Granger (1987) concept of cointegration and show that variables in (1) are individually integrated of order one, I(1), but the residuals in (1) as a proxy for a linear combination of all variables are integrated of order zero or I(0). The main difference is that the integrated properties of variables and the residuals must be established within a panel framework.

A few panel unit-root tests that have been introduced in the literature are based on the standard ADF test, with some modifications that account for heterogeneity in the panel data. In this paper we rely upon the one by Im, Pesaran, and Shin (2003) which allows for heterogeneity in intercepts as well as in the slope coefficients. For a variable Z, the Im, Pesaran, and Shin (IPS) test is based on the following equation:

$$\Delta Z_{it} = \mu_i + \beta_i Z_{i,t-1} + \sum_{k=1}^{n} \theta_{i,k} \Delta Z_{i,t-k} + \gamma_i t + \varepsilon_{i,t} \qquad (2)$$

where i = 1, 2, …,N and t = 1,2,…,T. The null hypothesis of $\beta_i = 0$, for all i's is tested against the alternative hypothesis of $\beta_i < 0$. The Im, Pesaran, and Shin statistic is, in principle, an average of the individual ADF statistics computed as:

$$\bar{t} = \frac{1}{N} \sum_{i=1}^{N} \frac{\hat{\beta}_i}{\hat{\sigma}_{\hat{\beta}_i}} \qquad (3)$$

In a further step, the above t-bar statistic is standardized so that it converges to a standard normal distribution as N grows very large.

While the above test is applied for each variable, the one applied to the residuals of (1) to test for cointegration requires additional modifications. Here we follow Pedroni (1995, 1997, 1999) who has constructed a framework that allows testing for cointegration of homogeneous and heterogeneous panels with *multiple* regressors. These modifications are not repeated here but explained intuitively in Bahmani-Oskooee et al. (2002), and technically in Bahmani-Oskooee and Miteza (2006). The two tests that are applied to the residuals of (1) to establish cointegration are called Panel-ADF and Group-ADF statistics.

III. Empirical Results

Since our intension is to determine whether changes in the black market exchange rates have expansionary or contractionary effects on domestic output, we restrict ourselves to a period of analysis for which all variables are readily available. In our empirical analysis we use annual observations for 29 developing countries over the period 1975-1998 where data for the black market exchange rates were available. The list of countries includes: Chile, Costa Rica, Cyprus, Dominican Republic, Ecuador, Egypt, El Salvador, Ghana, India, Indonesia, Iran, Israel, Jordan, Kenya, Korea, Kuwait, Malaysia, Morocco, Nepal, Nigeria, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Uruguay, Venezuela, Zambia, and Zimbabwe. Note that we assess the impact of both nominal black market rate (NBLR) as well as the real black market exchange rate (RBLR) on output.

We first report the results of the panel unit roots for each variable in Table 1.

Table 1 goes here

It is clear from Table 1 that the calculated statistic for each variable and for each group is greater than the critical value of –1.96 from the standard t-table in most cases, indicating that the null hypothesis of non-stationarity cannot be rejected. Therefore, we assume all variables to contain a unit root and move on to cointegration tests. Next, we calculate the Panel-ADF and Group-ADF statistics for cointegration among the variables of equation (1) and report the results in Table 2.

Table 2 goes about here

No matter which case and which exchange rate we consider, the calculated ADF statistic is much less than the critical value of –1.96 form the standard t-table, indicating that the null of non-stationary residuals in equation (1) is rejected or all variables are cointegrated. Now that we have established the fact that variables have a long-run relationship the last step is to estimate the models. To engage in some sensitivity analysis, we estimate the models using four different techniques. First, we apply OLS to the panel data and label this initial step as Case 1. Next, we assume each cross-sectional unit and each time period are characterized by their own special intercept (Kmenta, 1986, page 630) and include country dummy variables. We label this case as Case 2. In Case 3, we assume that residuals within each time period are correlated and estimate a so-called random-effect model by GLS or by Maximum Likelihood Estimation (Case 4). The results for each case using the nominal black market exchange rate first and then the real black market exchange rate are reported in Table 3.

Table 3 goes here

From the results we gather that in most cases nominal or real depreciation is expansionary since the Ln E variable carries a positive and highly significant coefficient. This finding using the black market exchange rate contradicts most of the previous research which used official exchange rates and concluded that currency depreciations in LDCs are contractionary. One major policy implication of our finding is that if developing countries are to benefit from devaluation or depreciation they should unify the two rates.

The results in Table 3 also reveal that monetary policy is very effective in stimulating domestic output in the long run. However, fiscal policy seems to have an adverse effect on output in the long run since Ln G carries negative coefficients in most models. This could be due to a crowding-out effect of increased government spending, or the fact that limited governments are more conducive to economic growth.

IV. Summary and Conclusion

Regardless of the estimation technique, the majority of studies related to less developed countries (LDCs) have concluded that indeed, devaluations are contractionary in LDCs. They have arrived at such a conclusion by using the official exchange rate data. However, due to restrictions on capital flows in most less developed countries, there is a black market for foreign exchange in most of them. Our conjecture in this paper is that since the black market rates are proxies for equilibrium exchange rates that are based on market forces, using these black market rates may yield a different outcome than previous research.

Therefore, in this paper we use a reduced-form model that has been used by previous research and replace the official exchange rate by the black market rate from 29 developing countries for which data for all variables were available. The list of countries includes: Chile, Costa Rica, Cyprus, Dominican Republic, Ecuador, Egypt, El Salvador, Ghana, India, Indonesia, Iran, Israel, Jordan, Kenya, Korea, Kuwait, Malaysia, Morocco, Nepal, Nigeria, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Uruguay, Venezuela, Zambia, and Zimbabwe. Annual data over the period 1975-1998 from all 29 countries are pooled together to estimate panel models using panel cointegration and four different panel estimation techniques. In six out of eight models estimated the results showed that indeed nominal or real depreciation of the black market exchange rate is expansionary in LDCs. A policy recommendation of our finding is that for effective exchange rate policy, developing countries should unify the two exchange rates.

APENDIX

All data are annual over the period 1975-1998 and collected from the following two sources.

a. International Financial Statistics of the IMF.

b. World Currency Year Book, different issues.

Variables:

Y = Real GDP. To make it unit-free and homogenous across countries, for each country it is expressed in index form with base year at 1998. Data come from source a.

M = Real money supply. M2 monetary figure is deflated by GDP deflator (or CPI in its absence) to arrive at M. It is then set in index form. All data come from source a.

G = Real government spending. Nominal figures are deflated by a price index (GDP deflator or CPI) to arrive at real figures. The real figures are then set in index form to make data homogenous across countries.

E = Black market exchange rate. For each country it is defined as number of units of that countries currency per US dollar. These rates that come from source b are also set in index form. The real black market rate is defined as (Pus.E/Pi) where Pi is the price level in country i and Pus is the price level in the US. This rate is also set in index form.

REFERENCES

Bahmani-Oskooee, M. 1993. "Black Market Exchange rates versus Official Exchange Rates in Testing Purchasing Power Parity: An Examination of Iranian Rial." *Applied Economics*, Vol. 25, 465-72.

Bahmani-Oskooee, M. and Miteza, I., 2003. Are devaluations expansionary or contractionary: A survey article. *Economic Issues,* Vol. 8, pp. 1-28.

Bahmani-Oskooee, M. and I. Miteza, 2006. "Are Devaluations Contractionary? Evidence from Panel Cointegration" *Economic Issues*, Vol. 10, pp. 49-64.

Bahmani-Oskooee, M. and A. Tanku, "Black Market Exchange Rate vs. Official Rate in Testing the PPP: Which Rate Fosters the Adjustment Process", *Economics Letters,* forthcoming.

Bahmani-Oskooee, M.; I. Miteza and ABM Nasir, 2002. The long-run relation between black market and official exchange rates: evidence from panel cointegration. *Economics Letters,* Vol. 76, pp. 397-404.

Edwards, S., 1986. Are Devaluations Contractionary? *The Review of Economics and Statistics*, Vol. 68, pp. 501-508.

Engle, R. F. and Granger, C. W. J., 1987. "Cointegration, Error Correction: Representation, Estimation, and Testing," *Econometrica*, Vol. 55, 1987, pp. 251-276.

Im, K.S., Pesaran, M.H. and Shin, Y., 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics,* Vol. 115, pp. 53-74.

Kmenta, Jan., 1986, Elements of Econometrics, Macmillan Publishing Company, New York.

Luintel, K. B. 2000. "Real Exchange Rate Behavior: Evidence from Black Markets." *Journal of Applied Econometrics*, Vol. 15, 161-185.

Nagayasu, J. 2002. "Does the Long Run PPP Hypothesis Hold for Africa? Evidence from a Panel Cointegration Study." *Bulletin of Economic Research*, Vol. 54, pp. 181-87.

Pedroni, P., 1995. Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Indiana University Working Paper Number 95-013.

Pedroni, P., 1997. Panel cointegration: asymptotic and finite sample properties of pooled time series with an application to the PPP hypothesis: new results. Working paper, Indiana University.

Pedroni, P., 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*, Vol. 61, pp. 653-70.

Table 1: Panel Unit Root Test Results (IPS Statistic).

Variable				
LogY	LogNBLR	LogRBLR	LogM	LogG
(no trend, no time dummies)				
5.16	6.13	-2.84	-2.17	-2.54
(with heterogeneous trend, no time dummies)				
-0.89	-0.44	-1.43	-10.06	-6.39
(with heterogeneous trend and time dummies)				
-2.13	1.92	-0.74	-5.05	-3.85

Table 2: Panel Cointegration Test Results

	Using the Nominal Black Market Rate	Using the Real Black Market Rate
Panel ADF Stat. (Heterogeneous Case)	-4.06	-5.56
Group ADF Stat. (Heterogeneous Case)	-26.87	-19.01

Note: Both Panel ADF tests have been computed for the case of heterogeneous deterministic trends

Table 3: Estimates of Cointegrating Vectors Normalized on Output.

	Coefficient Estimates of			
	Ln E	Ln M	Ln G	Adj. R^2
Models with Nominal BLR				
Case 1	-0.02 (2.87)	0.16 (5.43)	0.07 (1.93)	0.23
Case 2	0.11 (15.2)	0.35 (11.8)	-0.10 (2.57)	0.16
Case 3	0.10 (14.3)	0.36 (11.3)	-0.08 (2.07)	0.17
Case 4	0.10 (14.8)	0.34 (11.6)	-0.09 (2.33)	-
Model with Real BLR				
Case 1	-0.06 (1.52)	0.19 (6.03)	0.03 (0.84)	0.22
Case 2	0.13 (3.57)	0.37 (10.3)	-0.12 (2.70)	0.19
Case 3	0.12 (3.22)	0.34 (9.93)	-0.10 (2.29)	0.19
Case 4	0.12 (3.35)	0.35 (10.1)	-0.10 (2.42))	-

Note: Numbers inside the parentheses are the absolute values of the t-ratio.