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## DISCUSSION PAPER No. 87

### **Do Foreign Currency Deposits Promote or Deter Financial Development in Low-Income Countries? An Empirical Analysis of Cross-Country Data**

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#### **Abstract**

Foreign currency deposits (FCD) are prevalent in many low-income developing countries, but their impact on bank lending has rarely been examined. An examination of cross-country data indicates that a higher proportion of FCD in total deposits is associated with growth in private credit only in inflationary circumstances (over 24 percent of the annual inflation rate). FCD can lead to a decline in private credit below this threshold level of inflation. Given that FCD exhibit persistence, deregulating them in low-income countries may do more harm than good on financial development in the long term, notably after successful containment of inflation.

**Keywords:** foreign currency deposits, financial development, low-income countries, inflation, dollarization

**JEL classification:** G21, F36

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# **Do Foreign Currency Deposits Promote or Deter Financial Development in Low-Income Countries? An Empirical Analysis of Cross-Country Data**

## **Introduction**

The purpose of this paper is to assess the impact of foreign currency deposits (FCD) schemes on development of the banking sector in low-income countries. The prevalence of FCD differs substantially among such countries. FCD are prohibited in a number of countries, but they account for more than half of total deposits in others. As a feature, FCD may be effective in mobilizing savings, especially under circumstances of high inflation. However, mobilized savings in FCD accounts are not always directed toward domestic lending. For example, the balance sheet of the Foreign Trade Bank for Vietnam (Vietcombank), one of the largest commercial banks in Vietnam, may be observed. In 2001, its foreign assets reached 55 percent of total assets, which was over 2.5 times that of its domestic lending. The bulk of foreign assets were held in the form of the U.S. Treasury bonds. The concern arises that FCD may provide a channel for capital flight, and this in turn may arrest financial development.

The relationship between FCD and financial development is examined in this paper. As a consensus grows that financial development contributes to economic growth (Beck *et al* [2000], Levine [1997]), the question of what accounts for differences in financial development among developing countries arises as an important policy issue as well as a subject of research. Related to factors that may account for the differences in financial development among developing countries, studies have focused on the market share of state-owned commercial banks (La Porta *et al* [2002]) and foreign banks (Claessons *et*

*al* [2001]) from the viewpoint of corporate governance. The focus of studies also included inflation (Boyd *et al* [2001]), and regulations on the banking industry (Barth *et al* [2004]). Apart from De Nicolo *et al* [2003], the impact of FCD on banking sector development has seldom been explored in the framework of cross-country data analysis<sup>1</sup>.

FCD have often been discussed in the context of “dollarization”, the phenomenon in which a foreign currency such as the U.S. dollar is used in domestic transactions. In the literature related to dollarization, focus has been placed on its impact on monetary policy (i.e., Balino *et al* [1999]) and on the stability of the financial sector (i.e., Burnside *et al* [2001]). Recently, analyses of the determinants of FCD have been made both empirically (Ize and Levy Yeyatin [2003]) and theoretically (Broda and Levy Yeyati [2006]). A few studies such as those of De Nicolo *et al* [2003] and Honohan and Shi [2003] have examined the impact of FCD on bank lending.

In this paper, focus is placed on low-income developing countries. This is based on the assumption that the impact of FCD will be stronger in these countries. Lee [1996] illustrates the process of financial development. In this process, banks improve credit examinations by learning about their customers through practicing lending. As banks obtain higher profits with the improved credit examinations, they return a part of their profits to depositors with a higher interest rate, and this in turn leads to further deposits and lending. It is argued that in such a process of financial development, depositor access to foreign assets in the early stage of financial development can lead to capital flight and thus deter learning. This can then result in stagnation of financial

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<sup>1</sup> Balino *et al* [1999] offer a valuable survey on FCD in developing countries. While their study is comprehensive, they do not discuss the impact of FCD on financial development. De Nicolo *et al* [2003] claim to be the first to assess the impact of foreign currency deposits on financial deepening.

development. This analysis can be applied to FCD. It is not households but rather risk-averse banks that allocate FCD to foreign assets in order to reduce risk in their portfolios. The impact of FCD on the learning process may be more serious when banks have an inadequate capacity in credit examination, and this is especially the case for many low-income developing countries<sup>2</sup>.

The structure of this paper is as follows: In Section 1, a simple model of a bank's portfolio based on a mean-variance portfolio model is presented, and the impact of FCD schemes on bank lending is analyzed. Section 2 concerns the prevalence of FCD in low-income countries. This section also shed light on the phenomenon that FCD persist once their proportion in total deposits reaches a certain level. An econometric analysis is performed in Section 3 to examine the impact of FCD on the banking sector. In particular, an examination is made of the relationship of the FCD proportion in total deposits with the deposit-loan ratio, the proportion of foreign assets, and the degree of financial development measured in terms of deposit money bank credit to the private sector as a percentage of Gross Domestic Production (GDP). Based on results of estimations, Section 4 includes a discussion of the policy issue of whether or not a low-income country should relax regulation of FCD. A summary of analyses as well as conclusions are presented in Section 5.

## **1. Model of a Bank Portfolio with Foreign Currency Deposits**

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<sup>2</sup> There are several empirical studies that focus on low-income countries. Detragiache *et al* [2006] apply a framework of analysis similar to this paper to account for the background of financial development in low-income countries from the viewpoint of state ownership of banks. Rioja and Valev [2004] also differentiate low-income developing countries from other developing and developed countries in their empirical analysis on the financial development and economic growth nexus. They find that the impact of marginal growth in financial development on economic growth differs between low-income developing countries and others.

One of the distinctive features of FCD is that households can deposit their foreign currency-denominated assets (mainly foreign currency) in local banks without altering the denomination of assets. When, due to high inflation, households are not confident in the local currency and local currency-denominated deposits, they may hold a large part of their foreign assets (in the form of foreign currency) outside the formal banking system. In such cases, introducing FCD may be effective in mobilizing foreign currency savings that were otherwise held outside the banking system. However, there is still a question relative to how large a portion of such mobilized FCD may be intermediated to borrowers in the domestic market.

To address this question, a simple model of a bank portfolio in a static partial equilibrium framework is presented below. In the economy, there are households and a bank. The number of households is normalized to unity.

### **(1) Households**

Households get foreign currency (the U.S. dollar for example) from export transactions or overseas remittances from their relatives. They allocate such foreign currency into three types of assets: (1) local currency-denominated deposits ( $L^f$ ), (2) foreign currency deposits ( $F$ ), and (3) foreign currency held in hands ( $D$ ). Normalizing the amount of total foreign asset to 1 gives  $L^f + F + D = 1$ . Here,  $L^f$  is measured in terms of the foreign currency. The proportion of FCD in total deposits of the banking sector is denoted by  $\phi$  ( $0 \leq \phi \leq 1$ ). In general, a higher  $\phi$  implies less restriction and more convenience for FCD. Then, the household demand for  $F$  may be defined as follows:

$$F \equiv F(\phi). \quad F' > 0 \quad (1)$$

The above definitions indicate that as FCD become more prevalent, households tend to prefer them.

Apart from their income in foreign currency, households have local currency income, and they allocate a part of it to local currency deposits,  $L^l$ . This is also measured in terms of the foreign currency. Thus, their local currency deposits sum to  $L \equiv L^f + L^l$ . The local currency deposit may be assumed to be an imperfect substitute for FCD, and it is a decreasing function of  $\phi$ :

$$L \equiv L(\phi). \quad L' < 0 \quad (2)$$

## (2) Bank

The portfolio of a bank may be considered in the framework of a mean-variance approach. The bank accepts both local and foreign currency deposits. For tractability of analysis, it may be assumed that there is no reserve requirement for both types of deposits. Further, both lending and deposit interest rates are exogenous.<sup>3</sup> To focus the analysis on FCD, it may be further assumed that all local currency deposits are directed to local currency-denominated loans in the domestic market. However, FCD are allocated between foreign currency-denominated loans in the domestic market and U.S. Treasury bonds with the proportions of  $z_1$  and  $z_2$ , where  $z_i \in [0,1], i=1,2$  and  $z_1 + z_2 = 1$ . Thus, the total lending to the domestic market is

$$C \equiv L(\phi) + F(\phi) \cdot z_1. \quad (3)$$

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<sup>3</sup> The assumption that interest rates are exogenous can be interpreted that they are regulated in the context of developing countries.

The first term on the right hand side of the equation matches local currency loans (by assumption), and the second term refers to foreign currency loans. Note that all components are measured in terms of the foreign currency.

For given interest rates, the stochastic rates of return of assets may be denoted as follows:

$$\tilde{R}_L = R_L + \varepsilon_L, \quad (4)$$

$$\tilde{R}_F = R_F + \varepsilon_F, \quad (5)$$

where  $R_L$  and  $R_F$  are the expected returns of local and foreign currency loans, respectively. These expected returns take into account the bank's credit examination capacity and its non-performing loans (NPL). As in Lee [1996], the screening capacity is considered to depend on the bank's practice of lending, so that  $R_L$  and  $R_F$  are in proportion to the accumulated amount of loans the bank has provided. When the country is still in the early stage of financial development, the bank has less experience, and the expected rates of return tend to become lower for given interest rates.  $\varepsilon_L$  and  $\varepsilon_F$  are disturbance terms. For U.S. Treasury bonds, variance may be assumed to be zero, and the expected rate of return is  $R_{TB}$ . Hence, the mean and variance of the bank's portfolio,

$$\tilde{Y}, \quad \text{are} \quad E[\tilde{Y}] = LR_L + Fz_1(R_F - R_{TB}) + F \cdot R_{TB} \quad \text{and}$$

$$Var[\tilde{Y}] = L^2Var(\tilde{R}_L) + F^2z_1^2Var(\tilde{R}_F) + 2LFz_1Cov(\tilde{R}_L, \tilde{R}_F) \quad \text{respectively.}$$

For the utility of the bank,  $U(\tilde{Y})$ , the expected utility function may be defined as

$$U(\tilde{Y}) \equiv E(\tilde{Y}) - \frac{\rho}{2}Var(\tilde{Y}), \quad (6)$$

where  $\rho$  ( $\rho > 0$ ) refers to the risk aversion coefficient. For a given set of  $L$ ,  $F$ , and the rates of return of assets, the bank maximizes the expected utility with respect to  $z_1$ , subject to the constraint  $0 \leq z_1 \leq 1$ .

### (3) Bank Lending

Substituting the mean and variance of the portfolio into (6), solving the maximization problem yields

$$\begin{aligned} \hat{z}_1 &= \frac{(R_F - R_{TB}) - \rho L \cdot Cov(\tilde{R}_L, \tilde{R}_F)}{\rho F \cdot Var(\tilde{R}_F)}, \text{ for } 0 < \frac{(R_F - R_{TB}) - \rho L \cdot Cov(\tilde{R}_L, \tilde{R}_F)}{\rho F \cdot Var(\tilde{R}_F)} < 1. \\ &= 0 && \text{for } \frac{(R_F - R_{TB}) - \rho L \cdot Cov(\tilde{R}_L, \tilde{R}_F)}{\rho F \cdot Var(\tilde{R}_F)} \leq 0 \\ &= 1 && \text{for } \frac{(R_F - R_{TB}) - \rho L \cdot Cov(\tilde{R}_L, \tilde{R}_F)}{\rho F \cdot Var(\tilde{R}_F)} \geq 1 \end{aligned} \quad (7)$$

Therefore, for low-income countries where  $R_F$  is low in relation to  $R_{TB}$  due to the bank's inadequate screening capacity, the bank allocates less to loans. The bank holds more U.S. Treasury bonds, and this in turn leads to a slower learning process and slower financial development.

Now, the impact of FCD on bank lending may be evaluated. Differentiating  $C$  with respect to  $\phi$  yields

$$\frac{\partial C}{\partial \phi} = \frac{\partial L}{\partial \phi} + \frac{\partial F}{\partial \phi} \hat{z}_1 + F \cdot \left[ \frac{\partial \hat{z}_1}{\partial F} \frac{\partial F}{\partial \phi} + \frac{\partial \hat{z}_1}{\partial L} \frac{\partial L}{\partial \phi} \right]. \quad (8)$$

There are three channels through which the FCD scheme affects the volume of credit:

(1) **Substitution Effect** (between FCD and local currency deposits). There is substitutability between two types of deposits, and the increased prevalence of FCD leads to a reduction in local currency deposits. This in turn results in a decline of local

currency-denominated lending ( $\partial L / \partial \phi < 0$ ).

(2) **Savings Mobilization Effect.** In addition to the substitution between local currency and FCD, a convenient FCD scheme would attract household foreign assets that were otherwise held outside the banking system ( $(\partial F / \partial \phi) \cdot \hat{z}_1 > 0$ ).

(3) **Portfolio Adjustment Effect.** This is the bank's reaction to changes in the proportion of FCD to local currency deposits. This effect depends on the risk-averseness of the bank. Intuitively, an increase in the proportion of FCD enables the bank to reduce credit risk by increasing U.S. Treasury bond holdings, and this results in a decline in lending.

Substituting (7) into (8) yields (for the case  $0 < \hat{z}_1 < 1$ )

$$\frac{\partial C}{\partial \phi} = \frac{\partial L}{\partial \phi} \cdot \left( 1 - \frac{Cov(\tilde{R}_L, \tilde{R}_F)}{Var(\tilde{R}_F)} \right). \quad (8')$$

In this particular case, the whole increment in FCD is channeled to U.S. Treasury bonds. The remaining effects are a decline in local currency loans due to the decline in local currency deposits and the associated change in foreign currency loans. Unless the disturbances of foreign and local currency loans are perfectly correlated, a unit of decline in local currency loans leads to less than a unit of increase in foreign currency loans. Thus, the sign of the term in brackets is positive. As a result,  $\partial C / \partial \phi < 0$ .

It is appropriate to consider that the substitution effect between FCD and local currency deposits is higher under lower inflation ( $\partial^2 L / \partial \pi \partial \phi < 0$ ). In other words, it is less likely that under a high inflationary circumstance, households will change their foreign currency income into local currency deposits. Accordingly, it may be argued that lower inflation leads to more credit contraction effects.

Based on these results, the following sections contain examinations of the effects of FCD on the credit given to the private sector in low-income countries.

## **2. Outline of Foreign Currency Deposits in Low-Income Developing Countries**

Figure 1 shows a histogram of the prevalence of FCD in 89 developing countries.<sup>4</sup> These are countries where GDP per capita as of 1995 was less than 3,000 U.S. dollars. For the value of the proportion of FCD in total deposits, an average for 2002 to 2004 is used. The average for these three years is used to partially alleviate the influences of shocks such as an abrupt decline in the exchange rate on the proportion of FCD. This diagram, for example, shows that the proportion of FCD is between 31 and 40 percent in 13 countries. It should be noted that FCD are prohibited or severely restricted in one third of all sampled countries.<sup>5</sup>

Figure 1. Histogram of the Proportion of FCD in 89 Low-Income Developing Countries  
(Average for 2002-2004)

In Appendix Figures A.1 to A.5, the change in the proportion of FCD by region is summarized. Some regularity may be found in the prevalence of FCD according to region. The proportion of FCD is generally high in transition economies in Eastern

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<sup>4</sup> In this paper, FCD are deposits of residents into foreign currency accounts. In general, the foreign currency deposits of non-residents are not counted as “money” in macroeconomic statistics. The foreign currency deposits of non-residents are also disregarded in this paper.

<sup>5</sup> It should be noted that there are virtually no FCD in 12 West African countries that constitute the CFA franc monetary union.

Europe and the former Soviet Union. The proportion of FCD is higher in Latin America and the Caribbean region. It is also relatively lower in Asia, the Middle East, and Northern African countries. Among Sub-Saharan African countries, the proportion of FCD varies considerably.

From these observations, it is possible to relate the proportion of FCD in total deposits to some economic and social factors<sup>6</sup>. First, those countries that have experienced high inflation tend to have a high proportion of FCD. Examples include transition economies and Latin American countries such as Bolivia, Nicaragua, and Peru. Turkey, the Democratic Republic of Congo, and Lao PDR also fall into this category. Second, the high proportion of FCD is observed in countries where there is an unstable political situation such as civil war. Prime examples are in Sub-Saharan Africa and include Angola, Liberia, Mozambique, and Sudan. Other examples are Cambodia and Bosnia-Herzegovina. Third, the proportion of FCD is often high in countries that have a large number of emigrant workers and emigrants who send money back to their home countries. It is possible that these countries deregulate the FCD scheme to encourage inbound remittances for the accumulation of foreign reserves. Examples include Pakistan, the Philippines, Vietnam, and some Central American countries.<sup>7</sup>

Characteristics of the background of FCD vary from temporary ones such as high inflation and political instability to relatively permanent and structural ones such as foreign remittances from emigrant workers. However, a high proportion of FCD tends to demonstrate inertia regardless of background. Table 1 shows the transition matrix

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<sup>6</sup> For detailed analysis on the determinants of the prevalence of FCD, see Ize and Levy Yeyati [2003].

<sup>7</sup> A large amount of inbound overseas remittances from emigrant workers exists in India. However, Indian regulation deals with such foreign income in non-resident foreign currency accounts with a preferred deposit interest rate. These deposits are not counted as “money” in macroeconomic statistics, so they are also disregarded in this analysis. For workers’ remittances in Central and Latin America, see Amuedo-Dorantes and Pozo [2004].

summarizing the change in the proportion of FCD between 1994-1996 and 2002-2004. The number of samples includes 69 countries for which data could be obtained for both periods. From this table, for example, it can be seen that the proportion of FCD was in the range of 10.1 to 25 percent in 15 countries in 1994-1996. Among these countries, nine moved to the range of 25.1 to 50 percent in 2002-2004, and one country to over 50.1 percent. The proportion of FCD has in general an upward trend and inertia in the higher end of the sampled countries. Except for transition economies, once the proportion of FCD reached 25 percent, it rarely declined among sampled countries. This implies that once FCD spread and their convenience is established, it is difficult to lower their proportion.

Table 1. Transition Matrix of the Proportion of Foreign Currency Deposits in  
Low-Income Developing Countries, 1994-1996 to 2002-2004

### **3. Empirical Analysis**

#### **(1) Methodology and Data**

Through an analysis of cross-country data from low-income countries, the impact of FCD on the behavior of banks and on financial development in these countries may be examined.

With regard to the behavior of banks, Section 1 shows that the prevalence of FCD has three channels for exerting influence. These include: (1) a substitution effect between FCD and local currency deposits, (2) a savings mobilization effect, and (3) a portfolio

adjustment effect. Accordingly, a higher proportion of FCD in total deposits would probably be associated with more foreign asset holdings and less loans in a bank's portfolio. That is, a higher proportion of foreign assets in total assets and lower loan to deposit ratios would be expected. The aggregate effects of the three channels would include a slower growth in credit given to the private sector in the long term.

First, the balance sheet of the aggregate banking sector is used to examine the relationship of FCD with the foreign assets proportion and the loan to deposit ratio. Second, the relationship of FCD with the growth rate of the credit to the private sector is viewed. The FCD ratio refers to the proportion of FCD as a percentage of total deposits (demand and savings/fixed deposits) in deposit money banks. The index of foreign assets of banks,  $[\text{foreign assets} - \text{foreign liabilities}]/[\text{total deposits} + \text{foreign liabilities}]$ , is calculated in percentages. Foreign liabilities refer to foreign borrowings of banks, and do not include FCD. In general, the proportion of foreign assets to total assets tends to be high in accordance with a high proportion of foreign liabilities to total liabilities. In addition, the proportion of foreign liabilities to total liabilities differs substantially among sampled countries. An index such as  $[\text{foreign assets}/\text{total deposits}]$  does not clearly reflect the extent of capital flight due to FCD, so that the above-mentioned index is employed instead. Finally, the growth rate of credit given to the private sector is measured with the difference in percentage points of  $[\text{credit given to the private sector}/\text{GDP}]$  in 2002-2004 and in 1994-1996.

Apart from the above variables, regressions (where applicable) include inflation rates and per capita income as control variables. Inflation *per se* is considered to exert adverse effects on financial intermediation (Boyd *et al* [2001]). Per capita income is often used as a proxy variable for the level of economic development, and it is

considered to have positive correlation with the level of credit given to the private sector (Beck *et al* [2000]).

All data, except for the amount of FCD and per capita income, are collected from the International Monetary Fund (IMF) *International Financial Statistics* CD-ROM. The data on FCD are compiled from various issues of the *IMF Country Report* and various statistical bulletins of the central bank for each country. For the data on FCD, the earliest period available for a large number of countries is 1994. The data on per capita income is GDP per capita found in the World Bank *World Development Indicator* CD-ROM.

Table 2 includes a summary of the descriptive statistics of the variables and their correlation coefficients. As expected, negative correlations may be observed for the growth in private credit with indices of the foreign assets ratio, the FCD ratio, and inflation. Positive correlations may also be observed with the loan-deposit ratio.

Table 2. Descriptive Statistics

## **(2) Proportion of Net Foreign Assets and Loan-Deposit Ratios**

Regressions were performed to examine the relationship of the net foreign assets and loan-deposit ratios with FCD. To deal with endogeneity between dependent and explanatory variables, an average for 2002-2004 for the dependent variable of each regression and pre-determined variables for explanatory variables (an average of the FCD ratios in 1994-1996) were used. For control variables, an average of inflation in 1997-2001 and an average of per capita income in 1994-1996 were employed. To alleviate heteroskedasticity of residuals, logarithms of the inflation rate and GDP per

capita were used. Considering that the effect of inflation on bank lending is non-linear, specification of the square of the logarithm of inflation was also tested.

Results of Ordinary Least Squares (OLS) regressions are summarized in Table 3. Standard errors of the regressions in this table are White heteroskedasticity robust standard errors. As expected, for the regression of the net foreign assets ratio, the coefficients of the FCD ratio have a positive sign and are significant. The intercept dummy variable for Sub-Saharan African countries is significant. This might be associated with what is generally a low financial intermediation in this region.

Table 3. Estimation Results (Net Foreign Assets Ratio and Loan-Deposit Ratio)

For regressions involving loan-deposit ratios, coefficients of the FCD ratio have the expected sign but are not statistically significant. The influence of inflation on loan-deposit ratios appears to be non-linear; the coefficient of inflation is only significant in the specification of squared logarithms. The intercept dummy for transition economies is highly significant. The high loan-deposit ratio in transition economies may be related to stagnated savings mobilization. These economies made a transition from a planned economy to a market economy around the late 1980's and the early 1990's. Thus, the banking sector is relatively new, and savings mobilization has not progressed in comparison to the level of economic development. Furthermore, the banking system has often experienced crises in these economies. In the aftermath of such crises, intensified regulations have required banks to increase paid-up capital. As a result, commercial banks in transition economies tend to have high capital-to-deposit ratios which in turn often appear as high loan-deposit ratios.

On the whole, these results suggest that socio-economic characteristics are reflected in the structure of the balance sheet of the banking sector. In addition, there are indications that a higher FCD ratio is associated with a higher net foreign assets ratio. However, these results should be viewed with some caution since the regressions are subject to biased estimations due to possible omitted variables.

### **(3) Growth in Credit to the Private Sector**

The relationship of the FCD ratio in 1994-1996 to subsequent growth in credit to the private sector was examined using the following specification:

$$\begin{aligned} \text{Change in Private Credit} = & \beta_0 + \beta_1 (\text{FCD Ratio}) + \beta_2 [(\text{FCD Ratio}) \times (\text{Inflation})] \\ & + \beta_3 (\text{Inflation}) + \beta_4' (\text{Control Variables}) \end{aligned} \tag{9}$$

As in the previous section, pre-determined variables for explanatory variables are used to handle endogeneity between explanatory and dependent variables. In specification of the regression equation, the dependent variable is the first difference of [credit to the private sector]/[GDP]. This alleviates the problem of omitted variables. Taking the first difference eliminates fixed effects that would affect the level of the private credit.

This specification also includes an interaction term of the FCD ratio and inflation. As suggested in Section 1, under high inflationary circumstances, the adverse effect of FCD on credit growth would be weak, and FCD could add to credit growth through a savings mobilization effect.  $\beta_2$  is expected to capture such an effect. However, as also suggested in Section 1, FCD *per se* are expected to have a negative effect on the growth of credit given to the private sector; inflation does this as well. The expected signs of

coefficients are thus  $\beta_1 < 0$ ,  $\beta_2 > 0$ , and  $\beta_3 < 0$ . In addition, regressions with two specifications of inflation may be performed: (1) an average of inflation for 1997-2001 in logarithmic form, and (2) its square.

The following control variables are included in regressions: (1) the initial level of credit to the private sector that is an average of [credit to the private sector]/[GDP] for 1994-1996, (2) an average of per capita income for 1994-1996 (in logarithmic form), and (3) an intercept dummy variable for Sub-Saharan African countries. The initial level of credit is expected to reflect a convergence, if any, in financial development among developing countries.

In comparison with De Nicolo *et al* [2003], the estimation strategy used in this paper has both advantages and disadvantages. One advantage is that first-differenced variables are used for dependent variables; De Nicolo *et al* [2003] used level variables. The strategy incorporated in this paper yields more robust estimations with regard to biases related to omitted variables. A disadvantage is that De Nicolo *et al* [2003] use the instrumental variables method by first estimating the determinants of FCD ratios in order to handle endogeneity between explanatory and dependent variables. Considering the advantage and disadvantage, the analysis reported in this paper and that of De Nicolo *et al* [2003] are complementary.

Table 4 includes a summary of estimation results. Model fit seems better for the specification of the square of inflation in logarithmic form, implying a non-linear effect of inflation. For the model (B) in Table 4, the coefficients of interest are statistically significant and have expected signs. One percentage point increase in the FCD ratio in 1994-1996 is associated with a 0.1846 percentage point decline in credit given to the private sector as a percentage of GDP. One possible criticism on this result may be that

the negative impact of FCD on credit growth is spurious and actually reflects a correlation between the FCD ratio and other factors that affect credit growth. However, it is possible to refute such a criticism as follows. First, inflation is one of the important determinants of FCD ratios. Then, regardless of the specification of inflation in the two regression equations in Table (4), the coefficient of FCD is affected very little. This implies a peculiar impact of FCD on credit growth and its robustness.

Table 4. Estimation Results (Change in Credit Given to the Private Sector)

The coefficient of the interaction term of inflation and FCD ratio is positive. This implies that FCD schemes add to the growth in private credit when the annual inflation rate is over 24 percent ( $-0.1846 + 0.0183 * [\ln(23.95)]^2 \approx 0$ ). This result is consistent with De Nicolo *et al* [2003]. They also point out that the threshold level of yearly inflation is in the 20 to 30 percent range. Due to the adverse impact of inflation *per se*, however, credit to the private sector is stagnant under such levels of inflation.

#### **4. Policy Discussion**

Above results indicate that FCD schemes add to the development of financial intermediation under circumstances of medium and high inflation (inflation of above 24 percent per annum). This may be interpreted that the savings mobilization effect of FCD surpasses their portfolio adjustment (capital flight) effect under medium and high inflation. At the same time, net effects of FCD on financial intermediation appear to be

negative under low inflation (below 24 percent per annum) as the portfolio adjustment (capital flight) effect of FCD seems to exceed their savings mobilization effects.

As a policy prescription for low-income countries that suffer from high inflation and have a large informal foreign exchange parallel market, FCD schemes may give an immediate remedy for financial development. However, this policy prescription must be applied with caution. Experiences in many low-income countries have shown that once FCD become prevalent, they develop inertia. Thus, when countries succeed in containing inflation, prevalent FCD may do more harm than good under low inflation circumstances. Thus, FCD can be an obstacle to financial development in the long run.

In terms of the portfolio adjustment (capital flight) effect of FCD, controlling bank holdings of foreign assets by regulation may not always be a solution for growth in private credit. Forcing banks to provide loans to domestic borrowers that do not have foreign currency revenues may leave banks with exchange rate risks regardless of whether the denomination of loans is in local or foreign currency (Burnside *et al* [2001]). Further, creating a worse exchange rate risk may destabilize the banking sector, and this in turn may retard financial development.

## **5. Concluding Remarks**

This paper examined the impact of foreign currency deposits (FCD) schemes on the financial intermediation of banks in low-income countries. There are three channels through which FCD exert influence on financial intermediation: (1) the substitution effect between FCD and local currency deposits, (2) the savings mobilization effect with

which banks absorb the foreign currency that is otherwise held outside the banking system, and (3) the portfolio adjustment (capital flight) effect. In low-income developing countries, the credit examination capacity of banks is underdeveloped, and profitability of lending may remain low due to credit risk. FCD encourage such banks to increase holdings of foreign assets for alleviating high credit risk in their portfolio. As a result, the adverse portfolio adjustment effect of FCD on growth in private credit may be greater in low-income countries.

The prevalence of FCD and the background of the diffusion of FCD differ substantially among low-income countries. Nevertheless, once FCD attain a high proportion of deposits, they develop inertia in many countries regardless of the background.

An econometric analysis indicates that FCD add to the growth in private credit under circumstances of medium and high inflation (inflation of over 24 percent per annum). However, results also imply that the opposite will be the case under circumstances of low inflation (below 24 percent per annum). Given that FCD develop inertia, even a country with high inflation should be wary of relaxing regulations on FCD because it may exert an adverse effect on financial development after the containment of inflation.

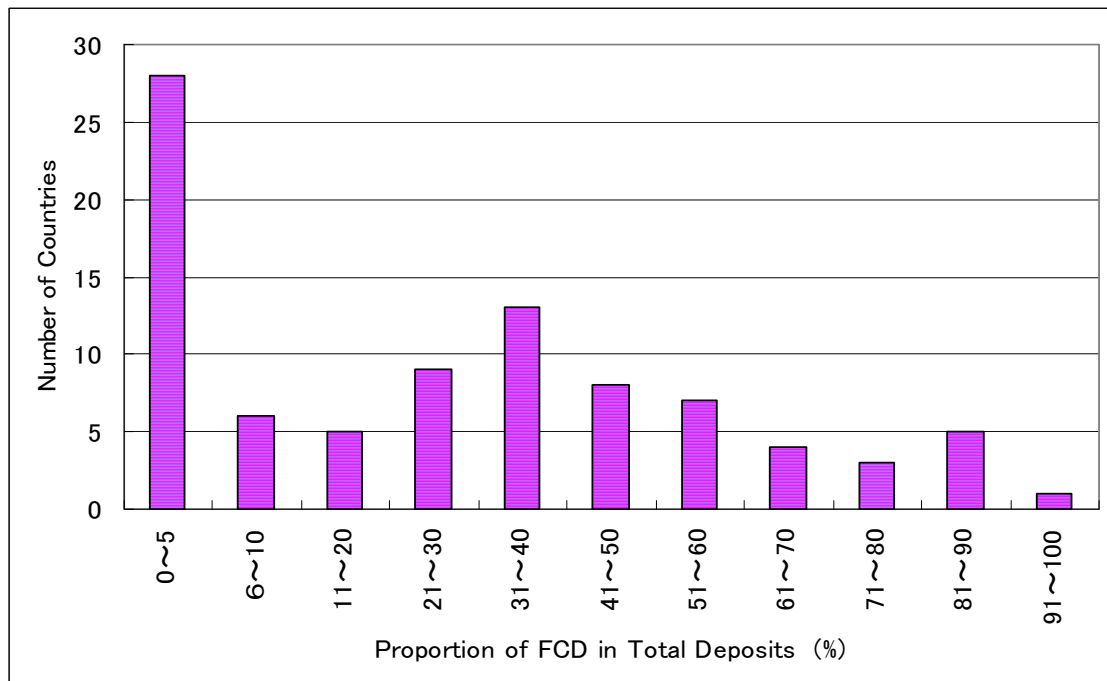
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Figure 1. Histogram of the Proportion of FCD in 89 Low-Income Countries  
(Average for 2002-2004)



Source: Compiled from the *IMF Country Report* [various issues] and statistics of the central bank for each country.

Note: The sample consists of countries with GNP per capita less than 3,000 US dollars in 1995 and in which data on foreign currency deposits (FCD) is available.

Table 1. Transition Matrix of the Proportion of Foreign Currency Deposits in  
Low-Income Developing Countries, 1994-1996 to 2002-2004

FCD Ratio (%) 1994-1996 Avg.	FCD Ratio (%), 2002-2004 Avg.				Unit: Number of Countries
	0~10.0	10.1~25.0	25.1~50.0	50.1~100.0	Subtotal
0~10.0	16	3	0	0	19
10.1~25.0	2	3	9	1	15
25.1~50.0	0	0	18	7	25
50.1~100.0	1	0	0	9	10
Subtotal	19	6	27	17	69

Source: Compiled from the *IMF Country Report* [various issues] and statistics of the central bank for each country.

Note: Member countries of the CFA franc monetary union (except Guinea-Bissau) are excluded from this table because their FCD ratio has been zero throughout the period under consideration.

Table 2. Descriptive Statistics

	Private Credit Growth	Net Foreign Assets Ratio (2002-04 Avg.)	Loan Deposit Ratio (2002-04 Avg.)	FCD Ratio (1994-96 Avg.)	Ln(Inflation) (1997-2001 Avg.)	Ln(GDP p.c.) (1994-96 Avg.)
<b>Descriptive Statistics</b>						
Sample Size	70	72	72	69	69	72
Mean	4.83	14.1	87.7	27.1	2.31	6.49
Standard Deviation	9.96	18.6	26.8	23.2	1.22	0.99
Minimum	-22.8	-17.7	28.0	0.0	-1.2	3.9
Maximum	41.8	98.4	152.7	92.8	5.6	8.2
<b>Correlations</b>						
Private Credit Growth	1					
Net Foreign Asset Ratio	<b>-0.3981</b>	1				
Loan Deposit Ratio	<b>0.3626</b>	-0.6487	1			
FCD Ratio	<b>-0.1387</b>	<b>0.0873</b>	<b>-0.1651</b>	1		
Ln(Inflation)	<b>-0.2559</b>	-0.0673	-0.1491	0.2327	1	
Ln(GDP p.c.)	0.1370	-0.4431	0.4369	-0.1565	-0.1230	1

Source: Author

Table 3. Estimation Results (Net Foreign Assets Ratio and Loan-Deposit Ratio)

Dependent Variables	Net Foreign Asset Ratio	Net Foreign Asset Ratio	Loan Deposit Ratio	Loan Deposit Ratio
Explanatory Variables				
FCD Ratio	0.18973 *** [0.0663]	0.14314 * [0.0776]	-0.24812 [0.1783]	-0.2181 [0.1749]
Ln(Inflation)	-2.7806 [3.3898]		-3.5381 [3.1129]	
[Ln(Inflation)]Squared		0.0957 [0.3360]		-1.0550 *** [0.3989]
Dummy (Sub-Saharan Africa)	19.007 *** [4.0314]	17.5393 *** [4.3760]		
Dummy (Transition Econ.)			23.196 *** [8.2876]	24.3830 *** [8.0582]
Constant	9.102 [10.0362]	3.7784 [5.3658]	98.465 *** [7.9393]	96.4133 *** [4.6135]
Adjusted R-Squared	0.1797	0.1490	0.1250	0.1683

Source: Author

Note: White heteroskedastic-consistent standard errors are in brackets [ ].

\*\*\* denotes statistical significance at the 1% level, \* at the 10% level.

Table 4. Estimation Results (Change in Credit Given to Private Sector)

Dependent Variable	Private Credit Growth	Private Credit Growth
Explanatory Variables		
FCD Ratio	-0.1712 [0.1240]	-0.1846 *** [0.0544]
Ln(Inflation)	-3.1697 [2.9587]	
[FCD Ratio]*[Ln(Inflation)]	0.0336 [0.0541]	
[Ln(Inflation)]Squared		-1.2147 *** [0.3934]
[FCD Ratio]*[Ln(Inflation)]Squared		0.0183 *** [0.0062]
Ln(GDP p.c.)	0.5755 [1.9717]	0.9486 [1.9205]
Private Credit in 1994–96	-0.2510 ** [0.1191]	-0.2811 *** [0.0931]
Dummy(Sub-Saharan Africa)	-7.1867 ** [3.3777]	-7.6338 ** [3.3976]
Constant	17.0888 [14.9157]	14.7873 [13.5623]
Adjusted R-Squared	0.1343	0.1878

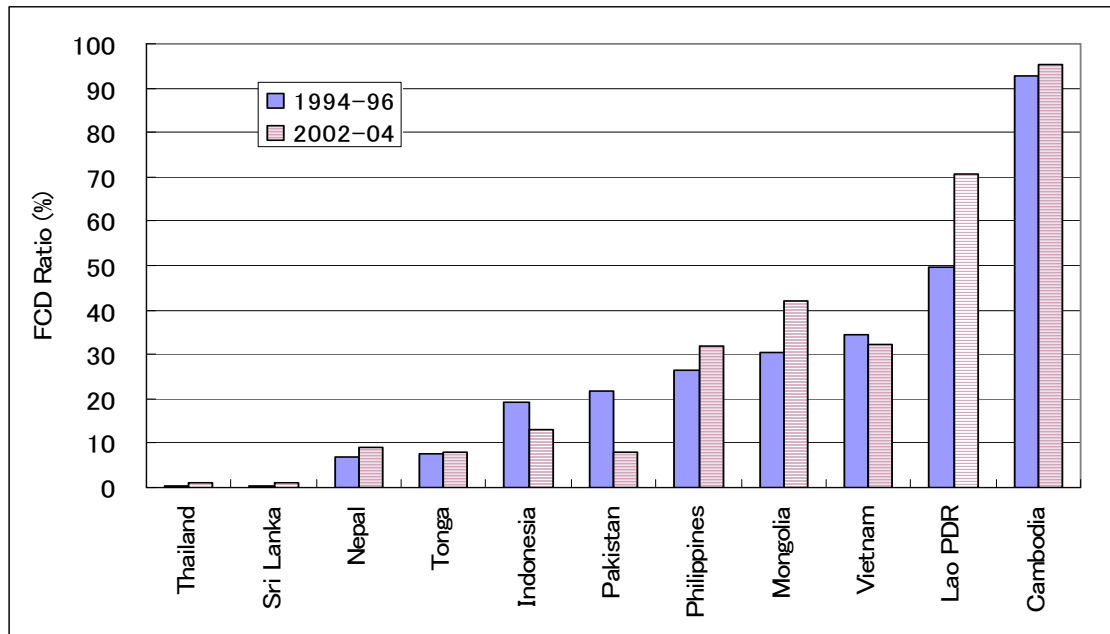
Source: Author

Note: White heteroskedastic-consistent standard errors are in brackets [ ].

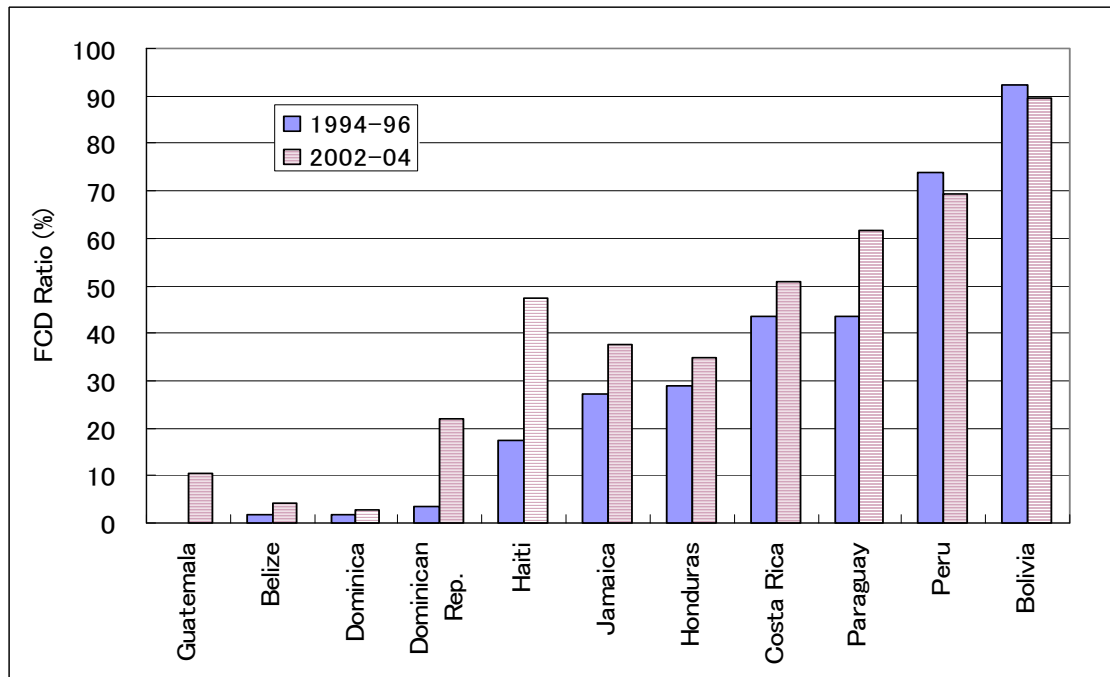
\*\*\* and \*\* denote statistical significance at the 1% and the 5% level, respectively.

Appendix: Changes in the Proportion of Foreign Currency Deposits by Region

A.1 Asia

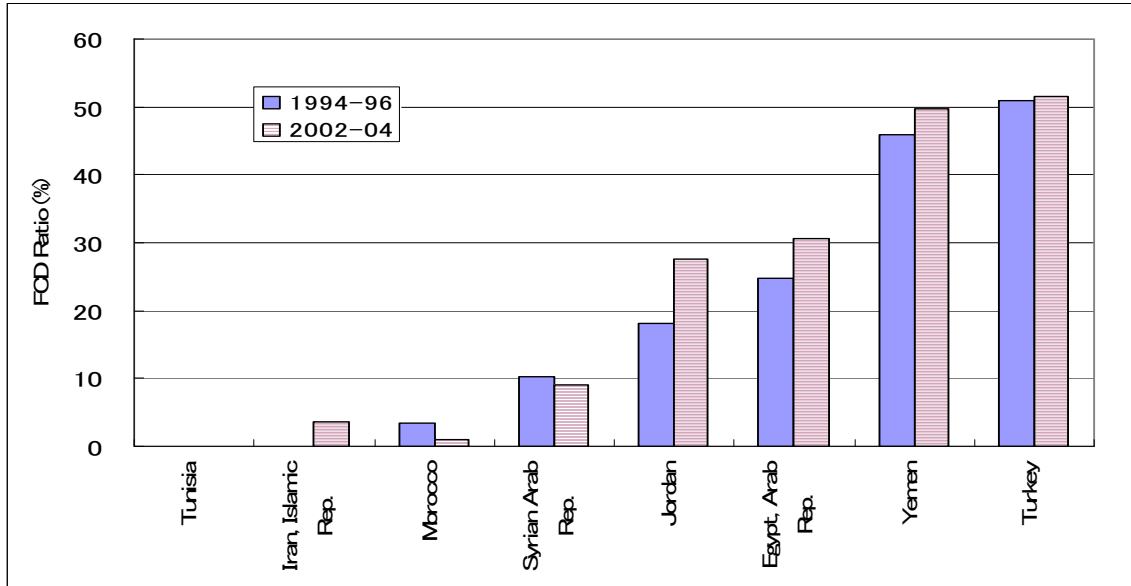


A.2 Latin America and Caribbean

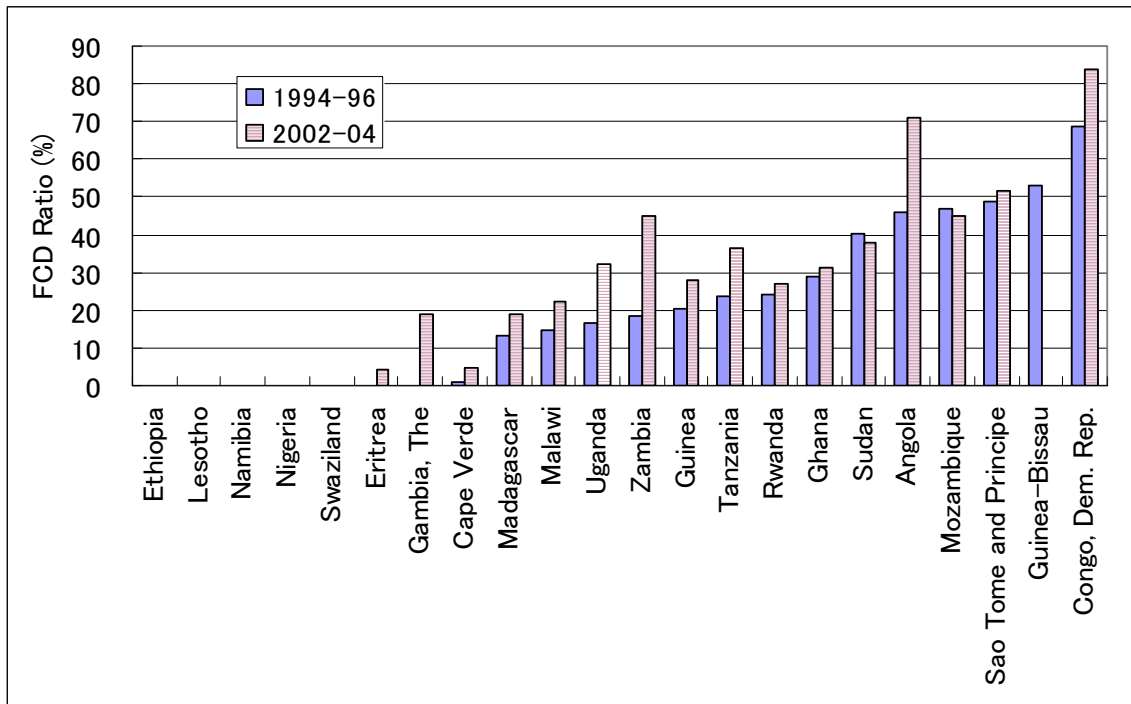


Appendix: Changes in the Proportion of Foreign Currency Deposits by Region (Cont'd)

A.3 Middle East and Northern Africa

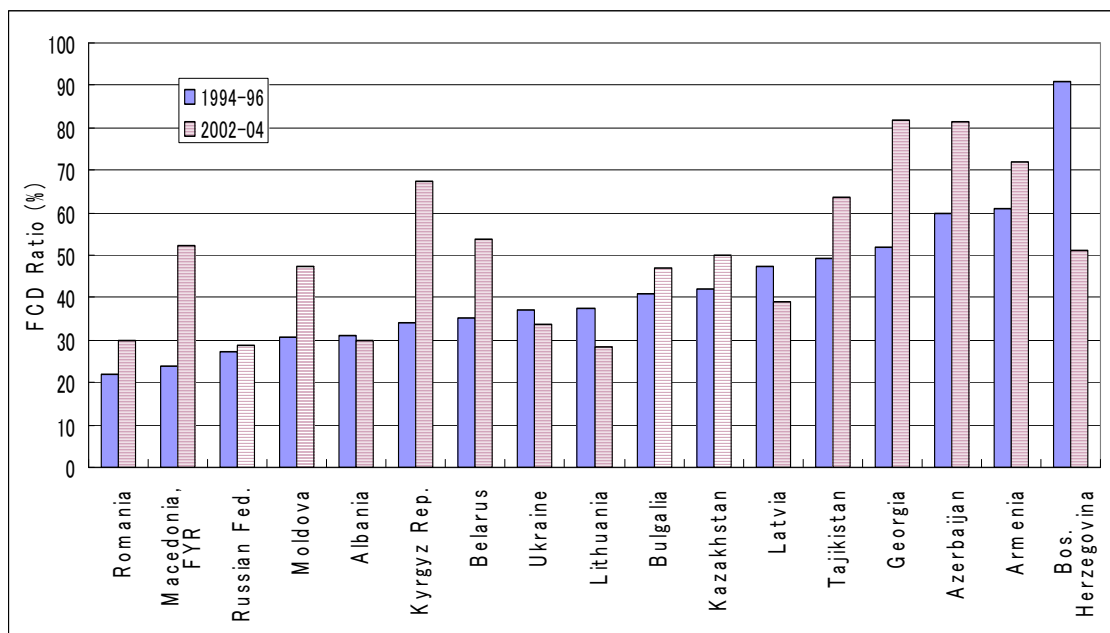


A.4 Sub-Saharan Africa



Appendix: Changes in the Proportion of Foreign Currency Deposits by Region (Cont'd)

A.5 Transition Economies



Source: Compiled from the *IMF Country Report* [various issues] and statistics of the central bank for each country.