CURRENCY SUBSTITUTION: EVIDENCE FROM INDONESIA

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Abstract

Currency substitution occurs as domestic money (both currency and deposits) is replaced by foreign money in the portfolio of local residents. It can directly reduce the demand for domestic currency, or does so indirectly by increasing the velocity of domestic money's circulation. This study aims to investigate currency substitution in Indonesia. Estimates of the cointegrating relations are obtained using Johansen's multivariate procedure for the period January 2001 to May 2009. The empirical result shows that there is no currency substitution in fact happened in Rupiahs.

1. INTRODUCTION

The demand for foreign fiat money by domestic residents of a country is commonly referred to as currency substitution (Rojaz, 1985). Nowadays, not only in developed countries but also in developing countries, the demand for foreign money by domestic residents has increased. In a small open economy with flexible exchange rate, the residents' desired proportion between domestic and foreign assets is given by a liquidity preference function depending on the difference between their expected rates of return.

Currency substitution implies a partial replacement of domestic money by foreign money. Foreign money can replace partially the role of domestic money as a means of transactions and as a store of value. In high-inflation countries in particular this latter function of money becomes increasingly dominant: foreign currency provides a higher degree of purchasing power stability and is therefore more desirable than domestic money (Aarle & Budina, 1995).

Currency substitution on the demand side, resulting from transactionary, precautionary, and speculative motives, could give rise to monetary policy dependence and exchange rate instability (Milner, Mizen, & Pentecost, 1998). Macroeconomic demand for domestic and foreign money in a country can either be derived from an underlying microeconomic structure or be postulated. The standard way to allow for the influence of currency substitution on money demand is to add depreciation expectations to real money demand (Aarle & Budina, 1995).

Calvo & Rodriguez (1977) demonstrate in a model of a small economy in which residents hold foreign currency balances that an increase in domestic money growth will cause an immediate real depreciation of the currency. The more rapid money growth increases inflation in domestic currency prices, thus increasing the real demand for foreign money. The country can acquire this money only through a trade surplus, which requires the real depreciation.

Studies done by Mizen & Pentecost (1994) illustrate that there is no clear evidence of currency substitution in European Monetary Union, in either the short or the long run, and that therefore currency substitution between sterling and EC currencies can not be relied upon as a mechanism or an aid to reduce the costs of monetary convergence. Kaplan (2008)

investigated currency substitution in Turkey by conducting cointegration test. Empirical results suggest that depreciation of the Turkey's Lira has resulted in a decline in holding of M1 indicating the presence of currency substitution in Turkey. Effiom & Samuel (2010) with Vector Error Correction Mechanism (VECM) in Nigeria find that currency substitution has been dominant yet silent feature of the Nigerian economy. Hence, they loss the purchasing power from holding home currency, loss seignorage revenue, and reduce the cost of enterprise theft and facilitates corruption and rent seeking.

A large number of papers have examined currency substitution in developed countries, but very few studies in the developing countries. This paper examines the empirical importance of currency substitution in the framework of the demand function for money. If currency substitution is important, the expected change in the exchange rate should be a significant determinant of the demand for home currency in Indonesia over the period January 2001 to May 2009 using co-integration approach.

This paper is organized as follows. Section two provides the teoritical foundation, section three introduces the econometric methodology and data, section four is the empirical analysis and presents the results, and section five is conclusion.

2. LITERATURE REVIEW

Currency substitution can be treated from a macro and microeconomic point of view. Within the macroeconomic tradition, currency substitution has been modelled by means of money demand function and portfolio balance models (Vries, 1988).

Lazea & Cozmanca (2003) describe the determinants of currency substitution can be better understood by distinguishing among the three traditional functions of money: unit of account, medium of exchange, and provider of store-of-value services. Performing a unit of account function, money is considered more prone to be substituted as non-domestic currencies are more widely used by people for transactions. As for money as a medium of exchange, the more acceptable the currency, the more it is used as a provider for transaction services. As a store of value money predominates in the form of nominal interest bearing assets and shares. Under currency substitution, the store of value services provided by a currency will determine its demand. This will suggests that demand for foreign currency will increase together with higher inflation.

The money demand function, in addition to usual variables such as those reflecting the level of transactions in the economy (e.g. real income), the opportunity cost of holding money, (e.g. the interest rate earned on other assets and/or the level of inflation) should include an exchange rate variable. In other words, to detect currency substitution, the link between exchange rates and money demand is used. According to the currency substitution literature, when the exchange rate is expected to depreciate, the expected return from holding foreign money increases and the demand for domestic currency falls (as individuals substitute foreign money for domestic currency) (Yazgan & Zer-Toker, 2010).

As stated on Brittain (1981), currency substitution in a Keynesian Framework on the demand side requires (a) that domestic as well as foreign currency balances are included in wealth holders' portfolios, and (b) that cash balances denominated in different currencies are systematically adjusted to changes in relative opportunity costs. Most of the empirical work concerning the currency substitution issue has consequently been based upon a Keynesian-type demand function for money which includes a foreign market rate of interest among the explanatory variables.

Currency substitution has important implications for the macroeconomic performance of countries, financing government deficit, determining an appropriate foreign exchange regime, and conducting the monetary policy. Currency substitution, leading to the decline

in domestic money holdings, could cause an economic slowdown and hence worsen the economic crisis (Bahmani-Oskooee & Techaratanachai, 2001).

Lazea & Cozmanca (2003) mention that currency substitution has important effects not only on monetary policy but also on fiscal policy. When currency substitution is widespread, the effective money supply is much larger than the domestic money supply and is, moreover, less easily controlled by the monetary authority because of the public's tendency to substitute foreign for domestic currency. In such an environment for example, an inflationary fiscal policy – imposing an implicit tax on domestic monetary assets, will be ineffective, monetary policy is prone to a more volatile velocity of money, lower monetary depth is also a consequence, part of the segniorage revenues is lost, not to mention that foreign cash transactions reduce the cost of tax evasion and facilitate participation in the "underground" economy. It is clear that formulating macroeconomic policy in such circumstances is not an easy task.

Currency substitution could also cause widening in budget deficits since *seigniorage* income is the main source of income for the government, particularly in high inflation economies. In case, this loss of income is not compensated by increasing taxes or reducing government spending, currency substitution may further increase the rate of inflation (Fischer, 1983).

3. RESEARCH METHOD

In this study we follow Arango & Nadiri (1981), Bahmani-Oskooee (1996), and Kaplan (2008) model. In the empirical analysis we estimated the following money demand function:

$$\log M1_t = a + b \log Y_t + c \log I_t + d \log neer_t + e_t$$

M1 is the real money stocks, *Y* is the real income, *I* is nominal domestic interest rate and *neer* is the nominal effective exchange rate. The elasticity of income b is expected to be positive and the elasticity of interest c is expected to be negative. This study uses monthly time series data from January 2001 to May 2009. The data are obtained from the Central Bank of Indonesia (BI) and Bureau of Indonesian Statistic (BPS). The annual real income is converted to monthly data using the interpolation method.

The link between exchange rates and money demand can also be used to define currency substitution. According to the currency substitution literature, when the exchange rate is expected to depreciate, the expected return from holding foreign money increases, and the demand for domestic currency falls (as individuals substitute foreign money for domestic currency). Thus, if depreciation of the domestic currency reflected by a decrease in effective exchange rate induces a decline in money holdings by domestic residents, the estimate of d should be positive (Kaplan, 2008).

Prior estimating any relationships between M1 and its explanatory variables, it is needed to check for the stationary of each data series. Testing the stationary of economic time series is very important since standard econometric methodologies assume stationary in the time series while they are, in fact, nonstationary. Consequently, the usual statistical tests—for instance, the ordinary least squares (OLS) estimation of regressions in presence of non-stationary variables gives rise to spurious regressions if the variables are not co-integrated are likely to be in appropriate and the inferences drawn are likely to be erroneous and misleading (Kikuchi, 2004).

We, therefore, use the classical unit root tests, namely, the Augmented Dickey-Fuller (ADF) test is based on the null hypothesis that a unit root exists in the time series. Once it is

established that series are I(1), we can proceed to test for a long-run relationship between the series. If such a relationship exists, the series are co-integrated.

We tested co-integration using the two co-integration techniques devised by (S. Johansen & Juselius, 1990). In the JJ method, two tests are used to determine the number of co-integrating vectors (r): the trace test and the maximum eigenvalue test. In the trace test, the null hypothesis is that the number of co-integrating vectors is less than or equal to r, where r is 0, 1, or 2. In each case, the null hypothesis is tested against a general alternative. In the maximum eigenvalue test, the null hypothesis r = 0 is tested against the alternative that r = 1, r = 1 against the alternative r = 2, etc.

4. RESULTS AND DISCUSSION

Indonesia is a small open economy, where exchange rate determines how the import price may affect the domestic economy. In some literature illustrated that the import prices reflect the general prices through the price of the final goods produced. General prices determine the level of interest rate and the interest rate determines the output of the economy trough aggregate demand changes in the short run. And how much money an individual decide to hold is determined by interest rate.
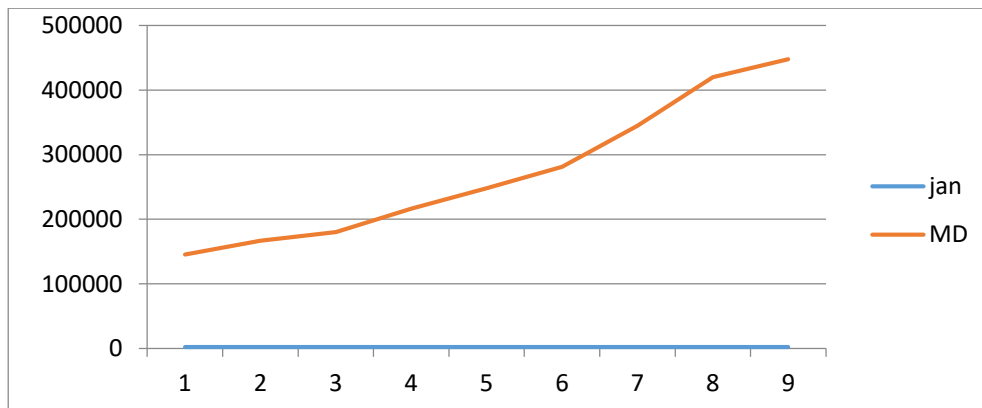
Figure 1. Money Demand in Indonesia

Table 1. The Descriptive Statistics of Interest Rate

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
interest	101	5.00	16.00	952.00	9.4257	.31224	3.13798
Valid N (listwise)	101						

In this study, the Augmented Dickey-Fuller test statistics are employed to test for unit root and the results are presented in Table 1. The results of the ADF test indicate that not all variables stationary in level. So that, we can conclude that all variables imply first-difference stationary.

Table 2. *Unit Root Test*

Augmanted Dickey-Fuller Unit Root Test		
Series	*Level*	*First Difference*
M1	-0.772723	-9.977681
	(0.8221)	(0.0000)*
Y	0.352547	-10.68692
	(0.9798)	(0.0000)*
I	-5.826127	-11.60196
	(0.0000)*	(0.0001)*
NEER	-3.665650	-10.17639
	(0.0061)*	(0.0000)*

* shows rejection of null hypothesis of a unit root at the 1% level. The lag order for the series was determined by the Akaike Information Criterion.

Knowing all variables is integrated of order one, the next step consists of testing for cointegration among the integrated variables. The procedure used in this study is Johansen multivariate cointegration test to explore any possible long run relationship among the variables based on maximum likelihood methods introduced by Søren Johansen (1991) and expanded upon by S. Johansen & Juselius (1990). For the trace test results, the null hypothesis of r = 0 is rejected. Almost similar conclusions are obtained from the -max results. Thus, both the trace test and maximum eigenvalue results indicate the presence of only one cointegrating vector in the model. The results obtained from the JJ method are presented in table below.

Table 3. Johansen Cointegration Test Results

Maximum Eigenvalue Statistic			Trace Statistic		
Hypothesized No. of CE(s)	*Statistic*	*0.05 Critical Value*	*Hypothesized No. of CE(s)*	*Trace Statistic*	*0.05 Critical Value*
None *	39.95706*	27.58434	None *	67.31838*	47.85613
At most 1	18.65268	21.13162	At most 1	27.36131	29.79707
At most 2	5.145585	14.26460	At most 2	8.708629	15.49471
At most 3	3.563044	3.841466	At most 3	3.563044	3.841466

* denotes rejection of the hypothesis at the 0.05 level

The long run co-integrating relationship is given in Table 3. The coefficient of income and nominal effective exchange rate are positive, while the coefficient of interest rate is negative, respectively, as expected. But, surprisingly the nominal effective exchange rate does not significantly affect the demand for Indonesian Rupiahs.

Table 4. Result

Dependent variable	Y	I	NEER
M1	5.585338 (0.262984)	-0.016822 (0.035391)	0.008602 (0.027566)

Figure in parenthese indicate the standard error of coefficient

Mizen & Pentecost (1994) empirically investigate currency substitution in European Monetary Union with two models, the money services approach and portfolio balance approach. The results demonstrate that in the two types of model tested there is no clear evidence of currency substitution, in either the short or the long run, and that therefore currency substitution between sterling and EC currencies cannot be relied upon as a mechanism or an aid to reduce the costs of monetary convergence.

Heimonen (2006) investigates empirically the impact of currency substitution on demand for money in UK. The study decomposed the dynamics of currency substitution in the UK economy into permanent and transitory components. The ratchet effect appeared to play only a minor role in inducing movements in currency substitution. Thus, currency substitution, i.e., euroization, as a long-run phenomenon will not present a major problem for the UK economy. His evidence suggests that, first since currency substitution will not be long-lasting, it would not have serious impacts on seigniorage in the UK economy. Second, given that the changes in foreign currency balances were mainly temporary, short-run shifts in money balances and the instability in the money demand equation cannot be ruled out.

5. CONCLUSION

In this paper we investigated the impact of depreciation on currency substitution in Indonesia. The longrun relationship between M1, real income, nominal interest rate, and nominal effective exchange rate is tested by conducting cointegration test over the period January 2001 to May 2009. Empirical results indicated that there is no currency substitution in fact happened in Rupias. This indicates that monetary policy in Indonesia will not be affected and can be implemented effectively.

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