

IS THERE AN ASSET SUBSTITUTION MOTIVE IN UKRAINIAN DOLLARIZATION?¹

The phenomenon of dollarization — residents in a given country holding a proportion of their assets in the form of foreign currency and foreign currency denominated assets — has become widespread in transition economies. This paper tests two hypotheses on Ukrainian data. The first is that dollarization in Ukraine is driven by portfolio balance considerations, i.e. by differences in real rates of returns. The second is the existence of hysteresis in dollarization pattern. Despite the data limitation, the paper finds that the difference in rates of return does play a significant role in explaining dollarization, leading to a conclusion, that large part of dollarization represents asset substitution. However, unlike what have happened in Latin American, there is no evidence so far of downward rigidity in dollarization in Ukraine.

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/ . Introduction

Opening the borders of transition countries to the rest of the world in 90-s has brought accelerating flows of goods, services and capital. As a part of liberalization programs, these countries lifted the restrictions on foreign currency (FC) holdings. Stable foreign money substituted partially the unreliable and depreciating domestic one. The indicator of dollarization for transition economies, proxied by foreign currency deposits as a share of all deposits, averaged 40 % by mid-1998 [1]. In Ukraine, FCD constituted 44% of all deposits in commercial banks in the end of 1999 [2]. Thus, Ukraine can be seen as a representative country.

Dollarization exists when residents hold a significant share of their assets in the form of FC, notably US dollar, and FC denominated assets. It may represent both currency substitution (CS), that is used for transaction purposes, and asset substitution (AS), that serves as mean of savings. As IMF [3] argues, CS typically arises under conditions of high inflation when the high cost of using domestic currency for transactions prompts the economic agents to look for alternatives; AS results from the firms' and households' allocation decisions based on the risk and return characteristics of domestic and foreign assets.

Dollarization typically occurs in high inflation countries with underdeveloped capital markets, where the domestic currency cease to be an efficient means of store of value, unit of account and medium of exchange. FC — most often, dollar — partially undertakes these functions. Calvo and Vegh [4] suggest the sequencing of the process of undertaking the money functions by foreign money. It starts when FC replaces domestic currency as a store of value. As high inflation continues, many prices, especially for real estate and durable goods, begin to be quoted in FC. Prolonged periods of high inflation may also induce the public to carry out transactions, especially those involving expensive items, in FC.

Dollarization brings in some advantages, but has also its costs. On the one hand, it benefits the country through closer integration with international markets, a wider range of financial assets for citizens, enhancing financial intermediation [3]. On the other hand, dollarization negatively affects the economic policy options through a number of channels. Macroeconomic stability becomes an even more important issue in transition economies at presence of CS and AS:

- monetary policy conduct becomes more difficult, as relevant monetary aggregate may include FC expressed in domestic currency terms and could not be directly controlled by monetary authority [5];
- inflationary consequences of financing fiscal deficit are worse [4], seignorage revenues are smaller [6];

- optimal choice of the exchange rate regime is challenged by the presence of CS and AS [7];
- risk of crisis in financial and foreign exchange markets increases as swings in capital flows (and in exchange rate) enhance the probability of banking crisis due to assets and liabilities mismatch and lower borrowers' ability to repay [3].

In transition economies dollarization quickly reached significant levels, which can be partly explained by a stock adjustment after restrictions were left. However, it may be argued that the primary reason was the combination of high inflation rates and widespread regulations on interest rates rendered real returns on domestic-currency-denominated assets quite unattractive. The evidence also shows, that unlike what has been observed in Latin America, dollarization has fallen substantially after successful stabilization plans in Estonia, Lithuania and Poland [5].

The objective of this paper is to find out whether dollarization in Ukraine represents any AS and whether asymmetry exists in the substitution between domestic and foreign currency. More specifically, I test econometrically two hypotheses on the Ukrainian data:

- the demand for FC and FC denominated assets by residents is driven by the relative rate of return on domestic and foreign currency;
- the existence of hysteresis (downward rigidity) in dollarization pattern.

The paper finds that relative change in profitability of domestic and foreign currency denominated assets appear to be significant determinant of dollarization in Ukrainian economy, while the existence of hysteresis in the pattern of dollarization is not confirmed by the evidence. The results should be treated very cautiously, however, in spite of data limitations, as cash holding and crossborder deposits have not been incorporated into dollarization ratio. Still, significance of real returns difference suggests there exist a room for economic policy to dedollarize the economy through creation of interest rate wedge in favor of domestic assets. This could not result, however, from artificial measures of keeping and interest rate high, but is likely to be a consequence of a sound economic policies and a prolonged experience of stability.

A literature on dollarization has become quite extensive in recent years. Large part of it comes under the title of currency substitution. As Giovannini and Tuttelboom point out, the terminology used in the literature is rather confusing [8]. Following Sahay and Vegh, in this paper I use the term "dollarization" to define the phenomenon of using FC as a store of value, a unit of account, and a medium of exchange, while the term "CS" reflects only the use as a medium of exchange [5]. In the early CS model of Calvo and Rodriguez demand for FC relative to domestic one depends on the opportunity costs of both currencies, i.e. the domestic and foreign nominal interest rates [9]. Bran-

son and Handerson [10] and Miles [11] introduce a portfolio balance formulation. Thomas (1985) presents the model of AS based on a C APM, where consumer's optimal choice of total foreign currency depends on the real return differential in addition to risk considerations [12]. Calvo and Vegh [4] and Giovannini and Tuttelboom [8] provide a comprehensive overview of the theoretical research into the issue and empirical works for developing countries. Persistence of dollarization after stabilization led to variety of explanations of the hysteresis. Uribe develops a model where cost of buying goods with a foreign currency is decreasing, as the economy accumulated the experience in transacting in the FC [13]. Ize and Levy-Yeyati extend the framework of asset portfolio balance and argue that financial equilibria gravitate around interest rate parity and minimum variance portfolio allocations, and dollarization is explained by the volatility of inflation and interest rate depreciation rather than the expected inflation and depreciation [14]. Sahay and Vegh [5] and van Aarle and Budina [6] provide an early overview of the dollarization patterns in transition countries. More recently, Mongardini and Mueller apply the ratchet variable technique to test the hysteresis in dollarization in Kyrgyz republic [1]. IMF discusses the monetary policy in the presence of dollarization and design of IMF-funded programs' experience [3]. Berg and Borensztein consider an optimal choice of the exchange rate regime and monetary target under dollarization [7].

2. Theory

I adopt the theoretical framework developed in Sahay and Vegh [5]. Assume a one-good two-country world where consumers may hold four assets: domestic currency, FC, domestic bonds (denominated in domestic currency) and foreign bonds (denominated in FC). Consumer will hold currencies only if they provide some liquidity services, because currencies do not bear interest. Therefore, real domestic money balances m and real foreign currency balances f reduce transaction costs, which are given by

$$s = cv \left(\frac{m}{c}, \frac{f}{c} \right), \quad (1)$$

$$v \geq 0, \quad v_1 \leq 0, \quad v_2 \leq 0, \quad v_{11} > 0,$$

$$v_{22} > 0, \quad v_{12} > 0, \quad v_{vv} v_{22} - v_{12}^2 > 0$$

where s is shopping time, c is real consumption. Additional real money balances have positive but diminishing reductions in transaction costs. Both currencies are imperfect substitutes. Bonds do not provide liquidity and are held only as a store of value. Domestic and foreign price levels evolve stochastically, so real returns on bonds are uncertain. Thus, bonds are also not perfect substitutes.

Let θ_j ($j = m, f, b, d$) denote the share of asset j in total financial wealth, $m + f + d + b$, where d is real holdings of domestic bonds and b is real holdings of foreign bonds. $\theta_f + \theta_b$ denotes the fraction of financial wealth denominated in FC or dollarization ratio. The consumer's problem is the optimization of consumption and portfolio structure. If consumer utility function is increasing and strictly concave in c , the first-order conditions are given by:

$$-v_1 \left(\frac{m}{c}, \frac{f}{c} \right) = i \quad (2)$$

$$-v_2 \left(\frac{m}{c}, \frac{f}{c} \right) = i^* \quad (3)$$

$$\theta_f + \theta_b = [i^* - (i - e)] \Gamma \quad (4)$$

where Γ is a term involving variability of returns and the degree of risk aversion, i^* and i are domestic and foreign nominal interest rates, e is devaluation rate of the domestic currency. In the absence of AS, the relative demand for monies would be determined by nominal interest rates, as follows from equations (2) and (3). If AS is present, as follows from equation (4), consumer optimal choice of share of FC denominated assets depends only on risk aversion and real return differential. Therefore, keeping other things constant, dollarization depends negatively on i , reflecting higher return on domestic currency denominated assets, and it depends positively on i^* and e . Due to risk considerations, uncovered interest parity does not lead to complete shift to assets denominated in one currency.

Following Mongardini and Mueller, the existence of asymmetry in dollarization patterns is explained by the fixed costs of developing, learning and applying new money management techniques to "beat" inflation. When these costs are paid for, incentives for households and enterprises to switch back to the domestic currency after achieving macroeconomic stabilization diminished. The result is a ratchet effect on the relative demand for foreign and domestic currency. The demand for FC rises when the return on FC assets rises, but falls by a lesser extent when the return on domestic currency assets increases [1].

3. Data and Methodology

Econometric specification should include difference of the real rates of return on domestic currency and FC denominated assets. Ratchet variable is added to capture the possible hysteresis. Portfolio choice is based on the difference between the real rates of return on domestic and FC. This is uncertain, however, because devaluation rate is not known. Consider three types of expectations formation. First, expectations are rational and realized devaluation over the next period is equal the expected one. Second, expectations are adaptive: expectations of "equilibrium" depreciation over

the next period are based on realized depreciation during this period and previous period's estimation of "equilibrium" depreciation. Third, expectations of depreciation over the next period are based on realized depreciation during this period. Three following specifications correspond to these formulations.

$$DR_t = \alpha + \beta_1 RETDIF_t + \beta_2 RATCHET_t + u_t \quad (5)$$

$$DR_t = \alpha + \beta_1 RETDIF_t + \beta_2 RATCHET_t + \beta_3 DR_{t-1} + u_t, \quad 0 < \beta_3 < 1 \quad (6)$$

$$DR_t = \alpha + \beta_1 RETDIF_t + \beta_2 RATCHET_t + u_t \quad (7)$$

where DR_t is a dollarization ratio, share of FCD in all deposits in the domestic banking system, $RETDIF_t$ is a difference between real rates of return on FCD, $i_t^* + e_{t+1}^e$ (where $e_{t+1}^e = e_{t+1}$), and domestic currency deposits, i , $RATCHET_t$ is a largest achieved value of DR_t over the period 1 to $t-1$ (defined as in [1]).

The hypothesis that the demand for FC and FC denominated assets by residents is driven by the uncovered interest parity, i.e. the difference between the real rates of return on domestic and foreign currency is tested by the significance of β_1 . The hypothesis of the existence of hysteresis in dollarization pattern is tested as a significance of β_2 . In case of (6) the long-run impact of returns difference due to autoregressive structure of the model is to be equal $\frac{\beta_1}{1-\beta_3}$ [15].

The choice of time series to use in econometric estimations was motivated by the following considerations. Three types of FC (dollar) denominated financial assets are usually considered to capture fully the dollarization phenomenon. First is a FCD in the domestic banking system, second is dollar currency in circulation within the domestic economy, and third is cross-border deposits held by domestic residents at banks abroad [3].

Dollarization is usually proxied by FCD as a share of all deposits in the banking system. While the data on cash in circulation and cross border deposits are limited, data on FCD are available for most transition countries. For Ukraine, the National Bank's data, as reported in International Financial Statistics, cover the period starting end-1992. Accounts in domestic currency are effectively convertible into FCD by withdrawing cash hryvnias, converting them into foreign currency, and redepositing. TACIS argues, that dollarization ratio is higher for cash than for deposits, so that actual dollarization is likely to be higher than the FCD share of all deposits [16]. What is important for this paper is that dynamics may be similar.

After independence in 1991 Ukraine entered a period of sharp macroeconomic instability. In the face of high inflation, the liberalization of foreign exchange rate regime laid the ground for dollarization, which was sustained by the underdevelopment of capital market and the lack of the alternative financial instruments. Thus, dollarization ratio exceeded 20 % by the beginning of 1993 [17].

The next rapid increase in dollarization ratio happened in fall of 1994, when the newly elected President Kuchma launched reform program with the immediate liberalization of many prices and unification of foreign exchange rate, that was accompanied by sharp depreciation. During just fourth quarter of 1994 dollarization doubled, reaching 45 %.

In 1995 exchange rate-based stabilization began and the rate of depreciation slowed. Since then until the end of 1997, the interest rate on hryvnia deposits exceeded depreciation. Predictably, dollarization ratio gradually declined to 25 %. Exchange rate stability was ruined again in the aftermath of Russian financial crisis, and until now depreciation rate in quarterly terms has been higher than interest rate on hryvnia deposits. Dollarization again increased, almost reaching the previous peak of early 1995 by the end of 1999. FCD exceeded \$1b at the end of 1999.

National Bank of Ukraine reports average interest rates on hryvnia deposits and exchange rate of hryvnia to foreign currencies. Reserve requirements for FCD in Ukraine are the same as for hryvnia deposits, and are stated in hryvnia terms. To contain foreign exchange risk, limits on foreign exchange position are imposed. Starting late 1998 it equals 30 % of the bank's capital. Therefore, commercial banks' demand for FCD depends on changing needs to keep their open position in check, which is influenced by the demand for loans denominated in FC.

The complication with $RETDIF_t$ series is that Ukrainian commercial banks had not reported interest rates on FCD until 1998. Therefore I performed two estimations, covering two periods with different frequencies. The first employs monthly observations over 1998—1999 and includes interest rates on FCD in calculating return on FC denominated assets. The shortcoming of this formulation is a short period of portfolio choice — one month, while most time and savings deposits are made for a longer periods. The second covers the period of 1993—1999 with quarterly observations, but the return on FC denominated assets is postulated to equal only exchange rate depreciation rate. The consumer's choice in this case consists of choosing between cash FC and hryvnia deposits. Additional assumption is to be made for specified dollarization ratio not lose sense. Let's assume, that economic agents hold a fixed share of their FC holdings in the form of cash. Cash dollars are used not

only for transaction purposes, which are determined by equations (2) and (3), but also as a store of value.

The exchange rate used in the estimation is UAH/\$ official rate of the National Bank of Ukraine. Interest rates and exchange rate series are period averages, while dollarization ratio is calculated as of end-period.

Results of the Augmented Dickey-Fuller test for stationarity for each time series are presented in Table 1. Dollarization ratio and ratchet variable for both time periods turned out to be non-stationary, while for all the other series the null-hypothesis of a unit-root can be rejected at 1 % and 5 % significance level. Non-stationarity suggests that level estimations may result in a spurious regression, that lead me to estimation in first-differences [15]. In first differences, series appear to be stationary.

tion ratio on 0,05 %. The possible explanations are that economic agents are learning through time to react to profit opportunities, so that by the 1998 they quicker shifted the portfolio, transaction costs diminished, and both currencies denominated assets became closer substitutes.

The existence of hysteresis in the pattern of dollarization is not confirmed by the estimations. A decrease in relative return on the asset induces the same amount of change in dollarization, as increase in relative return does.

The results should be treated very cautiously, in spite of stated data limitations and changes in regulations and economic environment during the period under study. In particular, due to evidence of growing foreign cash holdings in Ukraine, the discrepancy bet-

Augmented Dickey-Fuller Test

Table 1

| Monthly series 1998:1—1999:12 | Test statistics | Critical Values | Reject Unit Root |
|--------------------------------|-----------------|-----------------|------------------|
| DR | 1.0722 | 10% -1.6238 | no |
| RETDIF | -2.9553 | 1% -2.6756 | yes |
| RETDIFI | -3.0366 | 1% -2.6756 | yes |
| RATCHET | 1.0038 | 10% -1.6238 | no |
| Quarterly series 1993:1—1999:4 | | | |
| DR | -1.6245 | 10% -2.62 | no |
| RETDIF | -3.4 | 5% -2.97 | yes |
| RETDIFI | -5.22 | 1% -3.7 | yes |
| RATCHET | -1.64 | 10% -2.62 | no |

4. Results and Policy Implications

The estimation results using OLS are presented in Table 2. The estimation on 1998—1999 monthly observations seems to give better results, that can be explained by the more proper formulation of real returns difference. Relative change in profitability of domestic and foreign currency denominated assets appear to be significant determinant of dollarization in Ukrainian economy. The results also suggest that economic agents base their expectations of exchange rate depreciation over the next period on this period realized rate of depreciation. A1 % change in relative return on FCD lead to change in dollarization ratio on 0,17 %. The lagged dependent variable' coefficient is insignificant, so there is little evidence of adaptive expectations. The coefficient of *RETDIF7*, is also not significant, leading to the conclusion that firms and households fail to predict exchange rate depreciation over the next period.

The estimation performed on 1993—1999 quarterly observations gives smaller response of dollarization to the difference in returns. A1 % change in relative return on foreign deposits lead to change in dollariza-

tion between actual dollarization and dollarization ratio used in this study may be growing with time. Besides, evidently larger share of FCD is used as a store of value, compared with cash, thus, the choice of FCD as proxy for dollarization may lead to overly conclusion of AS persistence.

Still some important policy implications follow. First, the level of dollarization in Ukraine is quite high and macroeconomic policy cannot disregard it. Both fiscal and monetary policies are constrained by its presence. For instance, the National Bank of Ukraine should ideally have sufficient foreign exchange reserves to forestall a run on FCD [3]. At present, NBU's international reserves are of same magnitude as FCD. This fact combined with substantial external debt repayments leaves less room for exchange rate policy, suggesting more flexible exchange rate determination.

Second, significance of real returns differential suggests, that large part of dollarization in Ukraine constitute AS, as opposed to CS. Firms and households use FC mostly as a store of value, not as a medium of exchange. If the latter was dominant, nominal interest

Table 2

OLS Estimations Results

A. Estimations based on monthly data 1998:1—1999:12 (p-values in parentheses)

| | EQ1 | EQ2 | EQ3 | EQ4 | EQ5 |
|--------------------|----------------------|-----------------------------|------------------------------|------------------------------------|-----------------------------|
| C | 0.006353 (0.0855) | 0.006069 (0.1272) | 0.006585 (0.1078) | 0.006991 (0.1429) | 0.006486 (0.239) |
| RETDIF | 0.001729 (0.0008) | 0.001731 (0.0012) | 0.001729 (0.0011) | | |
| RETDIF1 | | | | 0.00028 (0.6215) | 0.000367 (0.6156) |
| RATCHET | | | - 0.03231 (0.8796) | | 0.068691 (0.8443) |
| DR(-1) | | -0.08405 (0.6315) | | | |
| R-squared | 0.420655 | 0.433985 | 0.421336 | 0.011815 | 0.013767 |
| S.E. of regression | 0.016865 | 0.017124 | 0.017271 | 0.022026 | 0.022547 |
| Durbin-Watson | 2.476479 | 2.090818 | 2.422771 | 1.960137 | 2.037405 |
| F-statistic | 15.24783 | 7.28402 | 7.281194 | 0.251073 | 0.13959 |
| Prob(F-statistic) | 0.000815 | 0.004486 | 0.00421 | 0.621533 | 0.870555 |
| Observations | 23 | 22 | 23 | 23 | 23 |

B. Estimations based on quarterly data 1993:1—1999:4 (p-values in parentheses)

| | EQ15D | EQ21 | EQ22 | EQ24 | EQ25 | EQ26 | EQ27 |
|--------------------|----------------------|-----------------------------|---------------------------|------------------------------------|-----------------------------|-----------------------------|-----------------------------|
| C | 0.005877 (0.6121) | 0.009705 (0.3646) | 0.008679 (0.4436) | 0.007994 (0.4845) | 0.009278 (0.4459) | 0.008916 (0.4739) | 0.008089 (0.4906) |
| RETDIF | | 0.000463 (0.0086) | 0.00051 (0.012) | 0.000524 (0.0125) | | | 0.000525 (0.0145) |
| RETDIF1 | - 0.00027 (0.094) | | | | -0.00032 (0.0632) | -0.00034 (0.0642) | |
| RATCHET | | | | 0.189143 (0.5365) | -0.32496 (0.2631) | -0.1697 (0.7465) | 0.14764 (0.7734) |
| DR(-1) | | | 0.112377 (0.58) | | | -0.13039 (0.7219) | 0.03467 (0.9187) |
| R-squared | 0.10809 | 0.245649 | 0.256764 | 0.259265 | 0.161436 | 0.166362 | 0.259624 |
| S.E. of regression | 0.059242 | 0.054482 | 0.056371 | 0.056276 | 0.059877 | 0.061043 | 0.057527 |
| Durbin-Watson | 2.166156 | 2.231096 | 2.414056 | 2.353258 | 1.74 | 1.631642 | 2.389371 |
| F-statistic | 3.029733 | 8.141079 | 3.972887 | 4.025122 | 2.213916 | 1.463452 | 2.57154 |
| Prob(F-statistic) | 0.094048 | 0.008566 | 0.032958 | 0.031705 | 0.132029 | 0.251809 | 0.080064 |
| Observations | 27 | 27 | 26 | 26 | 26 | 26 | 26 |

rates would be important factors (follows from (1) and (2)), while real returns would be less significant.

Third, unlike what have happened in Latin American, there is no evidence so far of downward rigidity in dollarization pattern in Ukraine. This implies, that higher real rates of return on hryvnia-denominated assets, such as commercial banks deposits, have a potential to diminish the level of dollarization in Ukraine.

A 6 % net interest rate difference in favor of hryvnia deposits will lead to a decrease in dollarization by 1 %.

However, the room for decreasing is limited, because globalization of goods, services and financial markets expect some level of dollarization to be an outcome of portfolio diversification.

Decrease of dollarization would contribute to improving monetary policy toolkit, lessen the negative

consequences of fiscal deficits and decrease the probability of banking crises. However, the direction of causation most possibly goes the other way. As Sahay and Vegh put it:

"Dollarization is often one of the manifestation — and certainly not the cause — of underlying fiscal and monetary disequilibria which are reflected in chronic fiscal deficits and accommodative monetary and exchange rate policies. Attacking the symptoms of the disease rather than its root causes may very well worsen the situation" [5].

IMF programs has not included explicit measures to reduce dollarization, as IMF explains "on the grounds that it is an inconvenience that will go away once its underlying causes have been corrected" [3].

During 1996—1997 Ukraine experienced a period of reversal in dollarization, which was inspired by high interest rates on t-bills. To finance substantial fiscal deficit, the government was inclined to pay high rate. As a result, many economic agents switched large part of their portfolio into t-bills. The Russian crisis of 1998 contributed to ruining the subtle balance of rolling over the government debt and period of financial instability followed. Thus, dedollarization is not likely to result from artificial measures of keeping an interest rate high, but could to be a consequence of an overall sound economic policies and a prolonged experience of stability.

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ЧИ ПРИСУТНІЙ МОТИВ ЗАМІЩЕННЯ АКТИВІВ В УКРАЇНСЬКІЙ ДОЛАРИЗАЦІЇ?

Феномен доларизації — утримання резидентами частини своїх активів у формі іноземної валюти та деномінованих у валюті активах — став поширеним у країнах з перехідною економікою. У цій роботі на основі українських даних тестуються дві гіпотези. По-перше, чи визначається рівень доларизації міркуваннями оптимізації портфеля активів, тобто залежить від різниці ставок доходу? По-друге, чи існує "гістерізіс" у доларизації української економіки? Результати економетричної оцінки засвідчують, що різниця ставок доходу у гривнях та іноземній валюті суттєво впливає на рівень доларизації, з чого можна зробити висновок про домінування в доларизації мотивів заощадження. Однак, на відміну від досвіду країн Латинської Америки, не знайдено підтвердження негнучкості рівня доларизації у сторону зменшення. При оцінці результатів слід визнати істотні проблеми з точністю та всеохопністю даних.