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The Measurement of Co-Circulation of Currencies and Dollarization in the Republic of Armenia

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Abstract

This paper attempts to estimate the actual (de facto) level of dollarization in Armenia. "Co-circulation" involves the regular use of two or more currencies within an economy. The existence of an unknown amount of foreign currency in circulation makes the outcome of domestic monetary policy uncertain. The volume of foreign currency deposits is easily obtained from the official statistics. However, it is very hard to determine the stock of foreign currency in circulation. The effective money supply may be much larger than the domestic money supply and is subject to behavioral responses which are very different than the movements of the presently measured money supply. The purpose of this paper is to assess the level of dollarization, that is, to evaluate the size and/or proportion of foreign currency in the total money stock of Armenia as a highly dollarized country.

JEL Classification: E4, E5, F3, G21, P2, P3

Keywords: dollarization, currency substitution, asset substitution, foreign currency, transition economies, Armenia

1. Introduction

After most restrictions on foreign currency holdings were relaxed in the early 90s, foreign currency notes and deposits in Armenia have been increasing rapidly. At present, foreign currency (principally the U.S. dollar) is widely used in the Republic of Armenia as a medium of exchange and as a means of saving in preference to the domestic currency. Residents hold about three quarters of their total deposits in foreign currency. These deposits constitute about half of broad money. Foreign currency in circulation and deposits, therefore, must be regarded as part of the country's money stock.

Dollarization is an important issue in many developing and transition economies. Currency substitution in developing and Eastern European countries is usually one of the consequences of high and variable inflation. High inflation, in turn, leads to dollarization and eventually to currency substitution. However, high inflation is not the only cause of dollarization.

The issue of currency substitution gained high importance in Eastern European and Former Soviet Union (FSU) countries since the early 90s when the command economy broke down and the newly established market economies became open to the outside world. High inflation and economic instability were present in Armenia in the early years of transition. The volume of foreign currency stock, especially U.S. dollars, increased rapidly under these conditions and became a major part of Armenia's money stock. Monetary stabilization in the late 90s did not substantially reduce the level of dollarization as measured by deposits. Thus the causes why businesses and households prefer to maintain their monetary holdings in foreign currency cannot be explained only by inflation. Other factors, such as the openness of the economy, economic uncertainty,

lack of confidence in the domestic currency, play an important role in the high level of dollarization. It appears that unofficial dollarization reflects citizens' perceptions of the stability of the domestic monetary regime, the credibility of monetary policies and the perceived stability of the domestic banking system.

Thus dollarization is viewed as a long-term phenomenon in the Armenian economy and its measurement is essential for the country's monetary policy and for increasing the quality of the national statistics.

Co-circulating foreign currency holdings reflect both currency substitution and asset substitution. The two may have different economic consequences, making the implications of unofficial dollarization for macroeconomic decisions more difficult to predict. The greater the extent and variability of dollarization, the weaker is the central bank's knowledge of and control over the effective money supply. Growing unofficial dollarization reduces the ability of the monetary authority to earn seigniorage from its own currency issue.

Despite the substantive importance of the issues cited, there is very little empirical information concerning the actual extent of unofficial dollarization in Armenia. This paper intends to measure the level of dollarization in Armenia. The results will also have implications on national statistics. The estimated data on foreign currency will help measure effective monetary aggregates; improve balance of payments statistics, the international investment position, and monetary statistics. The data on unofficial dollarization will also help estimate the real size of capital flows and thus identify suspicious currency movements.

There is an extensive literature on causes and implications of dollarization worldwide. Tobin (1980) argued that excessive variability caused by floating exchange rates encouraged dollarization in developed countries. Since the mid-80s, focus has shifted towards the determinants and characteristics of the currency substitution in developing countries (Ortiz, 1983; Canto, 1985; Ramirez-Rojas, 1985; etc.). However, the main focus here was on official dollarization. The issue of measuring dollarization became crucial since mid-90s, but most researches have concentrated on finding the volume of currency outside issuing countries (Feige 1996, 1997; Porter and Judson, 1996). Several researchers viewed currency substitution as basically unobservable (Calvo and Vegh, 1992).

The introduction of the Euro enabled some countries with high euroization (D-Markization) to estimate the volume of Euros in circulation. Based on the amounts of Euros that replaced the Deutsche mark, foreign currency in circulation was estimated, for example in Croatia (Feige, 2002). However, this technique could not be applied in Armenia, where euros make only 3-5% of foreign currency in circulation[1]. Feige (2002) has estimated de facto dollarization in FSU countries, including Armenia. However, the estimates were based on indirect methods and even the author admitted that actual holdings of foreign cash could be significantly different.

The results reported in this paper are based on a survey of 700 Armenians from different strata of society and from urban and rural areas. Our results differ significantly from and are much higher than Feige's estimates but are more or less in line with the ratio of foreign currency deposits to total deposits in Armenian banks.

The paper is organized as follows: Section II briefly reviews some key definitions. Section III briefly describes the macroeconomic situation in Armenia and the levels of

[1] Estimates of the Central Bank of Armenia

dollarization in comparison with other CIS countries and discusses the reasons for persistence of dollarization; this section also shows that the U.S. dollar is the principal foreign currency used in Armenia and the use of other currencies is negligible. Section IV describes the methodology of the survey. Section V presents results of the survey which indicate that de facto dollarization – calculated as the percentage of total foreign currency in effective money supply – is over 81%. Section VI presents other estimates of unofficial dollarization in Armenia and FSU countries and compares those estimates with the results of our survey; the section concludes that prospective economic developments in Armenia will reduce dollarization. Section VII summarizes the findings.

2. Definitions of Dollarization

"Co-circulation" involves the regular use of two or more currencies within an economy. Dollarization could be defined in the broadest terms as the use of foreign currency as a store of value as a medium of exchange, and as a unit of account. Dollarization is a generic term used to characterize any currency that effectively serves as a replacement for the national currency, i.e., the substitute currency need not be the U.S. dollar.
There are several measures of dollarization in an economy with unofficial dollarization. When describing the dollarization level in Armenia, we follow the definitions by Feige, et. al. (2000):

$$BM = DCC + DDD + DTD + FCD \quad (1)$$

where BM is broad money, DCC is domestic (dram) currency in circulation, DDD is dram demand deposits, DTD is dram time and savings deposits and FCD is foreign currency deposits.

$$EBM = BM + FCC \quad (2)$$

where EBM is the effective broad money supply and include FCC, foreign currency in circulation.

$$NM = DCC + DDD \quad (3)$$

where NM is the narrow money supply and excludes any foreign currency.

$$ENM = NM + FCC \quad (4)$$

where ENM is the effective narrow money supply and includes foreign currency cash. Finally,

$$QM = DTD + FCC \quad (5)$$

where QM is quasi money. Under this definition of QM foreign currency in circulation is seen as a form of asset substitution.

Measurement of FCC is difficult and is not included in the standard definition of the money supply. However, in countries with high dollarization foreign currency serves as a unit of account, store of value and, usually, as a circulating medium of payment. Due to the lack of data on FCC, research on the currency substitution process has been forced to accept FCD as a proxy for dollarization. The common dollarization index (DI), used by the IMF, is:

$$DI = FCD/BM \qquad (6)$$

However, in countries like Armenia with high levels of dollarization, the exclusion of FCC biases downward all measures of dollarization. Feige defines the unofficial dollarization index (UDI) as percentage of foreign monetary assets in effective money supply:

$$UDI = (FCC + FCD) / EBM \qquad (7)$$

Another measure of dollarization is the asset substitution index (ASI):

$$ASI = FCD / (DDD + QM) \qquad (8)$$

ASI is useful when dollarization primarily takes the form of asset substitution in the country. On the other hand, in countries where foreign currency is partly or entirely used as a unit of account and medium of exchange, the currency substitution index (CSI) is a very good measurement of dollarization.

$$CSI = FCC / (FCC + DCC) \qquad (9)$$

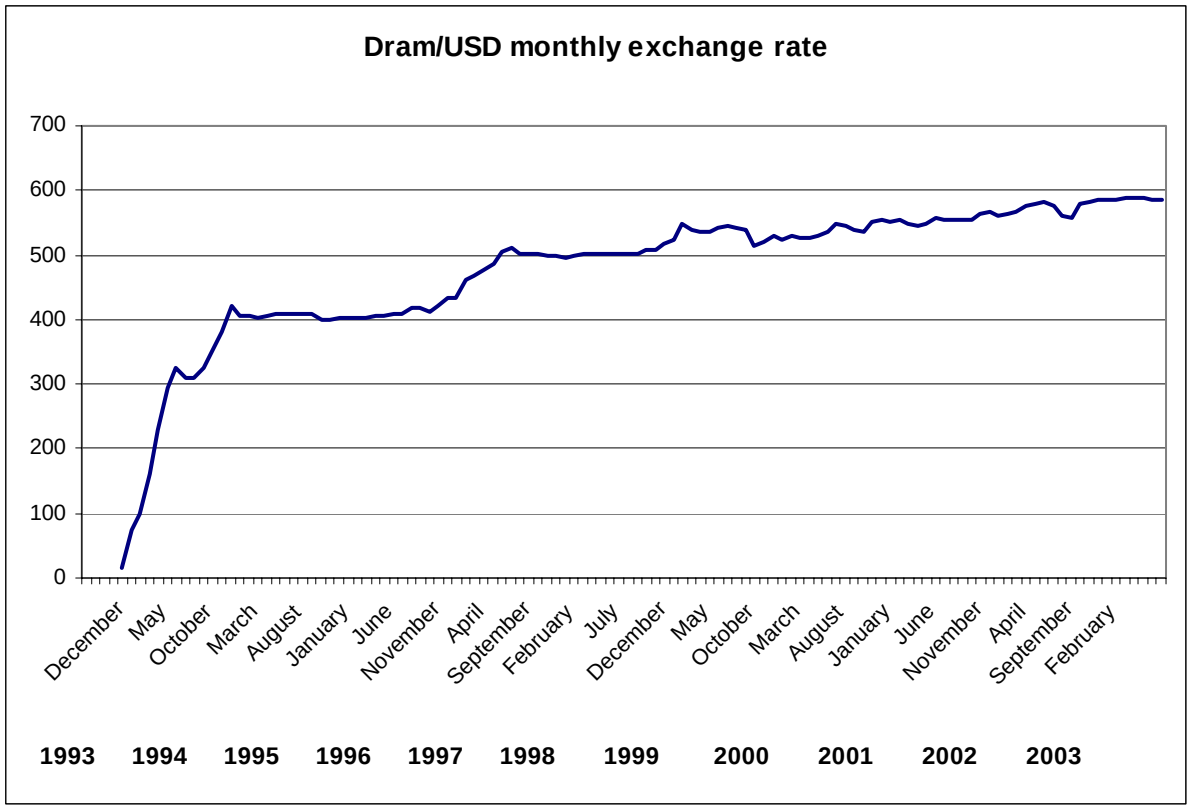
3. Macroeconomic Situation and Dollarization in Armenia

A. Background

At the outset of transition, there was very limited use of foreign currency in the countries of the Former Soviet Union (FSU). As restrictions on holding foreign currency were relaxed, most economies experienced high and volatile inflation rates along with sharply depreciating exchange rates. These phenomena severely hindered the basic functions of domestic money and encouraged dollarization as an inflation hedge. However, despite successful stabilization from the mid-1990s, the degree of dollarization remains high.

The introduction of the Armenian national currency, the dram, in November 1993, encouraged dollarization, as depreciation of the dram was very high during its first few months (Figure 1). However, the pace of depreciation of the dram slowed in the following years, when inflation was low and economic growth steady (Table 1).

Figure 1: Dram/US$ exchange rate



Source: Central Bank of Armenia (CBRA).

Table 1:Annual Inflation, Current Account Balance and Economic Growth in Armenia

	Inflation	Current Account Balance, % of GDP	Growth Per cent change, p.a.
1994	1762	-16.6	5.4
1995	32.2	-17.0	6.9
1996	5.7	-18.2	5.9
1997	21.9	-18.7	3.3
1998	-1.3	-21.3	7.3
1999	2.0	-16.6	3.3
2000	0.4	-14.5	5.9
2001	2.9	-9.5	9.6
2002	2.0	-6.8	12.9
2003	8.6	-6.7	13.9

Source: National Service of Statistics of Armenia (NSSA)

Since independence, Armenia has made considerable progress in stabilizing its economy. The Armenian economy has grown steadily since 1994.[2] At the same time, the inflation rate started to decline and the exchange rate began to stabilize as monetary policy

[2] Economic growth in Armenia began earlier than in other FSU countries, however, the decline in the early 90s was one of among the highest in FSU. In 1993, Armenian GDP was 45% of the 1989 level.

frameworks gained credibility. This recovery was slowed down by the 1998 Russian crisis but only briefly. The Russian recovery after 2000 and significant capital inflows from the Armenian diaspora in the U.S. boosted the Armenian economy. Since 2001 annual growth rates exceeded 9%. Despite the stabilization, dollarization as measured by deposit ratios remains high (Table 2).

Table 2: Ratio of foreign currency deposits in Armenia

	DI	Percentage of foreign currency deposits in total deposits
1992	29.3	38.2
1993	44.6	62.7
1994	40.9	67.9
1995	20.4	52.5
1996	21.0	58.3
1997	33.5	72.2
1998	40.6	70.8
1999	48.1	79.3
2000	49.1	81.1
2001	50.3	81.1
2002	38.8	69.0
2003	42.9	70.8

Source: CBRA. Measurements of dollarization do not include FCC since reliable data are not available.

Significant drops in the levels of dollarization in 1995 and 2002 are related to bank failures. Several failed banks with large foreign currency deposits were excluded from the calculation of broad money.

B. Comparison with other FSU Countries

Armenia is one of the most highly dollarized economies in the former Soviet Union As Table 3 shows, dollarization is highest in the Caucasus region (Armenia, Azerbaijan, Georgia) and the lowest in the Baltic States (Estonia, Latvia, Lithuania) and Russia and the Ukraine.

According to Balino (1999) "highly dollarized" countries are those where DI is higher than 30%. Thus, most FSU countries fit into this definition. For all three countries in the Caucasus region, the difference between DI and percentage of foreign currency deposits in total deposit is high, for these are cash economies with proportionately high levels of DCC. Given these conditions, high deposit dollarization suggests that the ratio of foreign currency in total currency in circulation may also be high in Armenia. Therefore, estimation of FCC is very important in evaluating overall monetary conditions and economic activity.

Table 3: Dollarization indexes in FSU countries (%), 2001

Country	DI	Percentage of foreign currency deposits in total deposits
Armenia	50.3	81.1
Azerbaijan	48.9	85.3
Belarus	52.6	65.7
Estonia	17.2	21.0
Georgia	44.9	88.9
Kazakhstan	46.0	60.5
Kyrgyz Republic	25.1	63.4
Latvia	30.7	45.2
Lithuania	33.1	43.2
Moldova	27.9	44.8
Russia	24.5	33.8
Tajikistan	41.3	72.8
Turkmenistan	39.9	57.8
Ukraine	20.6	32.9
Uzbekistan	24.4	37.6

Sources: IMF International Financial Statistics and Annual Reports of Central Banks of FSU countries

C. Reasons for Persistence of Dollarization

While investigating the factors contributing to high levels of dollarization in Armenia is beyond the scope of this paper, it is useful to review arguments for why dollarization tends to persist so the level of present dollarization in Armenia can be better understood. .

Persistence has been attributed to the "hysteresis" effect. (Oomes, 2003; Havrylyshyn and Beddies, 2003). Hysteresis refers to the fact that dollarization remains high even in the face of declining inflation. Hysteresis occurs because some costs associated with currency substitution make dollarization costly to reverse. Once people have adjusted to macroeconomic instability by switching to a foreign currency and reduce the demand for real domestic money balances, they lack confidence in the domestic currency for a long time even if macroeconomic fundamentals improve sharply.

Apart from the hysteresis effect, several other factors exist in Armenia that contributes to high level of dollarization.

1. *Small size and openness of the Armenian economy.* Armenia is highly dependent on foreign trade. On the average, imports of goods and services were about half of GDP over 1996-2002, exports about a quarter. Openness increases the demand for foreign currency.

2. *Dependence on private transfers from abroad.* Armenia has traditionally been dependent on remittances from abroad from the large Armenian Diaspora. This has increased the economy's bias toward dollarization. Private transfers more than doubled over 1998-2002 (Table 4). The volume and percentage of private transfers in GDP have been

growing steadily since 1998. Private transfers are about a fifth of the country's GDP and have a sizable effect on the economy.

Table 4: Remittances of individuals through the banking system of Armenia[3]

Year	**Inflow**		**Outflow[4]**		**Net**	
	Million USD	% in GDP	Million USD	% in GDP	Million USD	% in GDP
1998	218.9	12.5	133.2	7.6	85.7	4.9
1999	218.3	12.1	161.5	8.9	56.8	3.1
2000	287.7	15.4	149.5	8.0	138.2	7.4
2001	355.5	16.8	174.7	8.3	180.8	8.5
2002	458.9	19.4	247.0	10.4	211.9	9.0

Source: CBRA

3. *Small size of the banking system.* The Armenian banking system is small and its role in financial intermediation is modest. This reflects the low confidence in the banking system, following the loss of savings in the 1993–94 hyperinflation and the expansion of the informal economy which operates outside official banking channels. While the Armenian economy has been growing since 1994, the banking system is still very weak and is unable to generate sufficient savings for profitable lending opportunities to the formal economy. In 2002, GDP grew by 12.9%, but bank lending grew by only 7.7%. At the end of 2002, banking system assets were only 15 %, and bank capital only 4% of GDP. Lack of trust in the banking system creates large volumes of cash savings, which are held mainly in foreign currency as most people are concerned about the stability of the Armenian dram.

4. *Shortage of alternative saving instruments in the domestic currency.* Market-related savings instruments other than bank deposits and government securities virtually do not exist in Armenia. The stock of government securities is very small (only 2% of the GDP and 5% of total government debt) and over 70% is held by banks. Absence of dram nominated saving instruments reduces the demand for the domestic currency.

D. Types of Foreign Currencies Used in Armenia

The bulk of FCD and FCC in Armenia are denominated in U.S. dollars. As Feige (2002, p. 7) states: "US currency has many desirable properties. It has a reputation as a stable currency, and is therefore a reliable store of value. It is available in many countries, is widely accepted as a medium of exchange, and protects foreign users against the threat of domestic bank failures, devaluation and inflation."

In the early years following the introduction of the dram, the Russian ruble had a fairly significant circulation in Armenia. According to reports from currency exchange bureaus and banks' transactions, the share of the Russian ruble in foreign currency

[3] A large portion of private transfers avoids the banking system. Therefore the actual volume of private transfers is greater.

[4] A significant portion of remittances (estimated at around 30%) from Armenia is made by individuals for business purposes and, therefore, should be classified as imports.

circulation was about 10-15% in 1994 but declined gradually to 3-5% by August 1998, and dropped to less than 1% after the Russian crisis.

Unlike Central and Eastern European countries, the Deutsche mark (DEM) has made few inroads into Armenia. Reports from currency exchange bureaus indicate that the share of DEM in total foreign currency circulation was about 1-2% in the mid-90s and dropped to just 1% in the late-90s.

Shares of other currencies in total currency circulation were negligible. After the introduction of the euro, the share of the new European currency rose to around 5% by the end of 2003. As reporting requirements to banks concerning transactions and deposits in euro are very limited, the main sources of data on use of euro are reports from currency bureaus, on interbank currency market and weekly reports from banks on granted loans and attracted deposits over certain periods of time. According to these reports, the percentage of euro at the end of 2002 was 2.5-3% of turnover of currency bureaus, 3-4% of interbank currency market, and 2-3% of attracted deposits (for December 2002)[5]. The respective ratios for December 2003 are 5-7%, 4-7%, and 4-6%.

At this stage, it is hard to state whether the growth in circulation of the euro is related to the appreciation of the euro against U.S. dollar or is a result of the introduction of a uniform currency for Europe. Whatever is the reason for expansion in use of euro, the circulation of euro in Armenia remains insignificant compared to the U.S. dollar.

The U.S. dollar is the principal currency in Armenia (if not the only one) that acts as a store of value and as a unit of account. The U.S. dollar is also widely used as a medium of exchange. The Armenian dram is used mainly in low value transactions (normally below $50), i.e. to purchase food and utilities. The purchase and sales of capital goods, like property, vehicles, furniture, equipment, computers are always made in U.S. dollars. Prices of goods and services for more than $50 are predominantly quoted in dollars. Many people hold cash dollars as a store of value as they have no confidence in the banking system.

The introduction of high denomination 20,000 and 50,000 dram notes (approx. $35 and $85) did not changes the situation. Furthermore, 50,000 dram notes are rare in circulation and 20,000 notes are not popular with the public. This example of high denomination dram notes is a good illustration of the narrow use of drams for larger transactions.

Although it is hard to predict whether the use of drams will expand in the future, the fact is that foreign currency, primarily the U.S. dollar, performs many money functions in Armenia.[6] Therefore, estimation of the actual stock of foreign currency in Armenia is essential in evaluating the real money supply

4. The Survey

A. Methodology of the Survey

Foreign currency in circulation (FCC) cannot be obtained through reports as general reporting on import and export of foreign currency at customs has virtually been

[5] We present ranges of ratios as the reported data are daily or weekly flow data and variances in different reports are very high.

[6] Drams are used more widely now than in the mid-90s, when they were not even widely used in small transactions.

eliminated. Actual data would be biased even if such reports existed, since firstly, small amounts are not reported and secondly, such reports are usually not accurate. And if all these obstacles were removed, these data would only provide additions to the stock of FCC, not the stock itself.

Surveys provide an alternative for determining the level of FCC. To obtain a more accurate assessment of the level of FCC, we did not ask respondents directly how much foreign curreny they were holding. Rather respondents were asked about their portfolio of cash holding (i.e. the ratio of FCC to DCC or the ratio of FCC to FCD). Since the level of both FCD and DCC is known, it is possible to estimate the level of FCC from this information.

The survey has been conducted among households. While businesses hold substantial amounts of FCC, most non-financial businesses are not legally allowed to hold foreign cash. Therefore, survey results among companies are likely to be biased downward. Instead, we included owners of businesses as households in our sample, where cash holdings of their businesses are considered as holdings of their owners (as is the legal case in Armenia).

Wealth distribution is very unequal in Armenia and, therefore, CSI would vary significantly among different wealth groups. For this reason, the population was split into four wealth groups based on household surveys of 1999 and 2001 and a survey on inequality of consumption and income in 2000, conducted by National Service of Statistics and sponsored by the World Bank. We have also used Lorenz Curve data on distribution of income, constructed by experts of the Central Bank, to estimate holdings of cash by each wealth group. Here we have assumed that the income distribution is the same as distribution of holdings of cash. While wealth and income are normally different, since the market economy is only ten years old in Armenia, the differences between the distribution of income and distribution of holdings of cash should not be high. Furthermore, due to lack of confidence in the banking system most people hold their monetary wealth in the form of cash.

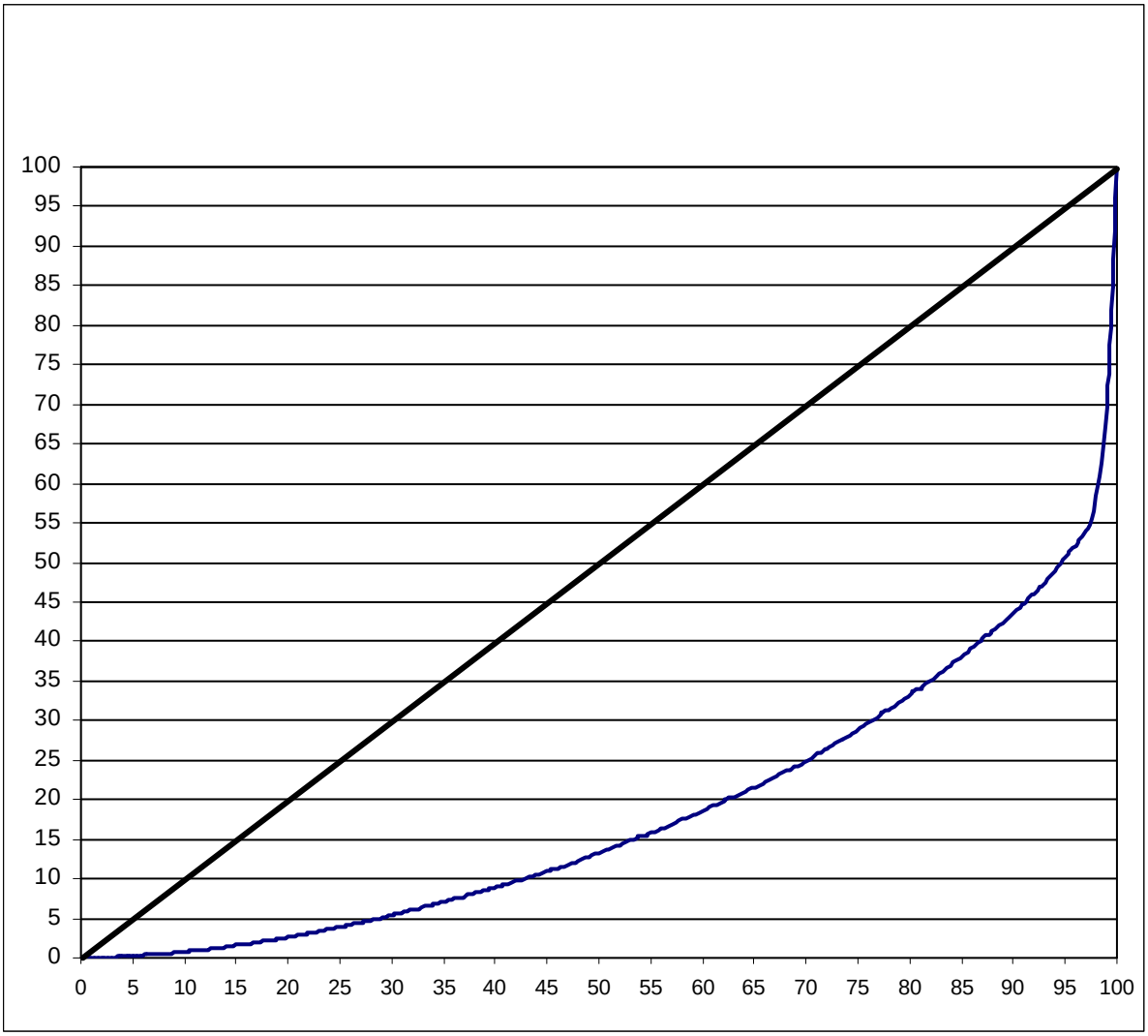
The wealth groups are constructed as follows:

1. Very poor - income below the minimal budget for food (USD 1,350 p.a. for a family of four), 20% of households.
2. Poor - income higher than the minimal budget for food but below the minimal consumer basket (USD 2,190 annually for a family of four), 40%.
3. Middle class - income higher than the minimal consumer basket, 37%.
4. Wealthy – the top 3%.

According to Lorenz Curve data (Figure 2), income of the upper 3% is highly dispersed, which enable to classify this part of the population as "wealthy". The distribution of income among the four groups is the following:

- Very poor, 2.5%
- Poor, 16%
- Middle class, 35.5%
- Wealthy, 46%

Figure 2: The Lorenz Curve for incomes in Armenia, 2000



Source: Estimation of experts of CBRA (G. Aghajanyan, I. Mkrtchyan).

B. Design of the Sample

To estimate the appropriate sample size the following formula was used (Yefimova et al 1998, p. 176, Ionin et al 1998, p. 26):

$$n(x) = \frac{N(x)[\sigma(x)]^2[t(x)]^2}{(N(x)-1)\Delta_x^2 + [\sigma(x)]^2[t(x)]^2}$$

where:
$\sigma(x)$– observed indicator's (CSI) standard deviation in population type x, %;

$t(x)$ – *t*-statistic of population type x;
Δx – error target in the population, %;
$n(x)$ – the size of the sample of x; $x = 1,\ldots,4$; i.e., the four classes of very poor, poor, middle class, rich respectively;
$N(x)$– the size of the population for each of the four classes.

In our statistical estimation based on previous surveys we assume that:
$\sigma(1)=20\%$, $\sigma(2)=25\%$, $\sigma(3)=10\%$, $\sigma(4)=10\%$.

The number of households in Armenia is 760,000. Applying the above-mentioned shares (page 11) for each class, the estimated populations of each class is:

$N(1)=152{,}000$; $N(2)=304{,}000$; $N(3)=281{,}200$; $N(4)=22{,}800$.

The error in the target population should not exceed 3% with 95% probability. Then $t = 1.96$, $\Delta_x = 3\%$.

Based on these calculations, samples for each of the classes should number: $n(1)=170$; $n(2)=270$; $n(3)=60$; $n(4)=40$. The total sample should have numbered 540. We did however choose a larger sample, and received approximately 700 responses, which is somewhat higher than required by the above calculations. The actual distribution of respondents during the survey by wealth groups was the following: $n(1)=117$; $n(2)=290$; $n(3)=272$; $n(4)=35$.

Although the population of Yerevan, according to official statistics, is only 34.3% of the population of Armenia,[7] the major part of the country's economic activity is concentrated in the capital (83.3% of retail trade, 58.8% of production of consumer goods, 49.3% of industrial production,[8] and 85% of foreign exchange bureau turnover). For this reason, 65% of the sample or 450 households were residents of Yerevan.
From other regions (marzes) of Armenia we have chosen five major marzes: Armavir, Gegharkunik, Lori, Kotayk, and Shirak (there are ten marzes in Armenia). Two thirds of the people living outside of Yerevan live in these marzes and conduct 70.7% of the retail trade 63.4% of consumer goods' production and 68.3% of the industrial production that take place outside of Yerevan. The other 3 marzes (Tavush, Vayk, and Sunik) are small and are distant from Yerevan, thus conducting surveys here would increase cost of the survey with little benefit. The economic conditions in the two remaining marzes (Ararat, Aragatsotn) are similar to the economic conditions in Armavir and Kotayk. Thus failing to survey the other marzes should not create significant biases since they represent less than a quarter of the population and their share of retail trade (6%) and industrial production (15%) is small.
After choosing the main marzes, we identified the main towns (Giumri, Vanadzor, Echmiadzin, Abovyan, Hrazdan, and Sevan) based on the principle "15 households

[7] It is believed that the actual share of Yerevan is higher as a large number of residents of other regions of Armenia are actually outside the country, whereas the quantity of such people in Yerevan is far less.

[8] Source: National Service of Statistics of Armenia (NSSA).

from each town". In total, 140 households were surveyed in these towns (40 in Giumri, 35 in Vanadzor, 20 in Echmiadzin, 15 in Abovyan, Hrazdan, and Sevan).

While about half the people in selected marzes live in rural areas, barter trade is common and cash is of limited use in the countryside. Therefore, the rural sample was proportionately smaller. We selected 3 or 4 largest villages in each of the five marzes based on the principle of "minimum 4 families in each village". The size of the rural sample was 100.

C. The Questionnaire

The questionnaire (see Appendix) was designed to:

1) identify the wealth group of each respondent;
2) determine the cash dollar/dram ratio and proportion of holdings of other currencies for each family;
3) determine the cash/deposit in terms of dollars and drams for each family;
4) determine each respondent's expectations about cash dollarization.

Since we did not expect that respondents would disclose their actual wealth, we used indirect questions to identify the wealth group respondents belong to. Therefore, the questionnaire was quite long, containing 21 questions.
The response rate was 74%. It was very high, over 90%, among "poor" and "very poor" households, whereas it was slightly more than 50% among "rich" and "middle class" households. In order to avoid the bias caused by the relatively low response rate of the richer groups, we included more respondents from the Center of Yerevan i.e., from areas where relatively "rich" households live (it is very hard to classify households who rejected to respond, however, it was clear at thresholds of flats that most respondents who did not respond were not "poor"). Biases resulted from the non-respondents may reduce the actual percentage foreign cash in total cash but we believe that inclusion of more respondents the middle and upper income groups gives us more or less unbiased picture.
Those respondents who owned businesses were asked to fill out another two-page questionnaire about the types of businesses they owned and the proportion of the owners' holdings of cash for personal and business purposes. About a quarter of the respondents filled out the questionnaire for businesspeople.

5. V. Results of the Survey

The survey found that a vast majority of the population holds their monetary wealth in the form of U.S. dollars (Table 5). The percentage of holdings of other foreign currencies such as euros and Russian rubles is rather small; only 7% of respondents stated they hold some euros or rubles. The proportion of these currencies does not exceed 10-15% of these respondents' cash holdings, i.e., other currencies represent only 1-2% of total cash holdings.

Table 5: Percentage of U.S. Dollars in Total Cash Holdings

Wealth group	Average percentage of dollars in the group [CSI]	Average percentage of cash in monetary assets in the group [(FCC+DCC)/EBM]
Rich	86	75
Middle class	93	85
Poor	64	95
Very poor	48	98
Total[9]	84	82

Source: Estimations of our survey

The statistical distribution of responses on percentage of holdings of dollars (Table 6) proves the reliability of the results of the survey. The distribution of responses is close to normal for the rich families, diverges from normal for middle and poor classes and is again closer to normal for the lowest wealth group families.

Table 6: Distribution of Dollar to Total Cash Ratios by Wealth Groups

Statistics	Rich	Middle class	Poor	Very poor
Number of Observations	35	272	290	117
Mean	86.3	92.7	63.9	48.0
Median	90	95	67	50
Standard Deviation	8.7	7.1	20.9	27.9
Skewness*	-0.62	-2.09	-1.57	-0.63
Std. Error of Skewness	0.4	0.15	0.14	0.22
Kurtosis*	-0.7	5.09	2.68	-0.74
Std. Error of Kurtosis	0.78	0.29	0.28	0.44
Minimum	70	60	0	0
Maximum	98	99	95	90
Range	28	39	95	90

Source: Estimations of our survey

** For normal distribution skewness and kurtosis should equal 0.*

Respondents were asked to explain the reasons why they hold a certain proportion of foreign currency. Although the explanations varied among families, there were certain consistencies within wealth groups.

Families that were classified as "very poor" stated that they were short of cash for their everyday expenses i.e., food and utilities. Here, the term "cash" meant dram, the currency used by households to buy food and other necessities. Many respondents stated that they had put aside small amounts of U.S. dollars for "a rainy day". Very poor families fear depreciation of the dram and do not trust local banks. Moreover, their savings are too small to risk depositing them in banks. About a third of these families regularly receive remittances from abroad, which are mainly exchanged for

[9] Totals are calculated as weighted average of the mentioned percentages by distribution of monetary wealth presented on page 12.

drams and spent while a small portion is held as savings in the form of U.S. dollars. For this group, the U.S. dollars total cash ratio for families living in Yerevan is about 60%; in the countryside, it is only 10%. About a third of respondents in the countryside were classified as very poor; the corresponding proportions in Yerevan and other towns in Armenia were 12% and 21% respectively.

Poor families have similar motives for holding cash. Their savings are larger compared to the previous group, which could be one of the main reasons for a higher proportion of foreign cash. On average, bank deposits make only 5% of the monetary wealth of these families.

"Middle class" families did not, for the most part, feel the shortage of cash for their everyday expenses. These families distinguish clearly between their cash savings, which are almost exclusively held in dollars, and their cash for current expenses, which is mainly held in drams. About 20% of these families receive remittances and about a third receive income in Armenia in foreign currency. On average, bank deposits make up only 5% of their total monetary wealth.

Rich families normally own businesses. They hold drams not only for their everyday expenses but also for transactions related to their businesses, such as paying taxes, a part of salaries, etc. In some businesses, a significant share of purchases and sales is made in drams. Therefore, the percentage of drams for this group is higher than in the previous group. However, monetary assets are mainly held in the form of U.S. dollars.

Thus, based on the results of the survey the CSI in Armenia is 84%. As the amount of DCC is known (86 billion drams)[10], we can estimate FCC based on the CSI i.e., the equivalent of 450 billion drams or 770-780 million U.S. dollars.

The estimation of FCC via the ratio of total currency in circulation to EBM (total monetary assets) gives slightly higher result. The stated ratio according to the survey is 82%.

Since

$$(DCC + FCC) / EBM = 82\% \qquad (10)$$

from equations (1) and (2) we can derive:

$$EBM = TCC + TD \qquad (11)$$

where,

$$TCC = DCC + FCC \qquad (12)$$

$$TD = DDD + DTD + FCD \qquad (13)$$

and TCC is total currency in circulation, and TD is total deposits.

Since TD is known, we can estimate EBM based on (10). The estimated amount of EBM is approximately 680 billion drams. From equation (11) we can estimate FCC, which is 470 billion drams (69% of EBM) or about 810 million U.S. dollars, i.e., very close to our estimate, just about 5% above it.

[10] As at the end of June 2003

It is well known, that survey results always need to be treated with caution. In particular, respondents may not be fully precise in their ratios or seasonal factors may affect FCC.
Based on the estimated amount of FCC, we can derive unofficial dollarization index (UDI).

$$UDI = (FCC + FCD) / EBM = 81\% \qquad (14)$$

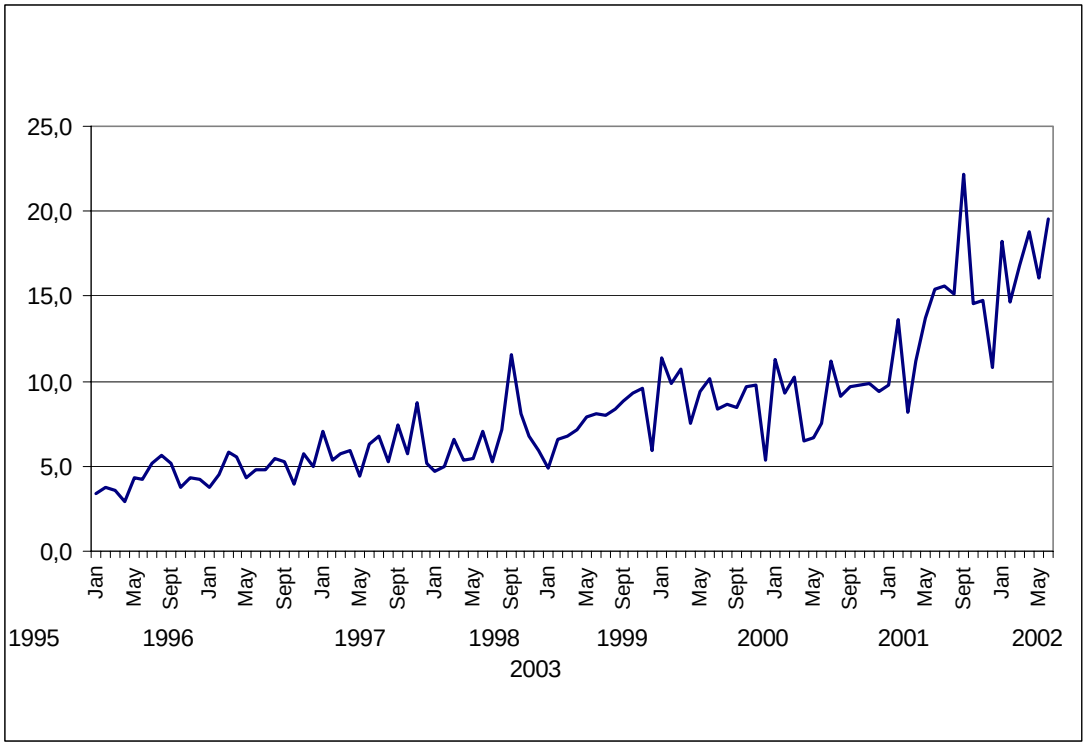
83% of the respondents thought the ratio of dollars will remain unchanged over the next three years, however, 89% of respondents stated that if their income grows they would hold more dollars. The reason stated by many of them for holding U.S. dollars in preference to other foreign currencies is that the dollar is familiar to people and is a stable currency. 87% of respondents receiving remittances from Europe (in euros) through banks stated that they withdraw dollars.
Questions to determine the seasonality of dollarization reveal that the CSI peaks in December, when remittances from abroad increase sharply, and is lowest in the summer and fall when the demand for drams is the highest for foreign cash is correspondingly low.
The results of the survey are striking, and show that dollarization in Armenia is much more extensive than alternative measures, such as those reported in Table 2. I am aware that survey results always need to be treated with caution. In this case, respondents may not be fully precise in their ratios of FCC (and in particular with respect to seasonal factors). But the difference between our estimates and those reported in Table 2 are too great to be due to survey errors.

6. Other Estimates of Unofficial Dollarization

This paper presents the first attempt to provide survey estimates of FCC in Armenia. Feige (2002) has estimated per capita FCC and CSI for a number of transition countries, including Armenia, based on adjusted Reports of International Transportation of Currency or Monetary Instruments (CMIR). Feige's estimates for Armenia are $55 per capita[11] and 62% for the CSI (p. 13). These estimates would place the level of FCC at approximately $200 million in 2001.
Some significant economic changes have taken place between 2001 (Feige's estimates) and 2003. Capital inflows have increased significantly. FCD have increased by 12% since the end of 2000 and private remittances in 2002 were 50% higher than in 2000.
Another indicator of growth of FCC is the holdings of foreign cash by banks (Figure 3). There is very little relation between FCC and bank holdings of foreign cash in the short run, but in the long run the growth of bank holdings of foreign cash indicates increasing demand for FCC. Comparison of banks' local and foreign currency cash holdings shows almost a stable level of drams and steady growth of foreign currency (Figure 4).

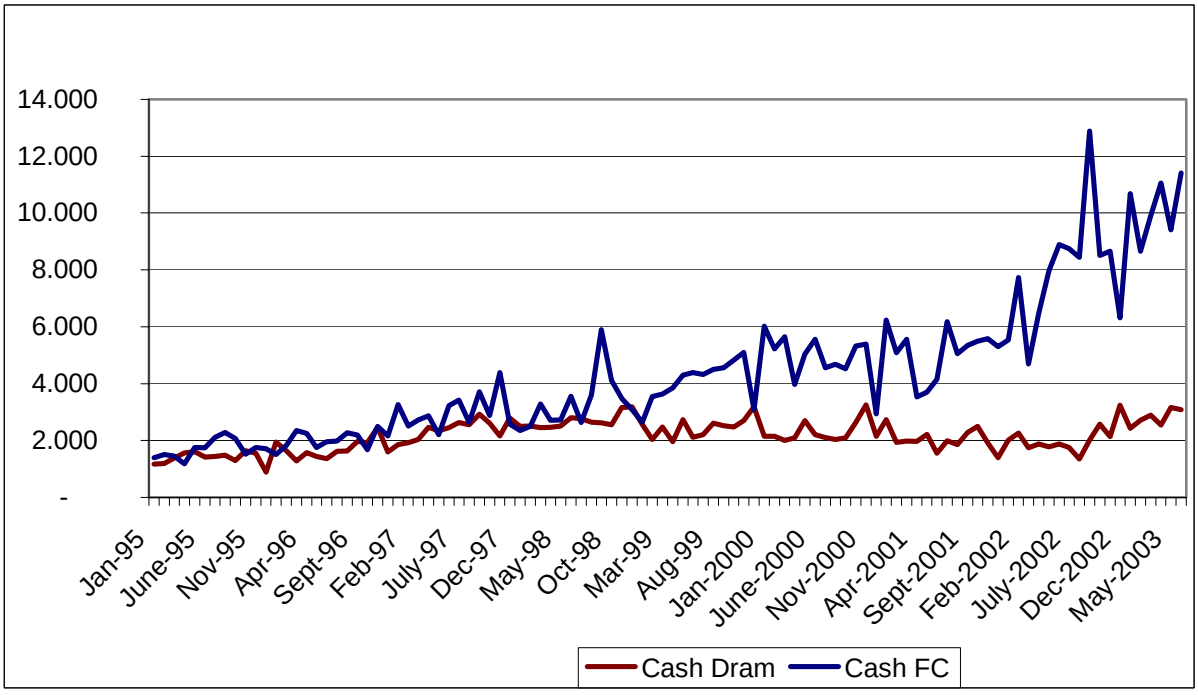
[11] Estimating per capita FCC for Armenia was very difficult in 2001, since the true size of the population was virtually unknown because of high immigration. Only the census of the end of 2001 revealed the real population. On the other hand, the amount of DCC is known, therefore, an accurate estimate of CSI will enable to estimate FCC.

Figure 3: Cash in vault at banks, million USD



Source: CBRA

Figure 4: Banks' holdings of Drams and FC (billion drams)



Source: CBRA

While it is difficult to compare estimates for 2001 (Feige) and 2003 (our survey results), it would appear that an estimate in the range of 650 to 700 million dollars in FCC in 2001 would be a reasonable figure based on our survey. If this is correct, the FCC in 2001 was several times Feige's estimate. Even Feige (2002) admits that it is very difficult to estimate FCC for a large number of countries based on CMIR:

Since firms hold a negligible amount of cash, the Federal Reserve's currency survey results indicate that such survey data require a blow-up factor of five in order to obtain a true estimate of actual domestic currency holdings. Moreover, repeated SCU (Survey of Currency Usage) surveys show a relatively stable temporal of underreporting bias, … (p. 11).

These results are not consistent with findings in countries of the former Yugoslavia. When the euro replaced the mark in Croatia and Bosnia, holdings of marks proved to be much higher than estimated previously. As Feige (2002) states:

The appropriateness of this fivefold adjustment is confirmed by independent estimates of the amount of FCC in circulation in Croatia. (p. 11).

Almost all studies on dollarization in transition economies classify Armenia as one of the most dollarized countries in FSU. Apart from the causes of dollarization that are common to most FSU countries, the Armenian Diaspora[12] is a permanent source of foreign currency flow into the country.

A study by the U.S. Treasury (2003) on the use of U.S. currency abroad indicates that 55-60% of the $620 billion in U.S. currency outstanding at the end of 2001, or $340 to $370 billion, was held outside the United States. As this study states:

Because currency can quickly move throughout the world, often without being detected, the determination of its location on any occasion is virtually impossible. Nonetheless, clearly the lion's share of overseas U.S. currency is in emerging market economies. We estimate that perhaps 25 percent of U.S. currency located abroad is held in Latin America, 20 percent in Africa and the Middle East, and about 15 percent in Asia. The remaining 40 percent of overseas U.S. currency is likely held in Europe and the countries of the former Soviet Union and their neighboring trading partners, such as Turkey. (p. VI, Executive Summary)

The study also estimated holdings of dollars in over 30 countries. The study covered Russia, Belarus, Latvia, and Lithuania among the FSU countries, where dollar holdings were estimate to be $80, $3, $0.5 and $0.5 billion respectively. Per capita dollar holdings estimates were $550, $288, $208 and $139 respectively. Our survey estimate is per capita foreign currency holdings in Armenia of $260, over 95% of which are in U.S. dollars. Thus, Armenia is comparable to Belarus. Latvia and Lithuania are less dollarized than Armenia (Table 3) but have stronger banking systems. Due to the vastly different size of its economy it is very hard to compare per capita holdings of FCC in Armenia and Russia. This is not surprising: almost all studies on dollarization in transition economies classify Armenia as one of the most dollarized countries in FSU. Apart from the causes of dollarization that are common to most FSU countries, the Armenian Diaspora[13] is a permanent source of foreign currency flow into the country.

[12] Over two thirds of Armenians in the world live outside Armenia, mainly in Russia and the United States.

[13] Over two thirds of Armenians in the world live outside Armenia, mainly in Russia and the United States.

7. Conclusions and Policy Implications

Armenia is a highly dollarized economy. Although currency substitution is the result of past inflation and devaluation, it is still very high despite macroeconomic stabilization. Since unofficial dollarization is very high in Armenia, the effective money supply cannot be measured solely by including domestic monetary assets and foreign currency deposits. FCC must be included in Armenia's money supply since FCC usually performs the general functions of money.

We have found that foreign currency (cash and deposits) makes over 81% of Armenia's effective broad money of which FCC is about 69%, i.e., a much higher proportion than alternative estimates have shown. Estimation of FCC will help estimate the ratio of total currency in circulation to total deposits which is about 84% in Armenia. This showns that the estimation of FCC, even by as imperfect means as our, is very important in countries where the use of foreign currency is widespread. The knowledge of FCC should make the outcomes of monetary policy more certain. It should, in particular, improve the forecasts of results of interventions in the foreign exchange market. It also improves the quality of monetary and balance of payments statistics. The inclusion of FCC in the country's monetary stock provides knowledge of the real money supply. At present, Armenia's International Investment Position (IIP) as displayed by the official statistics does not provide the real picture, even though it may be accepted by statisticians and policymakers: it can be improved significantly by the inclusion of FCC.

Currency substitution also has fiscal consequences. Foreign cash transactions reduce the transactors' costs of tax evasion and facilitate participation in the underground economy, which weakens the government's ability to command real resources from the private sector. Estimation of FCC can be used to provide better empirical estimates of the size of the underground economy.

Huge volumes of FCC also indicate the existence of considerable financial resources in Armenia that could otherwise be used in financial intermediation. FCC, to some extent, is used as a store of value; therefore, attraction of a part of FCC into the banking system would increase financial intermediation considerably.

Thus, the availability of more comprehensive measures of dollarization and its currency and asset substitution components should lead to a deeper understanding of both the dynamics and implications of the dollarization process.

APPENDIX

QUESTIONNAIRE

The survey is conducted with the support of the Academy for Educational Development and the Central Bank of Armenia. Confidentiality of your answers is guaranteed. The information you provide will be used for analyzing purposes to identify the scope of use of foreign currency and certain trends in financial markets.

1) List your family members

	Member	Occupation / position
1.	Husband	
2.	Wife	
3.	Daughter	
4.	Son	
5.	Father	
6.	Mother	
7.	Other member	
	Number of family	

2) Your occupation and position

Occupation _____

Position _____

3) What type of transport do your family members use?
(choose from the list below)

Family member	Transport

1. own car
2. state (office) car
3. taxi
4. public transport
5. other _____

4) Which of the following best describes the current state of your residence?

Modern repaired house

Several (own) apartments
A modern (own) apartment
(Own) apartment
Rent an apartment
Living in other's apartment or house but don't pay rent

5) Where do your family members get their clothes?

1. Order from abroad ....
2. Retail stores .....
3. Street markets .....
5. Donations by relatives from abroad.....
6. Donations by relatives and friends in Armenia.....
7. Other ....….....

6) What is the average percentage of remittances from abroad in your family's budget?

7) What is the percentage of the following expenses in your annual budget?

1. food _____%
2. utilities _____%
3. clothes _____%
4. transportation _____%
5. leisure _____%
6. other_____%

8) How does your family spend its summer and/or winter holiday?

1. In Armenia

1.1. Hotels and sanatoriums…….....

1.2. With relatives…….....

1.3. Other (specify _____)…….....

2. Outside Armenia
2.1. CIS countries…….....
2.2. Other countries (_____).....….....

9) Have you sold any family property over the last year?

Yes.....

No.....

10) If yes, what?

11) What were your large purchases over the last three years?

12) In which currency do you pay when making purchases (excluding food and utilities)?
1. dram rather than dollar…….....
2. dollar rather than dram..…….....
3. only dram…….....
4. other _____ .....….....

13) In which currency do you normally hold your cash?
1. Mainly dram.....
2. Mainly dollar.....
3. Mainly euro.....
4. Other currency _____

14) Why?

15) Do you follow financial market interest rates?
1. Yes .....
2. No .....

16) If yes, which interest rates are the most important to you?

1. Bank deposits in dram .....
2. Bank deposits in foreign exchange .....
3. Armenian government securities .....
4. Bank loans in dram .....
5. Bank loans in foreign exchange .....
6. Other_____

17) How do you hold your savings? Please indicate current percentages.

1. Cash dram ___%
2. Cash dollar ___%
3. Other currency cash (_____) ___%
4. Armenian government securities ___%

5. Bank deposits in dram ___%
6. Bank deposits in foreign exchange ___%
7. Other (_____) ___%

18) What is the proportion of your your dollar - dram holdings? (We are not interested in absolute figures, just percentages). If you hold other foreign currency, please indicate the percentage of that currency.

Dollar -- Dram				Other currency	
	%		%		
1.	0	–	100	_____	_____**%**

2.	10	–	90	☐	_____ _____%
3.	20	–	80	☐	
4.	30	–	70	☐	
5.	40	–	60	☐	
6.	50	–	50	☐	
7.	60	–	40	☐	
8.	70	–	30	☐	
9.	80	–	20	☐	
10.	85	–	15	☐	
11.	90	–	10	☐	
12.	95	–	5	☐	
13.	100	–	0	☐	

19) How does the above-mentioned proportion change during different seasons of year?

20) How will this proportion change if your family income rises?

1. Share of dollar will rise..... ☐
2. Share of dram will rise..... ☐
3. Unchanged..... ☐
4. Other..... ☐
(specify)_____

21) In your opinion, how will this proportion change in the future?

1. Will not change..... ☐
2. The share of dram will increase..... ☐
3. The share of dollar will increase..... ☐
4. Other _____ ☐

General information

Your age _____
Gender _____
Education _____

Residence _____

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