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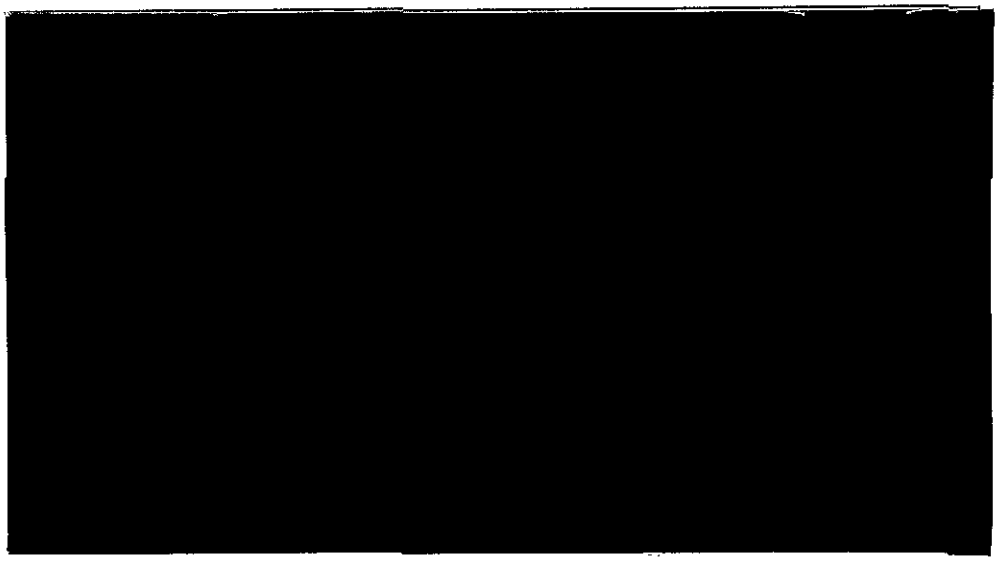

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"IS THE CURRENT FOREIGN EXCHANGE REGIME IN JAMAICA OPTIMAL?"

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Abstract

The paper employs the exchange market pressure model to identify an appropriate foreign exchange regime for Jamaica, a small open economy, over the course of the different political regimes. The empirical findings suggest that increase in world prices and domestic credit results in the appreciation of the Jamaican dollar, and inflow of international reserves, while increases in national income and inflation result in depreciation of the Jamaican dollar, and outflow of international reserves. The estimates of the exchange market pressure indicate that it is indeed sensitive to its composition, as the monetary authorities cannot determine the desired exchange rate target with it. This means that in Jamaica, the monetary authorities do discriminate between international reserves and exchange rate in absorbing exchange market pressure, and they do it by accumulating international reserves. Features which are akin to optimal fixed exchange rate, as domestic residents do consider domestic assets and foreign assets to be different.

JEL: F31, F41

Keywords: Exchange market pressure, and Optimal foreign exchange regime.

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INTRODUCTION

Jamaica is a small open economy that can hardly influence the mobility of international capital, and takes as given the world price for its imports and exports of goods and services. The country's degree of openness which is measured by the ratio of imports/Gross Domestic Product (GDP) averages around 60% from 1962 to 1998, and was 58% in 1998. Thus, the balance of payments (BOPs) and exchange rate tend to have an important effect on the country's attempt to achieve and maintain monetary equilibrium.

The Jamaican dollar (J$) has not been fixed in its history. Under the Bretton Woods system, when the exchange rates of most member countries of the International Monetary Fund (IMF) were pegged to the United States dollar (US$), the J$ was linked to the pound sterling. However, after the collapse of the Bretton Woods system in 1973 when the US$ was floated, the J$ was de-linked from the pound sterling and linked to the US$.

In 1972, the exchange rate was devalued by 6.5 per cent to correct imbalance in the BOPs. Between the decade 1973 to 1983, Jamaica moved from exchange controls in 1973, dual exchange rate in 1977, crawling peg (mini devaluation) in 1978, and parallel market in 1983. The exchange rate band was removed in 1984 to permit market forces to determine the exchange rate; in 1991, the exchange rate was floated when the foreign exchange market (FEM) was liberalized with Cambio dealers assuming the same role as banks. Thus, considering that the country has neither strictly adopted flexible nor fixed exchange rate relative to the US dollar which is our reference asset, we shall seek to examine empirically whether the accumulation of net international reserves and/or exchange rate fluctuations have been bearing the brunt of the current 'manage' or 'dirty' float. Note that during these periods, the economy underwent different political regimes from post-colonialism in 1960s, leaning towards socialism in 1970s, and laissez-faire in 1980s and 1990s.

Countries which are described as small and open, although bigger in absolute size than Jamaica, have employed the exchange market pressure (EMP) model which was pioneered by Girton and Roper (1977) for a Canadian study to examine how their countries react to external imbalance. Among these studies are Connolly and da Silveira (1979) for Brazil, Modeste (1981) for Argentina, Kim (1985) for Korea, Thornton (1995) for Costa Rica, and Bahmani-Oskoee and Bernstein (1999) for the G7.

It is also the objective of this paper to examine the external imbalance of Jamaica over these years by estimating EMP, and measuring the degree to which the bank of Jamaica (BOJ) in the current global environment can pursue independent monetary policies with the tools of both open market operation and discounting policies.

Following the introduction, the EMP model is modified to suit the Jamaican economy in Section 2. The estimated results are discussed in Section 3. The paper is concluded with a summary and policy recommendation in Section 4.

2: THE EXCHANGE MARKET PRESSURE MODEL

The EMP model which synthesizes the monetary approach to the BOPs and exchange rate determination is derived from the money market equilibrium and purchasing power parity by considering the following equations:

Monetary equilibrium[1],

$$MS = RS + DC = MD = M(P, y, \pi, \epsilon),\ M_P, M_y \geq 0, \text{ and } M_\pi \leq 0 \qquad (1)$$

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[1]See Ghartey (1998) for a rigorous study on a stable money demand function for Jamaica with price and income which satisfy both exogeneity and homogeneity conditions for a narrow definition of the money supply (M1).

Purchasing power parity (PPP)[2],

$$XR = P/P^f \qquad (2)$$

where,

MS and MD are money supply (broad definition, M2) and demand, respectively

RS = Net holdings of international reserves by central bank and commercial banks in J$s

DC = Domestic credit from consolidated banking sector in J$s

P, (P^f) = Domestic (foreign) consumer price index

XR = Exchange rate (Jamaican dollar value of the US dollar)

π = Inflation rates

y = Real income (GDP is used as nominal income)

The superscript f denotes foreign or the rest of the world which is represented by the US. The use of π as a substitute for interest rate in a money demand function for Jamaica, a country without any hyperinflationary experience is justified by Ghartey (2000). All of the data are collected and compiled from the IMF *International Financial Statistical Yearbook* of various years.

By log-linearizing and differentiating equations (1) and (2), and substituting $\Delta p = \Delta xr + \Delta p^f$, we obtain the following general equation:

$$\Delta rs - \Delta xr = -\beta_1 \Delta dc + \beta_2 \Delta p^f + \beta_3 \Delta y - \beta_4 \Delta \pi + \epsilon, \qquad (3)$$

where small case letters represent the logarithmic form of the variables, Δ is the difference operator, and the parameters are non negative with β_1 being unity.

2See Ghartey (1997) for a more detail study on PPP in Jamaica.

From equation 3, we can infer that (i) an increase (decrease) in domestic credit due to either open market operations and/or discounting policy by the central bank, or inflation rate results in either an outflow (inflow) of international reserves and/or depreciation (appreciation) of the exchange rate, and (ii) an increase (decrease) in real income and/or world prices results in inflow (outflow) of international reserves and/or appreciation (depreciation) of the exchange rate.

To determine the independence of the central bank's interventions, we included a variable which captures its behaviour, $W = \Delta xr/\Delta rs$, as an independent variable in accordance with the recommendation of Girton and Roper (1977) in equation 3. In case of discontinuities in the definition of W, we shall adopt Connolly and da Silveira's (1979) variant of $W = (\Delta xr - 1)/(\Delta rs - 1)$. The ordinary least squares (OLS), and generalized method of moments (GMM) are used as estimators. An insignificant coefficient of W with the rest of the coefficients of the independent variables remaining unchanged indicates that the EMP is not responsive to its composition which means that the central bank does not discriminate whether it absorbs exchange market pressure in international reserves or exchange rate, and the converse will hold good if the coefficient of W is significant.

The sign on the coefficient of W which measures the monetary authorities (MA's) behaviour indicates whether the EMP is absorbed by rs or xr. A positive coefficient indicates that more of the pressure is absorbed by exchange rate depreciation relative to loss of international reserves, and a negative coefficient indicates that more pressure is absorbed by the loss of international reserves relative to exchange rate depreciation. When the latter occurs, a fixed exchange rate regime will be optimal, as it is efficient only when the central bank's interventions are not sterilized, whereas the occurrence of the former will imply that a flexible exchange rate

regime is optimal. See McCallum (1996).

The sensitivity of the EMP to its composition can also be tested by using one of its component as the subject and making the other an explanatory variable in the model. When the sensitivity of the EMP is tested, the inclusion of W as an explanatory variable is likely to introduce simultaneous bias problem, so adopting an appropriate estimator such as the GMM is necessary.

3. ESTIMATED RESULTS

The EMP model developed in equation (3) is estimated by the OLS and GMM methods over the years 1961.1-1998.4, 1961.1-1973.4, 1974.1-1996.4, 1980.1-1989.4, and 1990.1-1996.4. Additionally, versions of equation (3) are estimated by making one of the EMP variables a dependent variable with the other as an explanatory variable over the entire sample periods.

The empirical results are reported in Tables 1 and 2. The OLS results in Table 1 are very good as judged by the diagnostic tests, namely: the t-ratios in the square brackets, the coefficient of determination (R^2), the F-statistics and the Durbin-Watson (DW) statistics. Both Tables 1 and 2 report a positive coefficient for Δdc which is not consistent with the findings of most studies, and our a priori expectation. It indicates that an increase in domestic credit results in inflow (accumulation) of international reserves, and appreciation of the exchange rate.[3] However, the size of the coefficient is unity in most cases, which is in tune with the monetarist theory. Intuitively, this finding can be explained by the experience of Jamaica which is quite contrary to the countries examined under the previous studies. Inflow of remittances tends to increase the supplies of foreign currencies thereby causing the value of the J$ viz-a-viz foreign currencies to increase. The

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3 Bahmani-Oskooee and Berstein (1999) obtain similar results for Italy and US, although the t-ratios remain insignificant.

Table 1: The estimates of the EMP model.

Indep. vars.	I[a]	II[a]	III[a]	IV[a]	V[a]	VI[a]
Δdc	0.8545	0.5743	1.1140	0.7189	1.0928	1.1780
	[13.64]*	[10.44]*	[11.72]*	[5.31]*	[4.79]*	[12.18]*
Δy	-0.0942	1.3044	-0.1021	0.1273	-1.4985	0.0753
	[0.54]	[1.95]	[0.53]	[0.32]	[2.42]	[0.39]
$\Delta \pi$	-1.3059	0.5379	-1.4084	-1.2583	-1.7672	-1.5533
	[7.88]*	[0.66]	[7.82]*	[3.16]*	[3.18]*	[7.48]*
Δp^f	1.7080	-2.4899	1.4618	1.9036	1.7937	4.4050
	[2.91]*	[1.22]	[2.15]*	[2.26]*	[1.25]	[2.22]*
R^2	0.60	0.71	0.64	0.56	0.41	0.87
DW	1.66	2.16	1.73	1.69	1.71	1.92
F	73.07*	38.30*	57.16*	17.29*	10.08*	68.43*
n	143	47	96	40	40	32

Note: I = 1961.1 - 1998.4, II = 1961.1 - 1973.4, III = 1974.1 - 1998.4, IV = 1970.1 - 1979.4, V = 1980.1 - 1989.4, and VI = 1990.1 - 1998.4; R^2 is the adjusted coefficient of determination, DW is the Durbin-Watson test statistics and F is the F-statistics; n is the sample size after adjusting the endpoints. The *t*-ratios are reported in the square bracket. a and b denote OLS and GMM estimators, respectively. *, ** and *** denote 0.01, 0.05 and 0.10 significant levels, respectively.

Table 2: The estimates of the EMP model with MA's behaviour W included as an explanatory variable.

Indep. vars.	I[a]	II[a]	III[b]	IV[b]	V[b]	VI[b]
Δdc	0.6320	0.5486	0.6023	0.6154	1.1637	0.6580
	[23.23]*	[10.99]*	[4.51]*	[4.65]*	[2.03]*	[16.70]*
Δy	-0.0378	0.6353	0.0656	0.5657	-0.1607	-0.0348
	[0.53]	[1.01]	[0.41]	[3.29]*	[0.48]	[0.36]
$\Delta \pi$	-0.1121	0.3129	-0.0074	0.0966	-0.3283	0.0327
	[1.36]	[0.43]	[0.05]	[0.35]	[0.67]	[1.30]
Δp^f	0.8775	-0.8247	0.8652	0.3812	0.1222	0.1874
	[3.59]*	[0.43]	[4.12]*	[1.48]	[0.21]	[0.55]
W	-8.2402	-3.9543	-8.7999	-5.9461	-8.4612	-9.6853
	[26.07]*	[3.38]*	[23.33]*	[6.89]*	[16.33]*	[26.88]*
R^2	0.93	0.77	0.98	0.85	0.95	0.99
DW	2.12	2.37	1.81	2.36	1.99	1.46
F	492.25*	38.57*				
n	143	47	94	40	40	30

Note: The GMM is estimated with no pre whitening, and a band-width of four. The instrumental variables are Δp^f, Δy^f_{-1}, Δxr, Δp_{-1}, and Δdcr_{-1}. See also Table 1.

international reserves increase as the bank of Jamaica (BOJ) on behalf of the government purchase a high proportion of these foreign currencies, thereby causing domestic credit and hence money supply to increase.[4]

In 1961.1-1973.4, the period before the global float when the J$ was linked to the pound sterling, with the exception of Δdc, none of the remaining explanatory variables was significant, and the signs of the coefficients were different from the results obtained in the general estimates for the other periods. In general, we observe that an increase in real income and inflation tend to result in depreciation of the J$ and outflow or loss of international reserves, while an increase in world inflation results in the appreciation of the exchange rate and inflow of international reserves.

In Table 2, we estimated the EMP model by including the behavior of the MA which is captured by W. Girton and Roper's (1977) definition of W is employed because it is monotonic and does not have the discontinuities found in Connolly and da Silveira's (1979) study for Brazil. However, for the periods after the global float, namely: 1974.1-1998.4, 1970.1-1979.4, 1980.1-1989.4, and 1990.4-1998.4, because of attending simultaneous equation bias problem, we used the GMM estimator without pre whitening, with a band-width fixed at four, and Δp^f, Δy^f_{-1}, Δp_{-1}, Δxr and Δdc_{-1} as instrumental variables for those periods. The results generally reflect what was obtained in Table 1. In all the periods, the estimated coefficient of W is negative and significant at a 0.01 level, with the absolute size of the coefficient being greater than unity. The sign of W is consistent with the findings of Girton and Roper (1977) and the other studies cited earlier, except that they were insignificant in those studies. This means that the exchange market pressure

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4Bank of Jamaica requires banks and cambio dealers in the 1990s to satisfy a daily quota by making a minimum of 5 per cent of all daily purchases available for it.

is sensitive to its composition, and in this case, the MA absorb the pressure by reducing international reserves rather than allowing the exchange rate to depreciate.

To further buttress the findings, we estimated the equations by using Δrs and Δxr as dependent variables. The results of the Δrs indicate that only Δdc significantly augments international reserves with the remaining explanatory variables being insignificant. The results of the Δxr equation is as follows:

$$\Delta xr = -0.190[1.98]^{**}\Delta dc + 1.568[7.73]^{*}\Delta\pi - 0.067[0.36]\Delta y - 4.467[2.78]^{*}\Delta p^{f} \qquad (4)$$

$R^2 = 0.67$, DW = 1.97, F = 22.47*, n = 32, Period = 1990.1-1997.2.

The estimates in equation (4) are consistent with the results obtained for the remaining periods covered in the study. The t-ratios in the square bracket are significant, except that of the real income, although it has the right sign which is consistent with monetary theory. It indicates that growth in real income and world prices result in the appreciation of the exchange rate, and growth in national inflation causes depreciation of the exchange rate. A point of special interest is the finding that growth in domestic credit tends to result in the appreciation of exchange rate, a finding which appears to contradict a priori expectations. However, it is consistent with the Jamaican experience, and so it lends support to the general findings discussed above. Additionally, it can be explained by the fact that an increase in domestic credit is employed by the MA to finance acquisition of international reserves in a 'placebo-type' of sterilized intervention designed to prop up the value of the exchange rate and discourage or defeat the activities of speculators. However, to achieve this, the MA tend to overshoot the reverse 'repos' deliberately by selling proportionately more treasury securities than is required to soak up the excess liquidity in the

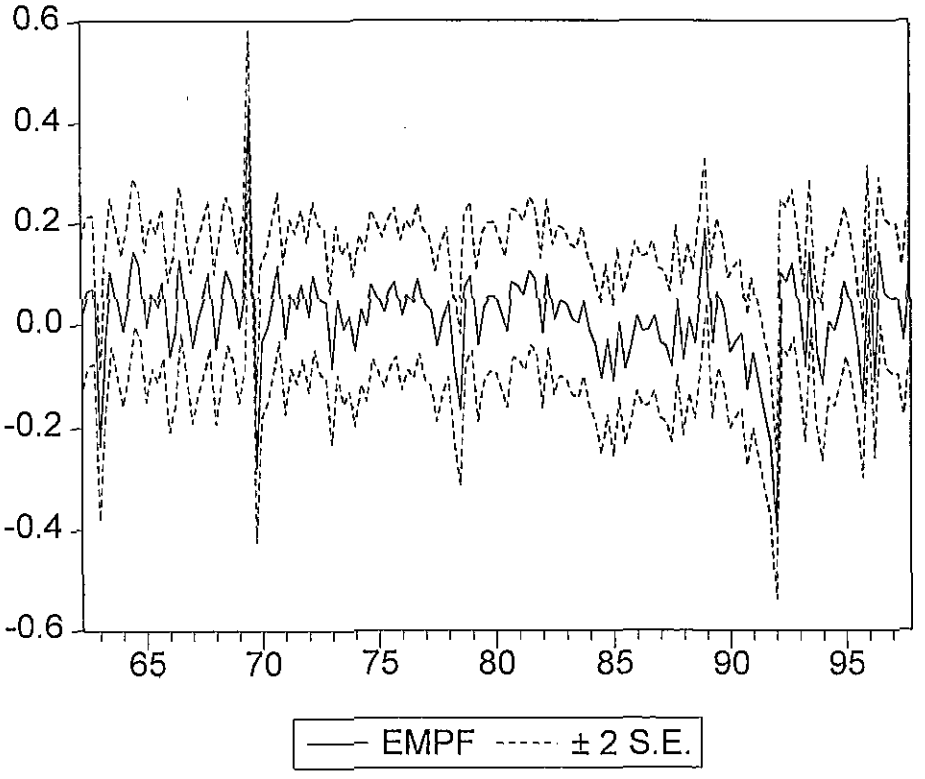

Figure 1: The forecast of the exchange market pressure.

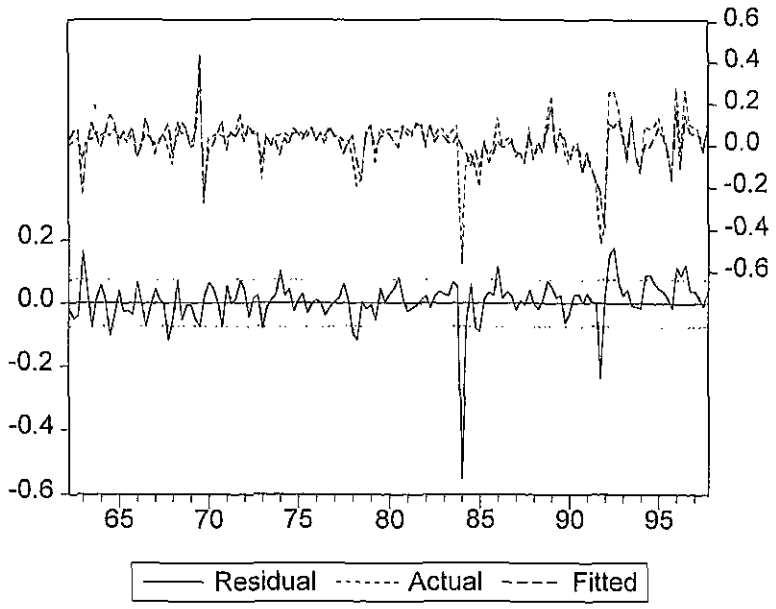

Figure 2: The actual and fitted values of the exchange market pressure.

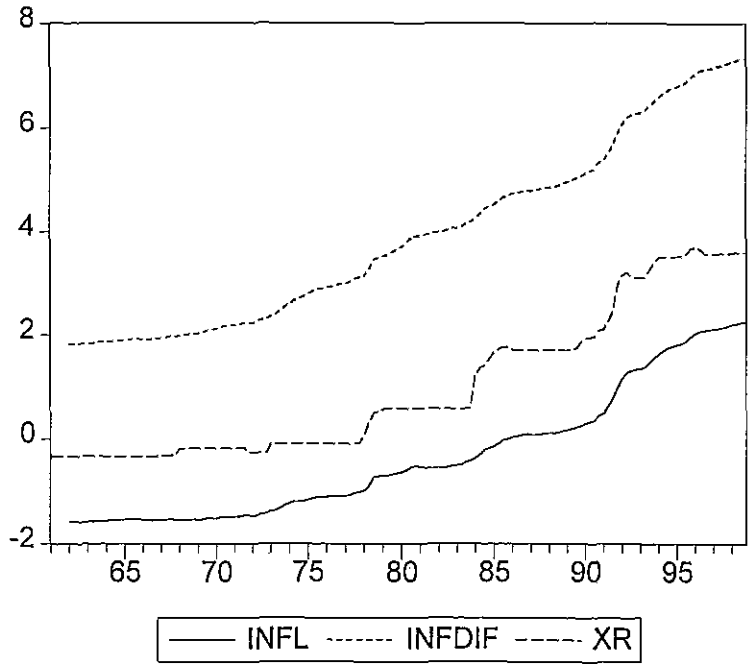

Figure 3: Purchasing power parity and inflationary differential in Jamaica.

economy, to the extent that the process results in further contraction of the money supply which cause the interest rate to rise and the exchange rate to appreciate. We should note, however, that a sterilized intervention under similar circumstances can still result in the appreciation of the exchange rate if foreign and domestic assets are not considered to be close substitutes.

The EMP forecast is reported in Figure 1. It is clear that there are spikes in the late 1960s and 1992. None the less, the forecast of the EMP over the entire sample period is very good as measured by the root mean square forecast error of 7 per cent.The fitted EMP captures the actual data positively and is reported in Figure 2. It is clear that the fits are very good. Purchasing power parity is captured by the exchange rate, relative prices and inflation rate differential as is seen in Figure 3.

4. CONCLUSIONS

The paper provides an answer to the question posed in the title. The MA's behaviour which is captured by W in the EMP model has a significant negative coefficient which means that they absorb exchange market pressure by losing or reducing international reserves, a feature which reflects an optimal fixed exchange rate regime, rather than allowing the exchange rate to depreciate which is what normally occurs under a flexible exchange rate regime.

The MA use domestic credit to buy international reserves, and when they are faced with exchange market pressure, they resort to reducing international reserves rather than allowing the exchange rate to depreciate. Additionally, their sterilized interventions initiated by selling treasury securities to mob up the residual excess liquidity is either overhot to penalize speculators or does not affect the public's perception that domestic assets and foreign assets are not close substitutes, thereby causing the exchange rate to appreciate. This makes the existing monetary policy to

maintain the manage float regime sub-optimal. A fixed exchange rate regime will be optimal for a small open economy like Jamaica, as it is effective under non sterilized interventions, and will provide the MA the requisite discipline for managing monetary policy; it will also ensure that monetary policy is conducted according to rule, and will provide the disciplinary environment needed to fight inflation, maintain fiscal discipline and balance budget, reduce uncertainties about exchange rate, and foster a sound economic growth.

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