

The Structure of the Monetary Assets in Transition Economies

G rard Duch ne*Ramona Jimborean†Boris Najman‡

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Abstract

Using a panel data set we investigate the specificities of the monetary assets in 13 transition economies of Central and Eastern Europe and the CIS. The analysis reveals the main factors standing behind the structure of deposits held with banks (demand or time deposits), as well as the determinants of the trade-off between cash and demand deposits. We compare the results with those obtained for several emerging countries of Latin America, Asia and the Middle East. Our study shows that the strong preference for cash -a feature of transition economies- is related to the extent of the informal sector, the low efficiency of the banking sector and the strong currency substitution. The higher share of time deposits compared to demand deposits is explained by the inefficiency of the banking sector and the underdevelopment of alternative financial markets.

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*ERUDITE, University of Paris Est, France (duchene@univ-paris12.fr).

†ERUDITE, University of Paris Est, France (jimborean@univ-paris12.fr).

‡University of Paris Est, France (bnajman@univ-paris1.fr).

1 Introduction

Transition countries have typically experienced a two-stage process of demonetisation and re-monetisation during the last 15 years (De Melo and Denizer, 1997; Berglof and Bolton, 2002; Bonin and Wachtel, 2002).

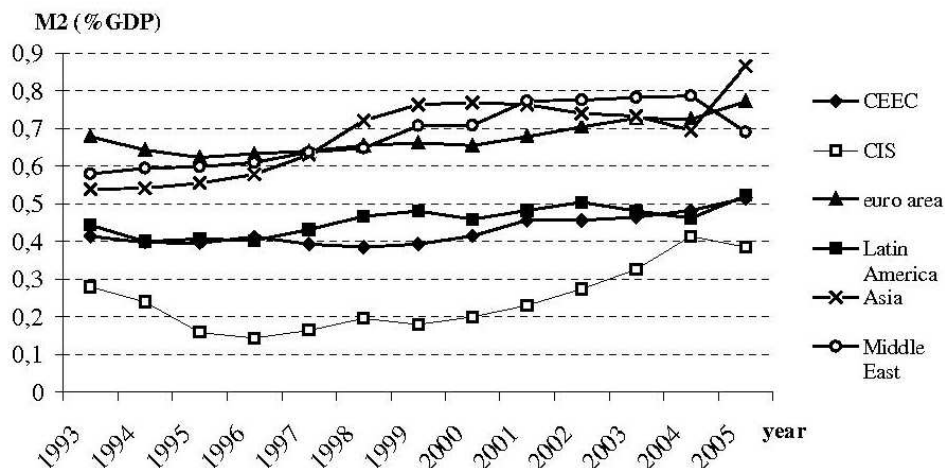


Figure 1: Evolution of M2/GDP ratio.

Source: Authors' calculation based on the Annual Statistical Bulletins of National Central Banks and the IFS (IMF). CIS countries: non-weighted average of Russia and Ukraine' data. Latin America: non-weighted average of Argentine, Brazil, Chile, Mexico, Peru and Uruguay' data. Asia: non-weighted average of Thailand, Indonesia and Korea' data. Middle East: non-weighted average of Egypt, Turkey, Israel, Morocco and Tunisia' data.

First, in the early 1990s, the high inflation and the disruption of production and of payments systems were accompanied by a significant increase in the velocity of money; households and firms sought to keep to a minimum the nominal assets denominated in domestic currency and they turned to value-keeping, often physical, means of preserving wealth¹. A number of factors might have caused the disintermediation until 1993/94; they equally account for the differences observed in Central and Eastern European Countries (CEECs) and the Commonwealth of Independent States (CIS) (De Melo and Denizer, 1997). The elimination of the monetary overhang is one factor; it appears to have been larger in CIS countries (De Melo, Denizer and Gelb, 1996). Other factor consists in the highly negative ex ante and ex post real interest rates, especially in CIS countries, which have eroded financial savings and determined little incentive to hold domestic currency in any form. Informal credit appears to be another factor (in the form of inter-enterprise arrears); these arrears may substitute for M1 and thus help to explain the observed high velocity in certain transition economies. Also, the credibility of reforms and the hysteresis effects may account for the high levels of currency substitution.

¹In this conception, money would exclude the so-called "exotic" means of payment, such as barter operations and payment arrears, as well as cash or deposits in foreign currency.

In a second stage, from the mid 1990s to post-1998 crisis, domestic liquid assets became increasingly more attractive, pushing upwards the ratio of broad money to GDP; this is due to the success of macroeconomic stabilisation policies and successful implementation of financial reforms and the restructure of the banking system. Accordingly, transition countries appear on a “convergence track” towards developed economies, albeit at various degrees and, still, with a significant backwardness (see Figure (1) above: average M2/GDP for CEECs, CIS, Euro area, Latin America, Asia and Middle East).

This widely accepted story rests entirely on a broad money concept and does not give an account of the composition of that aggregate. As a matter of fact, if there is a global convergence of the broad money (M2) to output ratio between transition and developed economies, the convergence disappears when splitting M2 into its components. For instance, cash/GDP ratio remains much above the average of the EU countries and term deposits have a larger share in total deposits than in EU². Beyond the usual debate about the overall monetisation, the questions that we raise in this chapter seek to analyse the reasons and potential persistence of such a divergence. Why do people in transition countries keep cash money in preference to demand deposits more than in the developed world? Why do they hold larger term deposits? Are these patterns going to persist in the long run, or are they mostly a residual and transitory phenomenon? What are the variables that would explain the monetary assets structure and their evolution in the context of transition?

A deep analysis of cash and various types of deposits in transition economies is an exercise that has not been tried much so far. There are three lines of research that might deal with the questions that we raise, namely (i) studies on demand for money, aimed at understanding inflation (or monitoring money supply); (ii) studies on the estimation of the informal (“shadow”) economy using cash ratios; and (iii) studies on the relationship between economic growth and financial sector development, with applications to the banking reforms in transition economies. We formulate the following hypotheses: first, “classical” variables (such as interest and/or inflation rates) may have an influence on the choice of liquid assets holdings: non- (or little) remunerated demand deposits, or often highly remunerated term deposits. Second, fiscal, social or regulatory evasions may play a role in the choice between cash and any kind of deposit. Third, the banking sector’s efficiency - for instance, the existence of modern means of payments, credit facilities and other factors illustrating the quality of the banking system (which all depend on the degree of banking competition) - may also influence deposits holding with these institutions.

“Identifying the various factors influencing the desired holdings of alternative monetary assets help provide policymakers with a more concrete understanding of liquid asset allocation within household and firms portfolios.” Duca and VanHoose (2004, p. 266)

Our study is one of the few attempts, as far as we know, to analyze the different behaviour of the components of M2 during the process of so-called monetization of transition economies. The main contribution of the analysis is empirical. It consists of the panel data approach to test the aforementioned hypotheses and measure the influence of each factor; we seek to

²See Figures (5) and (6) in the Appendix.

explain the monetary assets structure in transition economies, taking the Euro area and some emerging countries as a “benchmark”, in order to compile a comparative view. As far as we know, this methodology has not been used so far in this topic. The majority of studies on money demand used the Johansen co-integration method and the Vector Error Correction Models (VECM); these are time series analyses, applied to several transition economies on a case-by-case basis³. Our methodology proceeds with many countries together (28) and also with a chronological dimension (the period 1993-2005).

We make several contributions to the existing literature. The analysis focus on the determinants of two alternative specifications of the money demand function: the ratio of demand deposits to total deposits (which accounts for the trade-off between money as a store of value and money as a means of transaction) and the ratio of cash to M1 aggregate (which accounts for the trade-off between money used through the banking system and money used outside the banking system). The results show that the lack of confidence in the banking system (the high restrictions imposed by the government), the reduced efficiency (translated by a high spread between lending and deposit rates) and the high costs of using payment instruments through bank accounts are the main factors behind the high preference for holding cash. We add to these factors the massive currency substitution which is translated by the monetary instability (the high risk of exchange rate depreciation and high inflation). The results equally show that the preference for holding term deposits is due to a lack of alternative opportunities for investment. In transition economies, the spectrum of alternative assets is less wide than in developed countries. This is because of the lower degree of development of the financial markets (especially for stocks and bonds) and/or difficult access for a wide range of agents to these markets (especially in the case of Treasury bills and government bonds).

This paper is organized as it follows. Section 2 contains a review of the literature. Section 3 presents a brief history of the financial systems in transition countries. The empirical analysis is presented in Section 4; after presenting the data and the methodology, we proceed to a principal component analysis. This data analysis is imposed by the differences in the financial system features among the considered countries; it aims to disentangle some homogenous groups and shows the relevance of considering CEECs and CIS countries separately from the euro-area, Asian, Latin-American and Middle East countries. Section 5 raises the question of the structure of deposits - demand and term deposits - held with banks. It proposes to explain the share of demand deposits in total deposits using demand for money and savings functions and tests whether transition countries behave the same way developed or emerging countries do. Section 6 deals with the question of the distribution of M1 between cash and demand deposits: both assets do not yield any interest and the cost of holding them - the interest rate foregone - is the same; in that case, shadow economy and banking efficiency are proposed as main variables influencing the choice. Finally, we shall conclude.

2 Review of the Literature

There are three lines of research which might deal with the questions that we raise in this analysis: studies on the demand for money, aimed at understanding inflation (or monitoring

³See Van Aarle and Budina (1996), Cuthbertson and Bredin (2001), Komárek and Melecký (2001), Kruszká (2003), Duchêne and Goujon (2006), Fidrmuc (2006).

money supply); studies on the estimation of the informal (“shadow”) economy using cash ratios; and studies on the relationship between economic growth and the development of the financial sector, with applications to the banking reforms in transition economies.

We proceed to a brief presentation of each of these lines of research.

2.1 Studies on Demand for Money

The first line of research is rather classical. A substantial amount of past research on the demand for money and several survey elements exist (Laidler, 1969; Goldfeld, 1973; Fair, 1987; Sriram, 2001; Duca and VanHoose, 2004).

Understanding money demand is relevant for analysing the impact and the importance of financial innovation for portfolio allocation and financial transactions. Theories of money demand focus on explaining holdings of assets that represent direct claims to currency. Real-world demands for alternative monetary aggregates have been affected by financial innovations arising from technological advances and regulatory changes, so that the impact of these various factors has received considerable attention in the literature (Duca and VanHoose, 2004).

The long-term demand for money has generally the following functional relationship:

$$\frac{M}{P} = f(S, OC) \quad (1)$$

where M/P -the demand for real balances- is a function of the scale variable S (which represents the economic activity) and the opportunity cost of holding money, OC . M stands for the selected monetary aggregate in nominal term and P for the price. Like in theoretical models, the empirical models generally specify money demand as a function of real balances (Laidler, 1969). This is the ultimate specification structure for the money demand, common to most of the studies, even though each study may be different from the rest in choice of either the dependent or independent variables and/or both (Sriram, 2001).

Money demand has been estimated for various aggregates, their components or certain combinations of these components. The scale variable is used in the estimation as a measure of transactions relating to the economic activity. It is usually represented by a variable expressing the income, expenditure or wealth concept. For the price variable, the consumer price index is the most commonly used measure. The selection of the appropriate opportunity cost variables is an important aspect of modelling the demand for money. There are two major components: (i) own-rate and (ii) alternative return on money. The former is very important, especially if the financial innovation has taken place in an economy (Ireland, 1995; Ericsson, 1998). The latter involves yields on domestic financial and real assets for a closed economy, and additionally on foreign assets for an open economy. The yields on domestic financial assets can be represented by a large number of instruments. The yield on real assets is usually proxied for by the expected inflation and, on foreign assets, by the foreign interest rate or some form of exchange rate variable.

The economic theory provides some guidance concerning the relationship between the demand for money and its arguments (Friedman, 1959; Laidler, 1969, 1982; Goldfeld, 1973;

Goldfeld and Sichel, 1990). The scale variable represents the transactions or wealth effects; it is positively related to the demand for money. The own-rate is expected to be positively related; the higher the return on money, the less the incentive to hold assets as alternative for money. Conversely, the higher the returns on alternative assets, the less the incentive to hold money, and consequently, the coefficients of alternative returns expected to be negative. The expected inflation generally affects the demand for money negatively, as agents prefer to hold real assets as hedges during periods of rising inflation. The foreign interest rates are expected to exert a negative influence; an increase in foreign interest rates potentially induces the domestic residents to increase their holdings of foreign assets, which will be financed by reducing domestic money holdings. Similarly, the expected exchange depreciation will also have a negative impact. An increase in expected depreciation implies that the expected returns from holding foreign money increases, and hence, agents would substitute domestic currency for foreign currency.

Little is said about the money demand structure; one exception (but rather ancient) is an analysis realised in the case of the United States in early 1970. Three means of holding liquid assets are distinguished: cash, demand deposits and savings deposits. The demand for money is shown to be inversely related to the differential of interest return between savings and demand deposits. Another finding is that the demand for cash is insensitive to the rate of return on alternative liquid assets, and inversely dependent on the interest rate on demand deposits. Finally, the ratio of cash to total money holdings is independent of income (Barro and Santomero, 1972).

An issue which has not been examined in a great detail - whether the demand function for money can be assumed by the policy maker to be essentially stable in the short run - makes the object of another analysis. The single-equation econometric model expressing the demand for real M1 is found to be a stable function of real GNP and the nominal interest rates for quarterly U.S. data during 1952-1972; the stability is proved by the accuracy of its forecasts and the inability of a Chow test to reject the hypothesis of parameter constancy across subsamples (Goldfeld, 1973). A study published three years later shows that the performance of the money demand equation deteriorates when the period is extended to 1976 (Goldfeld, Fand and Brainard, 1976). Money demand regressions continue to be affected by instability when the sample runs through the present time (Goldfeld and Sichel, 1990).

2.1.1 Money Demand in Eastern Europe

There is a lack of internationally available literature on the analysis of money demand in transition countries, especially those in Central Europe (Komárek and Melecký, 2001).

Money demand and the effect of currency substitution are estimated using the portfolio balance approach, on Eastern Europe, during transition. The reform taking place in former centrally planned economies has led to the liberalisation of foreign exchange restrictions and legally allowed the possibility of foreign currency to replace domestic currency as a means of payment and a store of value. The important contribution of this analysis is that it investigates the impact of currency substitution on money demand; the error-correction method is used to estimate both long-term and short-term money demand. The findings support the hypothesis that currency substitution has influenced money demand and by that, monetary equilibrium in these countries (Van Aarle and Budina, 1996).

The demand for money is analysed in Czech Republic for the aggregates M0, M1 and M2, using monthly data over the period of 1992 to 1997. The issue of currency substitution is equally treated. Due to the small sample period, the Johansen co-integration approach is not used; instead, the general to specific methodology in a single equation framework is applied. The results show the existence of a long-run relationship between real money balances (M0, M1 and M2), a measure of real income and inflation. Currency substitution in Czech Republic is not as strong as has been found for other former centrally planned economies, due to the gradual reform taken by the authorities, the stable rates of inflation and the relatively stable exchange rate established after 1993 (Cuthbertson and Bredin, 2001).

Another analysis on demand for money in the case of Czech Republic covers the period of 1993 to 2002. Several foreign determinants that probably affect the demand for money in a small open transition economy (the real exchange rate, the nominal CZK/DEM and CZK/USD bilateral exchange rates, the returns on U.S. and German Treasury bills) are included in the traditional money demand function. The method applied is the Johansen procedure and the aspect of stability of the estimates is equally considered. The possible effect on prices and output of disequilibria on the money market is analysed. The results show that a liquidity gap has a significant influence on prices and output (Komárek and Melecký, 2001).

Money demand function is examined in the context of several Central and Eastern European Countries (Czech Republic, Hungary, Poland and Slovenia), over the period of 1994 to 2003. The VECM method is used, showing that the main determinants of cash demand are: the real value of industrial output, the nominal interest rate and the inflation rate. More generally, inflation, interest and exchange rates remain, along with a transactions index, the basic ingredients of the money demand function (Kruszka, 2003).

The panel co-integration method is used for the study of money demand in 6 countries (Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia), over the recent disinflation period (1994-2003). The basic money demand model is able to explain the long-run dynamics of M2 in selected countries. Money demand is found to have been significantly determined by the euro area interest rates and the exchange rate against the euro, which indicate the possible instability of money demand functions in CEECs. Direct inflation targeting is considered as an appropriate monetary regime before the eventual adoption of the euro (Fidrmuc, 2006).

2.2 Studies on Informal Economy

The second line of research is that of the “shadow” economy. The survey of Schneider and Ernste (1998) is used as the main reference.

The currency demand method is one of the most commonly used approaches in estimating the underground economy. It assumes that shadow (or hidden) transactions are undertaken in the form of cash payments, so as to leave no observable evidence for the authorities. The currency demand approach was first used by Cagan (1958), in an effort to estimate unreported income during World War II. Cagan’s method was later applied by Guttmann (1977), who estimated the “subterranean” economy of the United States at almost

10% of official GNP, in 1976. Still in the case of the United States, Tanzi (1983) estimates econometrically the currency demand function during the period of 1929 to 1980 in order to calculate the shadow economy.

According to currency demand method, an increase in the size of shadow economy will increase the demand for currency. This approach has been applied to many OECD countries, but has been, nevertheless, largely criticized. We mention:

- first, in the shadow economy, there are transactions which are not paid in cash (the barter), so that the size of the total shadow economy may be in reality larger;
- second, there is only one particular factor which is considered as a cause of the shadow economy, the tax burden; other factors are not considered because of the unavailability of data (for instance: the impact of regulation, “tax morality”).

This method estimates a “normal” currency demand, assuming no unreported activity and then attributes excess currency holdings to unreported activity, translating stocks of currency into flows of income via a “normal” estimate of velocity. The currency demand measures underestimate the fraction of GDP that is unreported (Dean, 2002).

The transactions method. Feige (1979) proposes an alternative approach for estimating the volume of unobserved monetary transactions and total monetary unrecorded income, based on the ratio of total monetary transactions to GNP. The author focus on the flow of monetary services provided by the stock of M1, namely, the total dollar value of transactions in M1 balances, instead of using stocks of currency and checkable balances. The key assumption in this approach is that total transactions are proportional to total economic activity; transactions consist of three components: production of final output, exchange of existing real or financial assets and direct transfer payments. In order to derive a measure of transactions appropriate for estimating the underground activity, Feige (1979) deducted a number of major financial transactions and direct transfers from gross transactions in order to arrive at a net transaction measure. Afterwards, the theory is reformulated in terms of the proportionality between net transactions and total income.

According to this method, all variations in the ratio between the total value of transactions and the officially measured GNP are due to the shadow economy (Feige, 1989). It is difficult to proceed to an econometric evaluation of Feige’s transactions-ratio method since there is no theory of total transactions. Although this approach is theoretically attractive, the necessary empirical requirements to obtain reliable estimates are difficult to fulfil, so its application may lead to doubtful results.

2.2.1 Informal Economy in Transition

The currency demand method has been applied in the context of transition countries by Hanousek and Palda (2004, 2006). The authors show that the currency-demand deposit ratio is very unstable in transition economies and this instability is explained by the catch-up effects in the banking sector. Financial innovation can destabilize demand for money as its forces interfere with the motives of holding cash. The preference for cash may not be entirely due to tax-fraud (or regulation-by-passes), but more simply, it may arise because of

the inefficiency of certain financial services and the banking system's underdevelopment at the outset of transition.

2.3 Studies on Financial Development and Economic Growth

The third research topic, which might be pertinent for the analysis of the structure of monetary assets, is that of the relationship between financial development and economic growth. There are a large number of studies on the financial development-economic growth link according to the first chapter of the thesis. As already perceived in the analysis of this first chapter, there is an apparent contradiction in reference to the effects of financial intermediation on economic activity. The empirical growth literature finds a positive effect of financial depth as measured by private domestic credit and liquid liabilities (Levine, Loayza and Beck, 2000b). On the other hand, the banking and currency crisis literature finds that monetary aggregates, such as domestic credit, are among the best predictors of crises and their related economic downturns (De Gregorio and Guidotti, 1995; Kaminski and Reinhart, 1999; Koivu, 2002; Loayza and Ranciere, 2002; Jimborean, 2004).

In regards to transition economies, Neimke (2003) shows that there is a significant impact of financial development on economic growth. This, however, does not help us in the topic related to the structure of money demand, since financial development is often measured by a ratio of broad money to GDP. More specific studies on banking reforms in transition economies like Claessens (1996), Murinde and Mullineux (1999), Meyendorff and Thakor (2002), Staehr (2003) focus on topics such as competition, concentration, the legal environment and banking supervision. However, they do not link these industry structures and the banks' behaviour to the performance of the system in terms of the forms taken by money held by non-bank agents. For instance, nothing is said about the impact of the lack of banking competition on the preference of households and firms to hold cash instead of deposits.

3 Financial Systems in Transition Countries

Transition involves a fundamental transformation in not only the economic system, but also the political system. The politics of transition, the quality and the extent of structural reforms, the different developments in the financial sector are crucial elements for the context of monetary policy in transition⁴. Transition is usually defined as a long-term process by which: enterprises are privatised, their governance is improved and hard budget constraints are imposed; markets (both internal and foreign) are liberalised, alongside the setting up of the necessary agencies of regulation; financial markets are organized, both with the banking system and securities markets; and infrastructures are restructured (EBRD; Havrylyshyn and Wolf, 1999).

On the basis of these orientations, the EBRD calculates the so-called "reform indicators" which are attributed to each transition country. Summing (arithmetically) the nine corres-

⁴See Ganev et al. (2002).

ponding indicators⁵ leads to a spectrum of 9 (minimal note) to 40.5 (maximum); the least advanced country (Turkmenistan) hardly reaches 11.7 in 2005; Belarus, another well known laggard, has 16.3. Transition is really a long-term process; after 14 years of transition, the most advanced countries - Poland, Czech Republic and Hungary - have not yet reached the maximal note, which is defined as “standards typical of advanced industrial economies”⁶. Unfortunately, the EBRD methodology has not been applied so far to emerging non-transition countries, so we are unable to make a comparison.

What is the role of transition in this institutional backwardness? What is the role of underdevelopment (the per capita GDP of the most advanced transition countries remains at half of the level of high income countries)? Would the marks obtained by certain emerging market economies be very different from those of emerging transition economies? Judging from the listing of the quite famous “Washington consensus”, the reform agenda of the developing market economies looks very similar to the one that would be set up a few months later for transition countries⁷. This consensus is a document established by Joan Williamson, before the fall of the Berlin wall, targeted to pinpoint the necessary reforms in the developing world (particularly Latin America).

However, there is a matter of degree in these reforms. The Washington consensus has, among its ten proposed “reforms”, a line called “financial liberalisation”. This line is also present on the EBRD’s list of reform indicators, even if it is sub-divided, according to the two main compartments of the financial sector: both the banks and the securities markets. Williamson’s financial liberalisation is aimed at establishing market-determined interest rates; he insists on two measures: the scheduling⁸ and the reinforcing of prudential supervision. In contrast, the financial reform in transition countries started from scratch: everything had to be built.

The development of the banks during transition had specific characteristics. First, most of transition countries had to establish the traditional two-tier banking systems in parallel with the initial stages of other structural reforms. Second, in the initial stages of transition, the banking systems were dominated by the state through banks’ ownership and administrative instruments. In the region, the number of banks increased quickly after the liberalisation of banking sector. The newly created banks were characterized by a poor equipment in capital, inexperience and lack of competitiveness. They had to compete to attract businesses, in the context of automatic financing and soft budget constraint inherited from the socialist times, coupled with the dramatic fall of the real economic activity, due to early-transition recession. In most transition countries, the banking systems were not able to overcome these problems without crises (Kutan and Brada, 2000).

⁵The indicators are the following: large scale privatisation; small scale privatisation; governance and enterprise restructuring; price liberalisation; trade and foreign exchange system; competition policy; banking reform and interest rate liberalisation; securities markets and non-bank financial institutions; and infrastructure.

⁶Czech Republic is at 34.3, Poland at 33.6 and Hungary is at 35.6. Slovenia is far behind at 30.3. Figures drawn from Transition Report Updates 2007.

⁷Many specialists believe that the Washington Consensus has been devised primarily for transition countries (it is presented in a caricature way with the triad “liberalisation / stabilisation / privatisation”) and it is often associated with so-called “shock therapy”. See Williamson (2004a, b).

⁸The premature opening of the capital account with banks not robust enough, in order to efficiently intermediate the capital inflows, has proved disastrous for certain countries.

All these problems can be traced back to the lending and borrowing practices that were unrestrained, expansionary and often fraudulent. At the beginning of transition, for most of the countries, the banking systems operated in a near-crisis environment for several years. Despite major progresses in the banking sector reform (including the privatisation of many state-owned banks, the entry of successful de novo competitors and the development of regulatory and supervisory capabilities), there was little financial deepening. This is reflected in the level of monetisation, which remained at a low level.

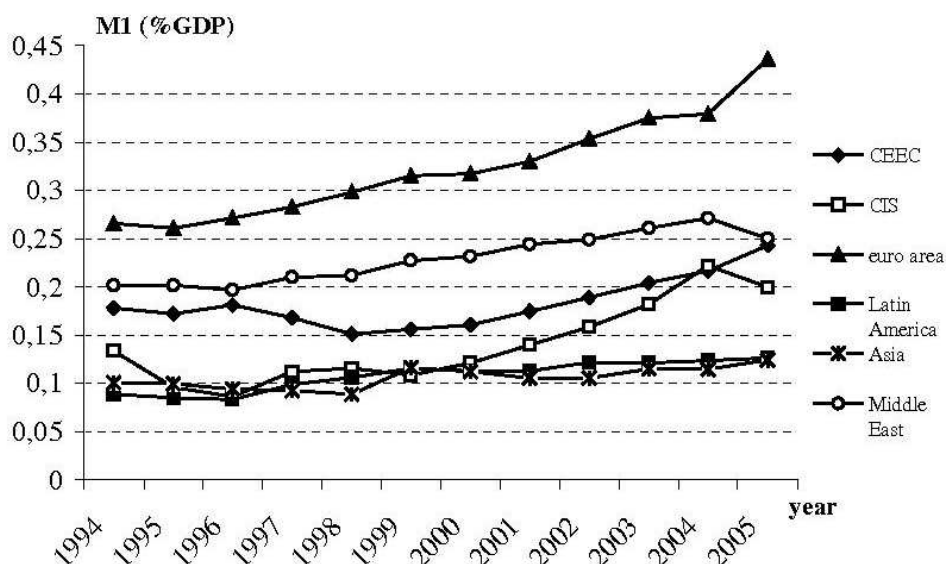


Figure 2: Evolution of M1/GDP ratio.

Source: Authors' calculation based on the Annual Statistical Bulletins of National Central Banks and the IFS (IMF). CIS countries: non-weighted average of Russia and Ukraine' data. Latin America: non-weighted average of Argentine, Brazil, Chile, Mexico, Peru and Uruguay' data. Asia: non-weighted average of Thailand, Indonesia and Korea' data. Middle East: non-weighted average of Egypt, Turkey, Israel, Morocco and Tunisia' data.

Figure (1) above shows that the ratio of M2 to GDP remained at approximately half that of the Euro area average (and slightly below Latin America - the worst performer among the market economies). The situation is similar for M1 (see Figure (2)). In 2005, the ratio of M1 to GDP was 17.6 percent in Russia, 24.6 percent in Hungary and 36.6 percent in Czech Republic (the most advanced transition country from that point of view), compared with that of 43.6 percent in regards to the Euro area average. Asia and Latin America fare worse than transition countries. The uneven evolution of the overall monetisation in transition economies came together with a specific structuring of money balances. The weakness of the banking sector and financial markets led economic agents to behave in a particular way, in relation to their decisions on assets holdings (cash, demand or term deposits).

We focus in this analysis not on the global degree of monetisation of the economies, but rather on its structure. The topic is the structure of monetary assets (cash and various deposits held with banks) in the case of transition economies. We do not intend to analyse the emerging countries; they are purely used for comparative purposes.

4 Empirical Analysis

4.1 Data

Data used in this analysis comes mainly from the International Financial Statistics (IFS) Database. Alternatively, if not available, other data sources were used: the Annual Statistical Bulletins of the National Central Banks, the ECB' Blue Book publication (2002, 2004, 2006), the World Bank' World Development Indicators (WDI) and the Transition Report (EBRD)⁹. The frequency of the data series is annual and the time period is from 1993 to 2005 for a sample of 28 countries¹⁰.

Table (1) below shows a descriptive and summary outlook of the situation in the countries under review. The first part of the table indicates the structure of the liquid assets (share of cash in M1) and the second part shows the structure of deposits (the share of demand deposits in total deposits).

Table 1: The structure of liquid assets and of deposits.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
M0/M1													
CEEC	0.40	0.39	0.39	0.37	0.38	0.40	0.42	0.40	0.39	0.37	0.35	0.33	0.31
CIS	0.42	0.46	0.55	0.59	0.57	0.63	0.60	0.56	0.58	0.59	0.58	0.59	0.57
Euro area	0.22	0.22	0.21	0.20	0.20	0.18	0.20	0.19	0.13	0.16	0.17	0.18	0.17
Latin America	0.45	0.47	0.47	0.46	0.42	0.40	0.41	0.40	0.40	0.41	0.41	0.42	0.41
Asia	0.32	0.32	0.32	0.32	0.33	0.32	0.37	0.32	0.30	0.30	0.27	0.27	0.21
Middle East	0.40	0.41	0.42	0.40	0.40	0.40	0.41	0.41	0.40	0.42	0.40	0.39	0.46
Demand deposits/total deposits													
CEEC	0.40	0.36	0.37	0.37	0.35	0.32	0.31	0.29	0.29	0.32	0.34	0.36	0.38
CIS	0.50	0.39	0.42	0.40	0.48	0.36	0.36	0.41	0.39	0.36	0.34	0.32	0.32
Euro area	0.24	0.25	0.33	0.35	0.38	0.39	0.41	0.43	0.45	0.45	0.47	0.47	0.52
Latin America	0.16	0.15	0.14	0.14	0.16	0.15	0.16	0.16	0.15	0.16	0.17	0.18	0.19
Asia	0.12	0.12	0.12	0.10	0.09	0.07	0.07	0.07	0.08	0.08	0.09	0.10	0.17
Middle East	0.26	0.25	0.24	0.24	0.25	0.25	0.24	0.24	0.24	0.24	0.25	0.25	0.27

Source: Authors' calculations based on the Annual Statistical Bulletins of National Central Banks and the IFS (IMF). Averages for the two categories of transition countries are non weighted averages; the line 'euro area' is not an average, but the data for the whole area.

Over this period, Euro area countries reduced the share of cash in M1 by almost a third. The period before the euro cash changeover, from December 2000 to December 2001, saw a significant decline in the circulation of currency¹¹. As the banking system has done the major part of the conversion, some of the cash came on the deposits. The evolution of this ratio is rather stable in CEECs from 1993 to 2002 (at 39-40%), followed by a decrease to 31% in 2005. The stable evolution, even though on a larger scale, is equally observed in Latin America and Middle East countries. In the other group of emerging countries (i.e. Asia) the ratio is lower (32%) and rather stable. The highest level of this ratio is recorded in CIS countries;

⁹See Table (9) in the Appendix for a detailed presentation of the data set (both on indicators construction and on data sources).

¹⁰The analysis is realized over 11 CEECs (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Slovakia), 2 CIS countries (Russia and Ukraine), the Euro-area (as an average for the 15 countries), 6 Latin American (Argentina, Brazil, Chile, Mexico, Peru and Uruguay), 3 Asian (Thailand, Indonesia, Korea) and 5 Middle East' countries (Egypt, Turkey, Israel, Morocco and Tunisia).

¹¹See Duisenberg (2002).

with a peak of 63% in 1998 (this was when the Russian banking crisis had occurred). The share of demand deposits in total deposits has slowly reduced in CIS countries. The same descending evolution is observed in CEECs until 2001, followed by a slow, ascending trend. We observe an ascending evolution in the Euro area, while the ratio is lower in emerging countries. This implies that households and enterprises put progressively their savings in banks instead of keeping them in demand deposits. The underdevelopment of the stock market in transition countries suggests that there are no major alternative opportunities for investment, and consequently, term deposits are preferred as a means of storing value. Euro area and the emerging countries are presented in order to have a “benchmark” and a comparative trend. Among all the countries under analysis, in the Euro area, cash is still on a very low and decreasing trend (because of the substitution of non-cash (check, credit and debit cards) payments for cash transactions), while term deposits are decreasing due to additional investment opportunities, for example the stock markets. The declining use of cash in 10 European countries is attributed to increased reliance on credit and debit cards (Snellman, Vesala and Humphrey, 2001).

4.2 Methodology

In order to explain the share of different kinds of money balances, we take as a starting point the demand for money function. Money demand has been the centre of the macro-policy debates since Keynes’ General Theory became the standard macroeconomic version of the theory. This applies for cash and demand deposits; however, as far as term deposits are concerned, the interests paid on these assets make them appear as a type of saving, rather than as standard money.

The empirical modelling of money is typically based on transactions demand (Ericsson, 1998) and we will, therefore, proceed with this approach in our analysis. As mentioned before, the main contribution of our study is empirical; it consists of analysing the structure of monetary assets in transition economies by using a panel data method. Until now, the large majority of studies on demand for money were time series analyses and they were using the Vector Error Correction Models or the Johansen co-integration approach. As far as we know the methodology we are applying has not been used so far.

We take as the main references the studies of Ericsson (1998), Sriram (2001), Duca and VanHoose (2004). Ericsson (1998) provided a practical “checklist” for the empirical studies on money demand. The main issues are the economic theory, data measurement, parameter constancy, the opportunity cost of holding money, co-integration, model specification, exogeneity and policy inferences. Most of these issues arise in empirical modelling of time series. Sriram (2001) offered a reference tool for the research on demand for money in various countries. The author surveys a selected number of studies that evaluated the demand for money across a range of industrial and developing countries, using the error-correction model approach. The objective was to extract relevant information and provide it in a readily useable and comparable framework. Duca and VanHoose (2004) provide an overview of the contributions since the late 1980s, emphasising how researchers have grappled with the challenges of theoretically and empirically modelling money demand following the considerable financial innovation that has affected payment and portfolio allocation. The review of empirical research focuses on the demand for money in the United States rather than across several countries.

We start with the transactions demand approach. The function of money demand that we use in our analysis takes the following form:

$$M_{i,t} = P_t \times L(Y_t, R - R_{i,t}) \quad (2)$$

where $M_{i,t}$ is the nominal money balances of type i in period t ; P_t is the price level index; Y_t the real income; $R - R_{i,t}$ is the short-run nominal interest rate foregone by type i asset, that is the differential between posted interest rate on deposits R and interest rate $R_{i,t}$ on asset i (% per annum). We adopt the Fischer hypothesis according to which the nominal interest rate, $R_{i,t}$, consists of the real interest rate and the compensation for the expected inflation; there is no need to consider inflation rate ($\pi_{i,t}$) as a specific factor of demand for real cash or deposit balances.

It is stated in the theory that money demand (measured by M1 or M2) increases with real income and decreases with nominal interest rate. When proceeding to a desegregation into different monetary components, we have the following functions:

$$M_{a,t} = P_t \times L_a(Y_t, R - R_{a,t}) \quad (3)$$

$$M_{b,t} = P_t \times L_b(Y_t, R - R_{b,t}) \quad (4)$$

where $M_{a,t}$ and $M_{b,t}$ is the demand for monetary assets of type a or b ; P_t is the price level index; Y_t is the real income; $R - R_{a,t}$ and $R - R_{b,t}$ - the opportunity costs of holding the monetary asset a or b .

There are some simplifying assumptions that we introduce here. The economic theory does not provide any rationale as to the correct mathematical form of the money demand function. There is a consensus that the log-linear version is the most appropriate functional form (Zarembka, 1968). Thus, we consider that the money demand function takes the form of a Cobb-Douglas function. Second, in order to be compatible with this functional form, we introduce the interest rate variable modulo 1 (as a discount factor). The ratio of the two monetary assets will be:

$$\begin{aligned} \frac{M_{a,t}}{M_{b,t}} &= \frac{P_t \times L_a(Y_t, 1 + R_t - R_{a,t})}{P_t \times L_b(Y_t, 1 + R_t - R_{b,t})} = \frac{Y_t^{\alpha_1} \times (1 + R_t - R_{a,t})^{\alpha_2} \times \theta_t^{\omega_1}}{Y_t^{\beta_1} \times (1 + R_t - R_{b,t})^{\beta_2} \times \theta_t^{\omega_2}} \\ &\dots = Y_t^{(\alpha_1 - \beta_1)} \times (1 + R_t - R_{a,t})^{\alpha_2} \times (1 + R_t - R_{b,t})^{(-\beta_2)} \times \theta_t^{(\omega_1 - \omega_2)} \end{aligned} \quad (5)$$

where θ_t represent other factors influencing the demand for the monetary assets a or b .

Passing to logs leads to:

$$\ln \frac{M_{a,t}}{M_{b,t}} = (\alpha_1 - \beta_1) \ln Y_t + \alpha_2 \ln(1 + R_t - R_{a,t}) + (-\beta_2) \ln(1 + R_t - R_{b,t}) + (\omega_1 - \omega_2) \ln \theta_t \quad (6)$$

The equation (6) may be simplified in the two instances that are of interest to us. First, if we compare cash and demand deposits, both types of assets do not bring any interest ($R_a = R_b = 0$); the opportunity cost of holding a or b is the same and reduces to $1 + R_t$. Second, if we compare demand deposits and term deposits, the foregone interest is in principle zero for term deposits ($R_t = R_{b,t}$), whereas the foregone interest on demand deposits is simply $1 + R_t$.

In both cases, equation (6) can be re-written as:

$$\ln \frac{M_{a,t}}{M_{b,t}} = \gamma_0 + \gamma_1 \ln Y_t + \gamma_2 \ln(1 + R_t) + \gamma_3 \Pi_t + \varepsilon_t \quad (7)$$

where Π_t stands for other factors influencing the demand for monetary assets a or b and ε_t the error term.

The income elasticity of the money demand is generally positive¹². It is stated that its coefficients (α_1, β_1) should be situated between 0.5 and 1.0 and the coefficient for the interest rate elasticity (α_2, β_2) should be located within the interval of -0.1 to -0.5. The coefficient of other factors influencing the demand for monetary assets, a and b (ω) depends upon the choice of their respective measure. As far as the equation (7) is concerned, the coefficients γ result from a difference between α, β , and ω and there is a priori no indication on the value they should take. We can predict that the coefficient γ_2 should be small -when comparing cash and demand deposits (because α_2 is close to β_2) - and significantly negative -when comparing demand deposits with term deposits (because β_2 disappears from the picture). The coefficients γ_1 , should, in principle, be small (because α_1 is close to β_1); however, there are reasons for the variations of the elasticity of various assets to income (we may expect that the ratio of cash to total assets decreases with income more than deposits holding); hence, this makes the γ_1 difficult to anticipate.

We proceed with a two step analysis. First, we analyse the trade-off between detaining money as a store of value and as a means of transaction. Secondly, we focus on the means of transaction and we seek to determine if it is used inside or outside the banking system. We will therefore analyse the determinants of the ratio of demand deposits to total deposits¹³, and, secondly, those of the cash to M1 ratio¹⁴. These ratios take the form of the equation (7). The analysis is separately realised for each of the two ratios, as currency and asset substitution processes are an independent phenomena, driven by different mechanisms. The coefficient of correlation between demand deposits/total deposits (in domestic currency) and cash/M1 (in domestic currency) ratio is only -0.27.

According to the transaction approach of money demand, we use the real income as a scale variable; it is approximated here by real per capita GDP. The nominal interest rate is the opportunity cost of holding money; we use the deposit rate (from IFS).

The empirical method applied is the panel data analysis¹⁵. We use the Feasible General Least Square (FGLS) method for the estimation of the equations; this method allows one to control for the residual heteroscedasticity and autocorrelation in the panel models (Greene, 2000; Wooldridge, 2002; Wiggins and Poi, 2003). The results are presented in Sections 5 and 6.

¹²When money demand is the monetary aggregate M1 or M2.

¹³An interesting issue consists in the distinction between the household sector and the enterprise sector, as the demand for money functions of the two sectors reflect different factors. The share of enterprise deposits in total deposits is very large in many countries. We could not realize this analysis because of the lack of data, the distinction between the two sectors is not available for all the countries in the sample.

¹⁴The two ratios are calculated by dividing indicators expressed in domestic currency.

¹⁵The span of time covers 13 years and the sample consists of 28 countries.

4.3 The Issue of Comparability between Countries

Are transition countries similar to emerging countries in terms of the features of their financial sector? Any eventual similarity would impose a classification in groups and, afterwards, a distinct estimation of regressions for each group. We have a sample of 28 countries: 13 transition, the Euro area and 14 emerging countries. We need to apply a procedure which allows for the inclusion of all the countries, whilst simultaneously controlling for the possible similarities and/or differences between them.

Consequently, we proceed to a Principal Component Analysis (PCA). This method is a technique of statistical description that leads to a graphical representation close to the content of a data table. It allows a simultaneous description of links among variables and similarities among individuals. In our case, it allows for the delimitation of individuals (countries) sharing the same characteristics in terms of banking and financial system features

The objective of this analysis is to examine the main features of the banking systems in CEECS and CIS countries, compared to those in Euro area, Latin America, Asia and Middle East, for a the time period of 1993 to 2005. We use the same data as in the empirical analysis. The active variables used for the PCA are: inflation rate (CPI, annual), exchange rate volatility, informal, banking, domestic credit to the private sector (% GDP), government expenditures (% GDP), government bond yields, Treasury bill yields, deposit rate, lending rate, market capitalisation (% GDP), cash/GDP, demand deposits/GDP, term deposits/GDP, per capita GDP, population, the number of ATMs with a cash dispensing function per 1000000 inhabitants, the number of POS terminals per 1000000 inhabitants and the number of cards with a credit function per 1000 inhabitants. These active variables are the only elements used for comparing the countries; yet, the rest of data is not abandoned, it will serve to illustrate or even suggest some “explanations” for the similarities and the differences among countries.

The analysis is computed by using the PCA program SPAD. We determine the number of the “main” axis (i.e. the axis revealing the most important information from the initial database), and we retain the first two axis. The analysis is first explained in relation to the variables and, afterwards, in relation to the individuals.

Concerning the variables:

- The 1st axis - the variables with a higher contribution to the formation of this axis are: domestic credit to the private sector, per capita GDP, market capitalisation, informal, the number of ATMs per 1000000 inhabitants, the number of POS terminals per 1000000 inhabitants and the number of credit cards per 1000 inhabitants. Their coordinates are close to unity (-0.58; -0.68; -0.50; 0.58, -0.58; -0.59 and -0.63, respectively). The only variable with a positive contribution is “informal” (0.58). The 1st axis opposes countries with a high average level of domestic credit to the private sector, GDP per capita, market capitalisation, the number of ATMs, the number of POS and the number of credit cards and a low level of informal sector to countries, where, on average, the level of informal sector is high, while domestic credit to the private sector, GDP per capita, market capitalisation, the number of ATMs, the number of POS and the number of credit cards are reduced.
- The 2nd axis - the variables which contribute the most to the formation of this axis are: domestic credit to the private sector, market capitalisation and term deposits/GDP.

They have coordinates of 0.55; 0.52 and 0.55, respectively. The variable “government expenditure” contributes negatively to the formation of this axis (-0.60). This 2nd axis opposes countries having a high average level of domestic credit to the private sector, market capitalisation and term deposits/GDP and a low level of government expenditure to countries, where, on average, the government expenditures are high, while domestic credit to the private sector, market capitalisation and term deposits/GDP are reduced.

Concerning the individuals:

- The 1st axis - Euro area, Chile, Thailand, Korea and Israel (highly negatively correlated to this axis) oppose to Bulgaria, Lithuania, Romania, Russia, Ukraine and Turkey.
- The 2nd axis - Euro-area, Chile, Thailand, Korea and Israel (highly positively correlated with this axis) oppose to Estonia, Hungary, Latvia, Slovenia and Ukraine.

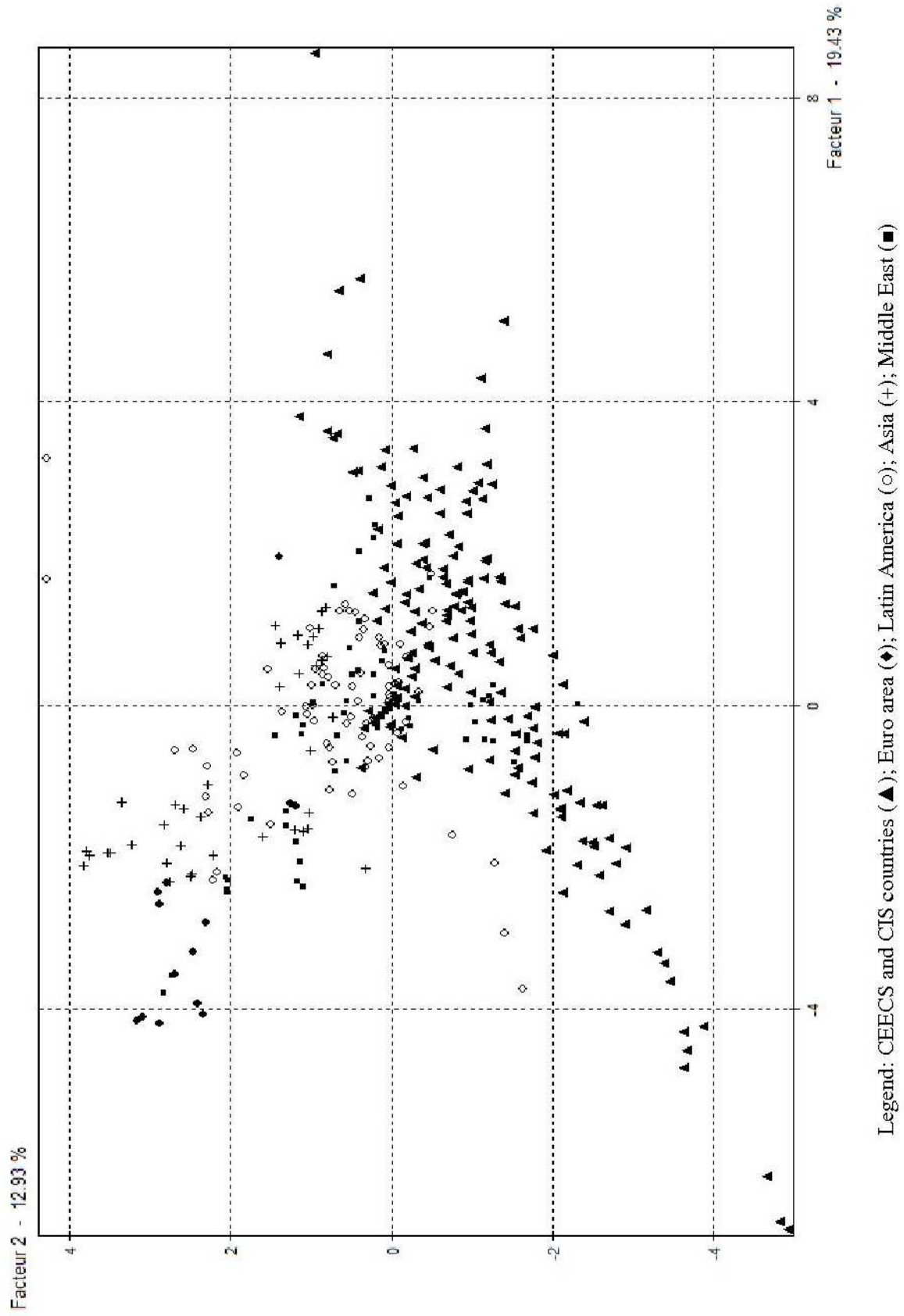


Figure 3: Principal Component Analysis.

As we can see in Figure (3) above, there is an obvious distinction of two main groups: CEECs and CIS countries, on one hand, and Euro area, Latin American, Asian and Middle East countries, on the other hand.

We can summarise the results as it follows:

- The 1st axis summarises 19.4% of the total dispersion. This axis makes a delimitation between: - countries with levels of domestic credit to the private sector (% GDP), per capita GDP, market capitalisation (% GDP), the number of ATMs with a cash dispensing function per 1000000 inhabitants, the number of POS terminals per 1000000 inhabitants and the number of cards with a credit function per 1000 inhabitants inferior to the mean, and levels of informal sector superior to the mean - Bulgaria, Lithuania, Romania, Russia, Ukraine and Turkey-; and -countries with levels of informal sector inferior to the mean, but superior levels of domestic credit to the private sector (% GDP), of per capita GDP, of market capitalisation (% GDP), of the number of ATMs with a cash dispensing function per 1000000 inhabitants, of the number of POS terminals per 1000000 inhabitants and of number of cards with a credit function per 1000 inhabitants - Euro area, Chile, Thailand, Korea and Israel.
- The 2nd axis summarises 12.9% of the total dispersion. The delimitation between countries is made in terms of domestic credit to the private sector (% of GDP), government expenditure (% of GDP), market capitalisation (% of GDP) and term deposits/GDP ratio. We have, on one hand, countries with levels of domestic credit to the private sector (% of GDP), market capitalisation (% of GDP) and term deposits/GDP ratio superior to the mean, but levels of the government expenditure (% of GDP) inferior to the mean - Euro area, Chile, Thailand, Korea, Israel - and countries with levels of government expenditure (% of GDP) superior to the mean and inferior levels for the other variables - Estonia, Hungary, Latvia, Slovenia and Ukraine.

Consequently, we have countries with a high share of ‘subterranean’ economy and an underdeveloped financial system (low levels of domestic credit and market capitalisation and a reduced use of payment instruments) that oppose to countries having a developed financial system and a reduced informal economy (Bulgaria, Lithuania, Romania, Russia, Ukraine and Turkey and, respectively, Euro area, Chile, Thailand, Korea and Israel). Simultaneously, we distinguish countries with a developed financial system and a well-implemented fiscal discipline that oppose to countries with an underdeveloped financial system and a lack of fiscal discipline (Euro area, Chile, Thailand, Korea, Israel and, respectively, Estonia, Hungary, Latvia, Slovenia and Ukraine).

According to the results of this analysis, we continue the empirical analysis by considering the existing differences between the two groups: on the one hand, CEECs and CIS countries and on the other hand, the other countries (Euro area, Latin America, Asia, Middle East). This way, we take as a “reference” group the CEECs and CIS countries (our group of interest) and we create a dummy variable for the second group. The introduction of this dummy variable in the regressions allows for the controlling of the existence of two separate groups. The sections that follow will consider all these aspects.

5 The Structure of Deposits held with Banks: Why do People Choose Demand Deposits or Term Deposits?

The analysis of the arbitrage between money as a store of value and money as a means of transaction coincides with the exploration of the structure of deposits held with banks. The ratio of demand deposits to total deposits takes the following form:

$$\ln \frac{M_{1,t} - M_{0,t}}{M_{2,t} - M_{0,t}} = \gamma_0 + \gamma_1 \ln Y_t + \gamma_2 \ln R_t + \gamma_3 \Pi_t + \varepsilon_t \quad (8)$$

where R_t is a measure of interest rate ; Π_t refers to other variables which may influence the ratio of demand to total deposits.

We focus on these “other” determinants of the ratio of demand deposits to total deposits in domestic currency. First, the interest rate on demand deposits should influence the choice between the two categories of deposits. This variable is shown to be highly significant by Komárek and Melecký (2001) in a study on Czech Republic. Second, differences in financial development influence agents’ choice between demand and term deposits. According to Knell and Stix (2004), a small number of studies contain proxies for financial innovation which is often regarded to have a noticeable impact on individual and aggregate money demand. Third, credit transfers that are “feeding” the current account might influence the trade-off between demand and term deposits; the larger the value of these payment orders, the larger the use of demand deposits. Credit lines determine many households to hold less money and more non-money assets (Duca and VanHoose, 2004).

5.1 Data Description

We use the ratio of demand deposits to total deposits as an alternative specification of the money demand function. Demand deposits consists of the difference between the M1 aggregate, on one side, and currency in circulation and demand deposits in foreign currency, on the other side. Total deposits is the sum of demand deposits in domestic currency and of term deposits in domestic currency¹⁶. (Data source: Annual Statistical Bulletins of Central National Banks).

The scale variable is approximated in this study by the real per capita GDP (Data source: Transition Report, EBRD).

As a measure of own rate of return on term deposits we employ the interest rate on term deposits. (Data source: IFS, IMF).

The rate of return on alternative assets or assets not included in demand deposits and total deposits aggregates is represented by the government bonds yield and the interest on Treasury bills. We are interested in the substitution effect (portfolio effect) that stems from changes in relative returns, so that demand or term deposits are likely to be substituted with government bonds or Treasury bills. (Data source: Central National Banks database).

¹⁶We determine term deposits in domestic currency as the difference between the M2 aggregate on one side and the M1 aggregate and term deposits in foreign currency included in M2, on the other side.

5.2 Estimation Results

The results of the estimations are presented in Table (2) below.

Table 2: Demand deposits/total deposits ratio: random-effects FGLS regressions.

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Demand deposits/total deposits (in domestic currency) ^a					
<i>Scale variable</i>					
GDP per capita	-0.028 (0.042)	0.108 (0.073)	-0.082** (0.040)	-0.201*** (0.073)	0.059 (0.043)
<i>Opportunity cost of holding money</i>					
Interest rate on term deposits	-0.138*** (0.026)			-0.155*** (0.043)	-0.144*** (0.028)
Government bonds yield ^{a1}		-0.111** (0.037)			
Treasury bills yield ^{a2}			-0.050* (0.030)		
<i>Other influencing factors</i>					
Credit transfers (% of GDP)				0.006 (0.026)	
Market capitalisation					-0.043** (0.019)
Dummy 2nd group	-0.818*** (0.076)	-0.453** (0.152)	-1.450*** (0.089)	-0.621*** (0.180)	-0.684*** (0.080)
Intercept	-0.462 (0.387)	-1.593** (0.637)	-0.260 (0.372)	0.999 (0.638)	-1.105*** (0.384)
<i>Tests</i>					
Hausman test ^b (p-Value)	0.6053	0.5520	0.4596	0.1881	0.8146
Breusch-Pagan LM test ^c	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test ^d	0.0000	0.0002	0.0000	0.0030	0.0013
F test ^e	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	310	150	141	124	288
Number of countries	25	15	14	13	25

Note: Standard errors in parentheses. *, **, *** denotes significance at 10%, 5%, 1% level.

^a data on demand deposits in domestic currency is missing for Brazil, Morocco and Tunisia.

^{a1} data missing for Hungary and Croatia (CEECs); Argentine, Brazil, Chili, Peru and Uruguay (Latin America); Indonesia (Asia) and all Middle East countries.

^{a2} data missing for Estonia, Croatia, Slovak Republic, Ukraine (CEECs and CIS); the Euro-area; Argentine, Peru and Chile (Latin America); all Asian countries; Morocco and Tunisia (Middle East).

^b the null hypothesis is that of the absence of fixed effects.

^c the null hypothesis is that of no random effects ($var[u] = 0$).

^d the null hypothesis is that of no first-order serial autocorrelation.

^e the null hypothesis is that of homoskedasticity.

We begin by estimating the simple regression of money demand. The explanatory variables are the real per capita GDP, the interest rate on term deposits and the dummy- 2nd group variable. In this first regression, the opportunity cost of holding money is its own rate - the interest on term deposits. This rate is very important, especially when financial innovation has occurred in the economy (Ericsson, 1998).

Other measures of the opportunity cost of holding money exist; these involve yields on other domestic financial and on real assets. First, we use the government bonds yield (regression (2)). As Judd and Scadding (1982), we consider it inappropriate to simultaneously include the two interest rates in the estimations because of their high correlation (0.82).

There exist, however, a number of analysis that include simultaneously several interest rates (Cooley and LeRoy, 1981; Goldfeld and Sichel, 1990; Ericsson, 1998). Another alternative return on money is the interest on Treasury bills (regression (3)).

The impact of credit transfers (as % of GDP) is taken into account in regression (4) and that of the financial market development in regression (5).

Hausman and Breusch-Pagan LM tests indicate the appropriate use of random effects. There is serial correlation in all the regressions, according to Wooldridge test. The heteroscedasticity (F) test shows its presence in all the estimations. We control for all these aspects by using the FGLS method.

As one can see in Table (2):

- the income elasticity is not significant in regressions (1), (2) and (5), but negative and significant in regressions (3) and (4). Regressions (1), (2) and (5) may correspond to the idea suggested above by the theoretical analysis, that income elasticity of various kinds of deposits may be very close. The results of regressions (3) and (4), which show a significantly negative income elasticity, may be due to the dropping of a large number of observations, which may change the influence of the “second group dummy”: due to data availability, there is only one “second group” country (Mexico) which appears in both regressions (2) and (3). Thus, it is difficult to ascertain if income elasticity of deposits ratio is significantly different from zero.
- when analyzing the interest rate elasticities, we see that they are consistent with theoretical postulates. Interest rate on term deposits is expected to influence both significantly and negatively the share of demand deposits. Taking into account the nominal deposit rate¹⁷, one can expect that its growth should encourage saving money on bank accounts - this involves removing the most liquid monetary assets. Negative signs of the coefficient entirely support this conclusion (see regressions (1), (4) and (5)). The increase in this interest rate of 1 percent diminishes the ratio of demand deposits to total deposits by 0.138 to 0.155 percent. However, there are other measures of interest rate: one may accede to bonds market and chose either the government bonds or Treasury bills yield as a measure of interest rate. The use of these alternative measures does not change the results (see columns (2) and (3)).

We use the 2nd group of countries (Euro area, Latin America, Asia and the Middle East) as a “benchmark” by means of a dummy variable. The coefficient of this variable is negative and significant in all the regressions, confirming the data in Table (1) - the use of demand deposits is lower in the 2nd group of countries. The coefficient of this dummy variable shows the average difference in the ratio of demand to total deposits between CEECs and CIS, on one hand, and Euro-area, Latin America, Asia and Middle East on the other hand, given the same amount of other explanatory variables (per capita GDP, deposit rate, government bond yields, Treasury bills yield, credit transfers, market capitalisation).

As mentioned, there exist other determinants of the ratio of demand deposits to total deposits in domestic currency.

¹⁷Deposit rate is the rate offered to resident customers for demand, term, or saving deposits (IFS (IMF) definition).

First, the existence of an interest rate on demand deposits should influence the choice between the two categories of deposits. Komárek and Melecký (2001) use the sight-deposit interest rate as a measure of the own rate of return on narrow money, showing that this own rate of return is highly significant. We could not introduce this measure in our estimations because of unavailable data for the whole sample of countries.

Secondly, we wonder if financial development influences agents' choice between demand and term deposits. Financial innovation (understood in a broader sense to encompass measures for debit card use to stock market capitalisation or the number of banks per capita) is often regarded to have a noticeable impact on individual and aggregate money demand (Knell and Stix, 2004). To consider this aspect, we introduce the market capitalisation of the listed companies (% of GDP). Normally, a developed financial market reduces the intermediating role of banks and should provide more profitable opportunities of savings than a mere term deposit with a bank. The estimations show significant results, the coefficient of this variable being negative and significant (see column (5)). This confirms our intuition - the weak development of the equity markets in transition countries is the cause of the accumulation of deposit accounts with banks. Secondary markets do not function perfectly and due to generally bad economic conditions, the demand for assets is low (Hainz, 2004).

Last but not least, we wonder whether credit transfers that are "feeding" the current accounts influence one way or another the trade-off between demand and term deposits. Due to the lack of data, we estimate the influence of credits transfers (% of GDP) for only 13 countries from the sample (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Slovakia from the 1st group and Brazil, Mexico, Korea and Turkey from the 2nd one). We expect a positive and significant impact of this indicator on the considered ratio, as the larger the value of payment orders, the larger the use of demand deposits. Credit lines determine many households to hold less money and more non-money assets (Duca and VanHoose, 2004). The estimation (see regression (4)) shows the expected positive, but insignificant coefficient for the value of credit transfers (% of GDP).

In the next section we proceed to the analysis of the trade-off between cash and demand deposits.

6 The Distribution of M1 between Cash and Demand Deposits

In the pre-transition period, the banking sector was made up by a handful of state-owned savings banks and state-owned loans banks. Due to the lack of competition, the scope of banking services was very limited. Following transition, foreign banks have entered financial markets. Competition narrows the gap between financial services provided in transition economies and developed economies. Some products, such as cheques, were never introduced in transition countries, as they were already outdated and superseded by credit and debit cards.

There are a lot of situations in which money demand changes during transition.

A feature of early transition economies that forces people to hold cash is the lack of credit. As credit widens, cash balances fall. During transition, the agents change their cash-holding strategies towards holding large amounts of cash because of bank failures. At the same time, great ups and downs in taxes determine people to transact in cash in order to avoid their obligations to the government.

At certain periods, the real interest rate was negative in several transition economies. Does a negative real interest rate stimulate people out of demand deposits and into cash holdings? The answer is clearly “no”, since holding cash gives a zero nominal return which is inferior to the positive - although low - nominal return given by deposits.

Changes in bank regulation determine changes in the cash to demand deposits that are hard to measure. Many transition countries changed their regulations quite frequently, introducing slowly deposit insurance.

Banking crises occurred in almost all transition countries in the 1990s. The loss and return of depositor confidence was bound to at first raise, and then depress the cash to demand deposits ratio.

To get a feeling of the volatility of cash to demand deposits consider the Figure (4) below.

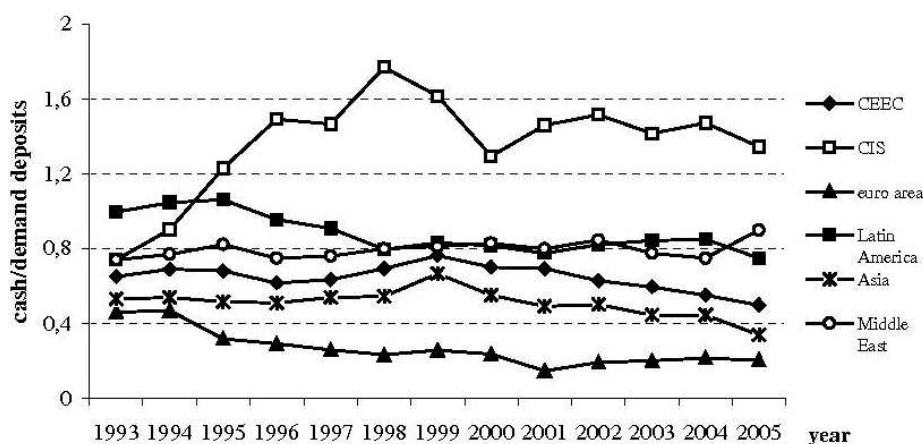


Figure 4: Evolution of cash/demand deposits ratio.

Source: Authors' calculation based on the Annual Statistical Bulletins of National Central Banks and the IFS (IMF).

The pattern of cash to demand deposits ratios is diverse in the considered countries. In CEECs, the average ratio is descending from 65.1 percent in 1993 and reaches 49.7 percent in 2005. The ratio is significantly volatile in CIS countries, reaching the highest level at the outset of the banking crisis (176.8 percent). Euro area countries experienced a decline in the ratio, from 46 percent in 1993 to 20.4 percent in 2005. The ratio is rather stable in Asian countries, being situated between 50 and 70 percent. Latin America and Middle East countries have higher ratios, but with a stable evolution. In transition countries, the volatility

in the cash to demand deposit ratio is explained by shocks in the monetary and the financial sector.

As stated before, we are interested in the money demand as a means of transaction. Its analysis imposes the comparison between money used through the banking system and money used outside the banking system. Consequently, we focus on the determinants of the ratio of cash to M1 (in domestic currency):

$$\ln \frac{M_{0,t}}{M_{1,t}} = \gamma_0 + \gamma_1 \ln Y_t + \gamma_2 \ln R_t + \gamma_3 \Pi_t + \varepsilon_t \quad (9)$$

where R_t is the interest rate and Π_t refers to other variables influencing the trade-off between cash and demand deposits.

We focus on the other determinants of the ratio of cash to M1.

The informal sector is one of the main determinants of this ratio. Black-market activities increase the demand for currency in order to conceal transactions during and after World War II (Cagan, 1958).

The efficiency of the banking sector is another determining factor. Financial development is included as an additional variable that further determines the money demand (Fidrmuc, 2006). Its measures are broad, going from the use of debit or credit cards to the number of banks per capita. Financial innovation translates into a permanent decrease in currency in circulation (Van Aarle and Budina, 1996).

Currency substitution is equally an influencing factor. The phenomenon of dollarisation or currency substitution emerges in open countries in transition. Giovannini and Turtelboom (1992) provide an excellent review of the literature on currency substitution in its broad sense. Several authors present particular views on world-wide dollarisation, but papers on dollarisation in transition economies are rather rarer (Van Aarle and Budina, 1996; Dean and Feige, 2002; Feige, 2003).

6.1 Data Description

We use the ratio of cash to M1 as an alternative specification of the money demand function. Cash consists of the currency in circulation. The M1 aggregate is the sum of currency in circulation and of demand deposits in domestic currency. (Data source: Annual Statistical Bulletins of Central National Banks).

The scale variable is approximated in this analysis by the real per capita GDP (Data source: Transition Report, EBRD).

The rate of return on alternative assets or assets not included in the currency in circulation and the M1 aggregates is represented by rate of return on term deposits, the government bonds yield and the interest on Treasury bills. We are interested in the substitution effect (portfolio effect) that stems from changes in relative returns, so that cash and demand deposits are likely to be substituted with term deposits, government bonds or Treasury bills. (Data source: IFS (IFM) and Central National Banks database).

6.2 Estimation Results

The expectations are of a negative value for the coefficient of the per capita GDP (γ_1), as banking intermediation is increasing with the income level. In principle, interest rate should not affect this ratio (γ_2 is expected to be non-significant, as stated above in the theoretical section). There is no return for cash in circulation and, generally, the rate of return on demand deposits, when it exists, is quite small. The net rate of return on demand deposits is defined as the value of services rendered by banks less any service charges (Becker, 1975). We could not calculate it for our sample of countries, because of data unavailability. Interest rate on term deposits, government bond yield and Treasury bills yield -the opportunity costs of holding either cash or demand deposits- will have the same impact on both assets and should not influence their relative share.

The results of estimations are presented in Table (3). The structure of the equations is similar as in the previous section. First, the explanatory variables are the real per capita GDP, the interest rate on term deposits and the 2nd group dummy. Then, we introduce the interest rate on government bonds (regression (2)). In regression (3) we have the Treasury bills yield as the opportunity cost of holding money.

Hausman and Breusch-Pagan LM tests indicate the appropriate use of random effects. Wooldridge test shows the presence of serial correlation in all the estimations. The heteroscedasticity (F) test shows its presence in all the estimations. In order to control for these aspects we use the FGLS method.

As we can see:

- the income elasticity is negative and significant (going from -0.128 to -0.197). When per capita GDP is high, cash is used less compared to demand deposits. Usually, a high per capita GDP corresponds to a developed financial and banking system, and, consequently, to a larger use of banking products and services. Therefore, the use of cash is reduced.
- the interest rate - whatever its form - presents an insignificant coefficient, as predicted by the theoretical model (see regressions (1), (2) and (3)). Hess (1971) shows that interest rates do not have any significant effect on cash holdings. According to Becker (1975), currency appears to be less sensitive to changes in these interest rates than are demand deposits.
- the dummy variable for the 2nd group is not significant in regression (3), but it is positive and significant in regressions (1) and (2), showing that, in average, the ratio of cash to M1 in domestic currency is higher in the 2nd group of countries compared to CEECs and CIS countries.

Table 3: Cash/M1 ratio: random-effects FGLS regressions (a).

Dependent variable:	(1)	(2)	(3)
Cash/M1 (in domestic currency) ^a			
<i>Scale variable</i>			
GDP per capita	-0.128*** (0.016)	-0.197*** (0.027)	-0.187*** (0.019)
<i>Opportunity cost of holding money</i>			
Interest rate on term deposits	-0.009 (0.010)		
Government bonds yield ^{a1}		-0.010 (0.013)	
Treasury bills yield ^{a2}			-0.011 (0.011)
<i>Other influencing factors</i>			
Dummy 2nd group	0.099** (0.042)	0.120** (0.048)	-0.065 (0.045)
Intercept	0.416*** (0.144)	1.075*** (0.227)	0.965*** (0.172)
<i>Tests</i>			
Hausman test ^b (p-Value)	0.6315	0.9545	0.2541
Breusch-Pagan LM test ^c	0.0000	0.0000	0.0000
Wooldridge test ^d	0.0001	0.0002	0.0035
F test ^e	0.0000	0.0000	0.0000
Observations	310	150	141
Number of countries	25	15	14

Note: Standard errors in parentheses. *, **, *** denotes significance at 10%, 5%, 1% level.

^a data on demand deposit in domestic currency is missing for Brazil, Morocco and Tunisia.

^{a1} data missing for Hungary and Croatia (CEECs); Argentine, Brazil, Chili, Peru and Uruguay (Latin America); Indonesia (Asia) and all Middle East countries.

^{a2} data missing for Estonia, Croatia, Slovak Republic, Ukraine (CEECs and CIS); the Euro-area; Argentine, Peru and Chili (Latin America); all Asian countries; Morocco and Tunisia (Middle East).

^b the null hypothesis is that of the absence of fixed effects.

^c the null hypothesis is that of no random effects ($var[u] = 0$).

^d the null hypothesis is that of no first-order serial autocorrelation.

^e the null hypothesis is that of homoskedasticity.

With regards to the other determinants of our alternative specification of the money demand function, the results of the estimations are presented in Table (4) below. There is no need to introduce the interest rates as they are not significant (see regressions in Table (3)) and, additionally, we do not consider the existence of a rate of return on demand deposits.

In this case, Hausman and Breusch-Pagan LM tests indicate, once again, the appropriate use of random effects. Serial correlation is detected in all the estimations by the Wooldridge test. The heteroscedasticity test (F test) shows its presence in all the estimations. Consequently, we use the FGLS method.

We consider the possible impact of the “shadow” economy by introducing the informal sector index, published by the Heritage Foundation (regression (4)). We find a positive but insignificant effect of this variable on the considered ratio. Usually, the bigger the informal sector in the economy, the larger the use of cash compared to demand deposits (Cagan, 1958). Unsurprisingly, cash is used more in the informal sector, in order to avoid taxes and state controls (for example, regulations) in such activities. We can add that small activities and self-entrepreneurs usually do not have access to the banking sector.

Table 4: Cash/M1 ratio: random-effects FGLS regressions (b).

Dependent variable: Cash/M1 (in domestic currency) ^a	(4)	(5)	(6) ^{a1}	(7)	(8)
<i>Scale variable</i>					
GDP per capita	-0.089*** (0.015)	-0.067*** (0.013)	-0.163*** (0.013)	-0.088*** (0.014)	-0.278*** (0.025)
<i>Other influencing factors</i>					
Informal sector	0.004 (0.008)				
Banking restrictions		0.019*** (0.005)			
Interest rate spread ^{a1}			0.013 (0.012)		
Dollarization				0.070*** (0.014)	
Number of credit cards per 1000 inhabitants ^{a2}					0.031*** (0.005)
Dummy 2nd group	0.157*** (0.041)	0.182*** (0.041)	0.057* (0.032)	0.159*** (0.038)	-0.008 (0.035)
Intercept	0.062 (0.135)	-0.151 (0.114)	0.638*** (0.122)	0.146 (0.119)	1.534*** (0.197)
<i>Tests</i>					
Hausman test ^b (p-Value)	0.5805	0.4602	0.1821	0.5407	0.5500
Breusch-Pagan LM test ^c	0.0000	0.0000	0.0000	0.0000	0.0000
Wooldridge test ^d	0.0001	0.0001	0.0001	0.0001	0.0326
F test ^e	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	319	319	295	319	119
Number of countries	25	25	24	25	16

Note: Standard errors in parentheses. *,**,*** denotes significance at 10%, 5%, 1% level.

^a data on demand deposits in domestic currency is missing for Brazil, Morocco and Tunisia.

^{a1} data missing for Turkey and Tunisia.

^{a2} data missing for Russia, Ukraine, Euro area, Croatia, Argentine, Uruguay, Indonesia, Egypt, Israel, Morocco and Tunisia.

^b the null hypothesis is that of the absence of fixed effects.

^c the null hypothesis is that of no random effects ($var[u] = 0$).

^d the null hypothesis is that of no first-order serial autocorrelation.

^e the null hypothesis is that of homoskedasticity.

Financial innovation should influence the ratio of cash to M1. We use several measures: the index of restrictions on banks ('banking') published by the Heritage Foundation¹⁸ (regression (5)), the interest rate spread (regression (6)) and the use of payment instruments (regression (8)).

1. We expect a positive coefficient for the index of restrictions on banks. The results confirm our expectations: the higher the government control in the banking system (illustrated by a high index of restrictions on banks), the higher the ratio of cash to M1 in domestic currency (see regression (5)). People's confidence in the banking system is reduced and, consequently, they cannot rely on it.
2. With regards to the interest rate spread, we expect a positive and significant coefficient. A high interest rate spread is the synonym of an inefficient banking system; this explains the reduced use of banking services and products (Duchêne, Jimborean and Najman, 2005). Hence, the higher this spread, the higher the incentive to use cash instead of

¹⁸See Table (9) in the Appendix for the definition of this index.

bank money. The estimations do not confirm the expectations; the coefficient is positive but insignificant (regression (6)).

3. We can use some other indicators to reflect the efficiency of the banking system. These are related to the use of payment instruments, such as credit and debit cards, credit transfers and direct debits, the ATM network and POS terminals¹⁹. In an economy where there is a large use of these instruments, there is less need for money to finance the business activities compared to an economy where all the payments are realised in cash. As in the case of demand deposits/total deposits ratio, we estimate the cash /M1 ratio as a function of the value of credit transfers (in % of GDP), then of the number of ATMs with a cash dispensing function per 1000000 inhabitants, of the number of POS terminals per 1000000 inhabitants and of the number of credit cards per 1000 inhabitants.
 - (a) The only significant result is obtained for the number of cards with a credit function per 1000 inhabitants (regression (8)). The coefficient of this variable is positive and significant, while the intuition is exactly the opposite. We explain this result by the fact that, in transition countries there is a lack of trust in banks after several bank failures. Whitesell (1989) shows that a payment from an account imposes two costs, which are both avoided by currency transactions. First, there is a fixed cost per transaction (which could reflect: bank charges per cheque drawn, the time needed to fill out a credit card authorization and await account verification by the retailer). Second, opposed to payment with currency, using the account involves a net variable cost or benefit that depends on the size of the transaction. Usually, the debit account is not used for small transactions because of the fixed cost; if this cost did not exist, there would be no reason to hold currency. Checks and credit cards are used for larger transactions. Raa and Shestalova (2004) show that the low fixed transactions costs of using debit cards favour using currency over debit cards for small transactions, while lower variable costs give an advantage to debit cards. By providing liquidity and enabling households to weather temporary changes in asset prices (e.g. stock prices), credit cards induce many households to hold less money and more non-money assets (Duca and VanHoose, 2004). The positive coefficient of the number of credit cards per 1000 inhabitants is consistent with the findings of Duca and Whitesell (1995); as credit cards holdings lower transactions deposits holdings, the ratio of cash/M1 will increase.
 - (b) For all the other indicators related to the payment systems, the coefficients are insignificant. Snellman and Virén (2006) deal with the issue of how the market structure in banking affects the choice of means of payments and, in particular, the demand for cash. Using a panel data from 20 OECD countries, for the period of 1988 to 2003, the authors show the ambiguity in terms of the ATMs impact on cash holdings. Nevertheless, studies on individual countries show that ATM usage has an important impact on currency balances in the United Kingdom (Markose and Loke, 2003) and Italy (Attanasio, Guiso and Jappelli, 2002). One possible explanation concerning our insignificant results is the lack of data for the entire sample. We intend to enlarge our data set in a future analysis, in order to improve the quality of the estimates.

¹⁹Duca and Whitesell (1995) show that credit card ownership is associated with lower transactions deposits.

Currency substitution is equally an influencing factor. The phenomenon of dollarisation or currency substitution emerged in open countries in transition. Most studies in this area use the ratio of foreign currency deposits to M2 as a proxy for the level of currency substitution or dollarisation. This measure seems inadequate because it omits the foreign currency cash in circulation, which flaws the extent of dollarisation²⁰. Several studies use the ratio of foreign currency deposits to the monetary aggregate M2D (which is the sum of M1 and of term deposits in local currency)²¹ (Sarajevs, 2000; IMF studies). We consider this measure as inappropriate as the previous one. We prefer to use a measure of dollarisation which relates foreign currency deposits to total deposits (Mongardini and Mueller, 1999) (regression (7)). The results show a significant positive coefficient of the dollarisation ratio. This means that the larger the currency substitution, the higher the ratio of cash to M1 in domestic currency. What is the explanation for this result? All the countries considered in our analysis display hysteresis effects; the lack of confidence in domestic monetary assets resulting from past inflations, devaluations and bank confiscations appears difficult to reverse, even when macroeconomic conditions stabilize. Keeping deposits in dollars is often used as a means of protection against inflation and exchange rate depreciation risks. So, the deeper is the monetary instability (reflected by high dollarisation ratios), the larger is the use of cash. Cuthbertson and Bredin (2001) show that currency substitution does not influence cash holdings in Czech Republic.

There are several econometric problems that might appear when estimating the money demand function. First, our sample of countries consists of very different economies; although the econometric tests (Hausman, Breusch-Pagan) show the appropriate use of random effects, we wonder if the results are similar when controlling for fixed effects. Second, there is the aspect of the stability of the money demand function. We will further show, through a Chow-test, that the alternative specifications of the money demand equation used in this analysis are time-invariant. Third, there is an endogeneity problem, as interest rates might be endogenous. We seek to clarify the three aspects in the following section.

7 Possible Econometric Problems

7.1 Random Effects versus Fixed Effects

We estimate the determinants of the trade-off between demand and term deposits in domestic currency, as well as of the distribution of M1 between cash and demand deposits in domestic currency, by using the method of fixed effects in panel data. The results are presented in the Tables (5) and (6) below.

²⁰According to Feige (2003) this measure is indicative of asset substitution but perform poorly as measures of currency substitution.

²¹M1 is the sum of cash and demand deposits in local currency, so that the M2D appears as a measure of the domestic supply of money.

7.1.1 The Trade-off between demand and term deposits in domestic currency

When we compare the results of the fixed-effects method (Table (5)) with those of the random effects method (Table(2)), we observe two major changes: the coefficients of government bonds yield and market capitalisation (% of GDP) are no longer significant.

Table 5: Demand deposits/total deposits ratio: fixed-effects FGLS regressions.

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Demand deposits/total deposits (in domestic currency)					
<i>Scale variable</i>					
GDP per capita	-0.181*** (0.065)	0.005 (0.100)	-0.232** (0.102)	-0.189 (0.119)	-0.104 (0.073)
<i>Opportunity cost of holding money</i>					
Interest rate on term deposits	-0.100*** (0.032)			-0.082 (0.070)	-0.096*** (0.033)
Government bonds yield		-0.082 (0.063)			
Treasury bills yield			-0.164*** (0.060)		
<i>Other influencing factors</i>					
Credit transfers (% of GDP)				-0.093 (0.082)	
Market capitalisation					-0.035 (0.029)
Dummy 2nd group	-1.516*** (0.208)	-2.345*** (0.179)	-1.800*** (0.222)	-0.010 (0.513)	-1.387*** (0.186)
Intercept	0.546 (0.506)	-1.037 (0.962)	1.470 (0.929)	0.198 (1.142)	-0.064 (0.563)
Observations	310	150	141	124	288
Number of countries	25	15	14	13	25

Note: Standard errors in parentheses. *, **, *** denotes significance at 10%, 5%, 1% level.

7.1.2 The Distribution of M1 between cash and demand deposits in domestic currency

As before, we compare the results of the fixed-effects method (Table (6) below) with those of the random effects method (Tables (3) and (4)). We observe several major changes: the coefficients of banking restrictions and dollarisation ratio are no longer significant and the coefficient of the dummy variable becomes negative and significant in regressions (1), (3) and (4).

Table 6: Cash/M1 ratio: fixed-effects FGLS regressions.

Dependent variable: Cash/M1 (in domestic currency)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Scale variable</i>								
GDP per capita	-0.111*** (0.036)	-0.321*** (0.052)	-0.046 (0.055)	-0.122*** (0.035)	-0.124*** (0.038)	-0.118*** (0.035)	-0.120*** (0.034)	-0.350*** (0.059)
<i>Opportunity cost of holding money</i>								
Interest rate on term deposits	0.011 (0.014)							
Government bonds yield		-0.013 (0.017)						
Treasury bills yield			0.015 (0.018)					
<i>Other influencing factors</i>								
Informal sector				-0.001 (0.018)				
Banking restrictions					-0.004 (0.019)			
Interest rate spread						0.023 (0.015)		
Dollarization							0.030 (0.026)	
Number of credit cards per 1000 inhabitants								0.058*** (0.011)
Dummy 2nd group	-0.242*** (0.120)	0.349*** (0.086)	-0.393*** (0.111)	-0.229* (0.122)	0.235** (0.094)	-0.041 (0.117)	0.300*** (0.108)	0.750*** (0.053)
Intercept	0.367 (0.260)	1.881 (0.486)	-0.126 (0.465)	0.479* (0.278)	0.049 (0.372)	0.093 (0.346)	0.495** (0.242)	1.794*** (0.481)
Observations	310	150	141	319	319	295	319	134
Number of countries	25	15	14	25	25	24	25	15

Note: Standard errors in parentheses. *, **, *** denotes significance at 10%, 5%, 1% level.

We conclude that the results are not similar when using the fixed-effects method. Is it because of the possible endogeneity of some explanatory variables?

7.2 The Stability of the Money Demand Function

“The question of whether the demand function for money is “stable” is one of the most important recurring issues in the theory and application of macroeconomic policy.” Judd and Scadding (1982, p. 993)

According to Goldfeld (1973), the question of the long-term stability of money demand function is usually addressed with annual data covering a span of seventy or so years. One way to examine the long-run stability is to split the data sample at a priori chosen point and compare the resulting estimates for the sub-periods via the Chow test.

We will analyse the stability of the alternative money demand specifications that we have estimated in the above sections. The main constraint is a reduced span of time (1993-2005); we split our data sample in two: prior to and after the 1998 crisis.

The Chow test allows us to test the stability of the regression coefficients on two different sub-samples. We apply this test by following step by step the procedure below:

1. we estimate first the model on the entire period of time and we pick up the sum of the square residuals (SQR).
2. we estimate the model on each sub-sample of time and we extract the corresponding sums of the square residuals ($SQR1$ and $SQR2$).
3. we calculate a statistic test that follows a Fisher distribution:

$$\frac{SQR - (SQR1 + SQR2)}{SQR1 + SQR2} \times \frac{n - 2k}{k} \rightarrow F(k, n - 2k)$$

where k is the number of explanatory variables including the intercept and n is the number of observations.

4. if this statistic is lower than the statistic value read in the Tables of Fisher distribution, we can reject the hypothesis of coefficients being constant.

The results are presented in Table (7) below.

The probability of the Chow test is superior to 10% for the two alternative money demand specifications, in all the regressions. Consequently, we cannot reject the hypothesis of coefficients' stability in the two sub-samples.

To resume, the evidence does not seem to suggest any need to estimate the alternative specifications of the money demand equation over separate sub-samples of the analysed period.

Table 7: Stability test of alternative money demand specifications.

Money Definition	Regression	F-test (P-value)
1) Demand Deposits/Total Deposits (in domestic currency)	(1) Table (2)	0.8015
	(2) Table (2)	0.7479
	(3) Table (2)	0.8010
	(4) Table (2)	0.9880
	(5) Table (2)	0.4640
2) Cash/M1 (in domestic currency)	(1) Table (3)	0.9941
	(2) Table (3)	0.9984
	(3) Table (3)	0.9869
	(4) Table (4)	0.9989
	(5) Table (4)	0.9919
	(6) Table (4)	0.9998
	(7) Table (4)	0.9943
	(8) Table (4)	0.9482

7.3 The Endogeneity Aspect

In both random and fixed effects methods we treat the interest rates for different monetary assets as exogenous. This aspect is not necessarily valid; even if central banks set some nominal interest rates, other interest rates are still endogenous.

We consequently proceed at the application of an endogeneity test for all the opportunity cost measures of holding money (interest on term deposits, government bonds yield, Treasury bills yield). This is the Nakamura Nakamura test and it consists of two steps:

1. each endogenous variable is regressed over the exogenous variables of the model and its instruments²²;
2. the residuals of the first step are picked up and included in the initial model.

If the coefficients of the residuals are significant (P-values inferior to 10%), we support the hypothesis of endogeneity of the variable in cause.

Table (8) below summarizes the results obtained when applying the Nakamura Nakamura test. The last column of this table show the probability value associated to the Student test; its null hypothesis is that the variable' coefficient is not significantly different from zero. A probability superior to 10% means that we cannot reject the null hypothesis, and, as a consequence, the coefficient is zero. In the case of the Nakamura Nakamura test, the coefficients are the residuals from the first step of the test; these coefficients are not significant, so we cannot support the hypothesis of endogeneity of the opportunity costs measures of holding money.

²²In our case, the instruments are the two lags of the supposed endogenous variable.

Table 8: Endogeneity test for the interest rate variables.

Money Definition	Variable	Regression	Student-test (P-value)
1) Demand Deposits/Total Deposits (in domestic currency)			
	Interest rate on term deposits	(1) Table (2)	0.534
		(4) Table (2)	0.348
		(5) Table (2)	0.826
	Government bonds yield	(2) Table (2)	0.161
	Treasury bills yield	(3) Table (2)	0.534
2) Cash/M1 (in domestic currency)			
	Interest rate on term deposits	(1) Table (3)	0.776
	Government bonds yield	(2) Table (3)	0.675
	Treasury bills yield	(3) Table (3)	0.964

As a summary, we can conclude that the alternative money demand specifications tested empirically in this chapter are time invariant for the entire sample of countries; besides, interest rates measures are not endogenous. This confirms the ‘appropriate’ choice and use of the FGLS empirical method.

Conclusion

Why do people in transition countries keep cash money in preference to demand deposits more than in the developed world? Why do they hold larger term deposits? Are these patterns going to persist in the long run, or are they mostly a residual and transitory phenomenon? This was the starting point of our analysis.

The paper studies the monetary assets features in transition countries. The empirical method used is the FGLS technique, on a panel of 28 countries for the period of 1993 to 2005. Differences in the features of the financial system among the considered countries impose a principal component analysis in order to disentangle some homogenous groups. This analysis shows the relevance of considering CEECs and CIS countries separately from Euro-area, Asian, Latin-American and Middle East countries.

We take into account the distinction between the two groups of countries and we further analyse the determinants of the trade-off between money as a store of value and money as a means of transaction. We equally analyse, in the case of money as a means of transactions, the trade-off between money used through the banking system and money used outside the banking system. In both cases, the analysed ratios are calculated for indicators in domestic currency.

The main determinants of the trade-off between money as a store of value and money as a means of transaction (demand deposits/total deposits ratio) are: the interest rates on term deposits; the opportunity costs of holding money (government bonds yield and Treasury bills yield); and financial innovation (measured by the stock market capitalisation).

The main determinants of the trade-off between money used through the banking system and money used outside the banking system (cash/M1 ratio) are: financial innovation (measured by an index of restrictions on bank, the interest rate spread and the use of payment instruments - the credit cards); and currency substitution.

As far as statistical data show, cash holdings are higher in CIS countries than in CEECs. The empirical analysis confirms that the lack of confidence in the banking system (the high restrictions imposed by the government to banks), the reduced efficiency (translated by a high spread between lending and deposit rates) and the high costs of using payment instruments through bank accounts are the main factors behind the high preference for holding cash. We add the massive currency substitution translated by the monetary instability (high risk of exchange rate depreciation and high inflation).

Demand deposits are not the predominant form of deposit holdings in these countries. We wonder why people prefer term deposits. The high interest rate paid by banks can explain this form of money holding. Another possible explanation is the lack of alternative opportunities for investment. In transition economies, the spectrum of alternative assets is less wide than in developed countries. This is because of the low degree of development of financial markets (especially for stocks and bonds) and/or a lack of access for a wide range of agents to these markets (especially in the case of Treasury bills and government bonds). Also mutual funds are underdeveloped with regards to investment in domestic assets (Komárek and Melecký, 2001).

Are these patterns going to persist in the long run, or are they mostly a residual and transitory phenomenon? We consider that, as international financial markets will undergo substantial deregulation over the next years, additional investment opportunities will arise and many residents of transition countries will change their habits associated to portfolios.

Can we speak of an inefficiency of the banking system in transition countries? In our opinion, it is rather an underdevelopment, due to a “more recent” banking reform. In these economies, the creation of the two-tiers banking system took place at the end of the 1980s; at this time, developed economies have already had in place well regulated and wealthy banking and financial systems.

Financial innovation will contribute to the structural transformation of their financial systems and this will alter the actual features of monetary assets (the high share of cash and term deposits). These features are only a transitory phenomenon dictated by the particular economic legacy of the past of all the former centrally planned economies.

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A Appendix

Table 9: Data sources.

Variable	Definition and Source
cash (M0)	currency outside banks, end-of-year, Annual Statistical Bulletins, central banks.
demand deposits	demand deposits, end-of-year, Annual Statistical Bulletins, central banks.
demand deposits in domestic currency	overnight deposits in domestic currency, end-of-year Annual Statistical Bulletins, central banks.
demand deposits in foreign currency	overnight deposits in foreign currency, end-of-year Annual Statistical Bulletins, central banks. For Latvia, Slovakia(1993-1998) and Russia demand deposits in foreign currencies are calculated as a ratio of total demand deposits. This ratio is almost the same as the ratio of foreign currencies term deposits to total term deposits.
M1	monetary aggregate M1, end-of-year, Annual Statistical Bulletins of central banks.
M2	monetary aggregate M2, end-of-year, Annual Statistical Bulletins of central banks.
term deposits	quasi-money, end-of-year; or term deposits =M2-M1.
term deposits in foreign currency	term deposits in foreign currency, end-of-year, Annual Statistical Bulletins of central banks.
term deposits in domestic currency	term deposits in domestic currency, end-of-year, Annual Statistical Bulletins of central banks.
inflation	inflation rate, CPI annual %, end-of-period, IFS (IMF); for Estonia - EBRD data.
exchange rate	exchange rate (per US dollar), end-of-year, IFS (IMF).
volexch	standard deviation, in %, of the average nominal exchange rate related to US dollar, in the last 3 years. Own calculations.
domestic credit	domestic credit to private sector, % of GDP, WDI (World Bank data).
interest rate spread	interest rate spread (lending rate minus deposit rate) Interest rate spread is the interest rate charged by banks on loans to prime customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits. WDI (World Bank data).
government expenditure	general government expenditure, in % of GDP, Transition Reports (EBRD).
government bonds yield	yield on government securities, Central National Banks statistics
GDP per capita	per capita GDP (\$), Transition Reports (EBRD).
Treasury bills yield	the rate at which short-term securities are issued or traded on the market, Central National Banks statistics.
market capitalisation	the market capitalisation of listed companies (% GDP), WDI (World Bank).
deposit rate	rates offered to resident customers for demand, time, or saving deposits. Often, rates for time and saving deposits are classified according to maturity and amounts deposited. In addition, deposit money bank and similar deposit-taking institutions may offer short and medium-term instruments at specified rates for specific amounts and maturities; these are frequently termed “certificates of deposits”. For countries where savings deposits are important, a Saving Rate (line 60k) is also published (IFS).
lending rate	the bank rate that usually meets the short and medium term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing (IFS).
card cash	number of cards with a cash function, ECB (Blue Book).

Table 9: (continued)

Variable	Definition and Source
ATM cash	number of ATMs with a cash dispensing function, ECB (Blue Book).
card debit	number of cards with a debit function, ECB (Blue Book).
terminals	number of POS terminals, ECB (Blue Book).
card credit	number of cards with a credit function, ECB (Blue Book).
credit transfer	credit transfers, ECB (Blue Book).
direct debit	direct debits, ECB (Blue Book).
banking	<p>Index of Economic Freedom, banking and finance grading scale (for the Euro area the non-weighted average of member's index value)</p> <ul style="list-style-type: none"> • very low (1) -government provides financial sector with prudent regulatory supervision by an independent central bank; government may be active in some financial institutions but must comprise a very minor role in terms of total market share; credit allocated on market terms; foreign financial institutions able to operate freely and treated the same as the domestic financial institutions; banks may engage in all types of financial services. • low (2) -limited government involvement in financial sector beyond providing prudent regulatory supervision by an independent central bank; few limits on foreign financial institutions; credit allocated on market terms; government may be active in some financial institutions but must comprise a limited role in terms of total market share; banks may engage in all types of financial services. • moderate (3) -substantial government influence in financial sector; regulatory supervision of financial institutions may be insufficient; government owns or controls banks that have a significant role in terms of market share; government influences allocation of credit; foreign financial institutions face restrictions; country may maintain some limits on financial services; bank formation may face some barriers. • high (4) -heavy government involvement in financial sector; central bank not independent; regulatory supervision of financial institutions poor; banking system in transition or unstable; government owns or controls most financial institutions; government directs allocation of credit; possible corruption; foreign financial institutions discouraged; bank formation faces significant barriers. • very high (5) -very heavy government involvement in financial sector; nearly all financial institutions owned or controlled by government; financial institutions in crisis or collapse, or banks operate on primitive basis; nearly all credit controlled by government; most credit extended to state-owned enterprises; corruption widespread; foreign financial institutions prohibited; bank formation virtually nonexistent.

Table 9: (continued)

Variable	Definition and Source
informal	<p data-bbox="461 338 1469 398">Index of Economic Freedom, informal market grading scale (for the Euro area the non-weighted average of member's index value)</p> <ul data-bbox="512 421 1469 831" style="list-style-type: none"> <li data-bbox="512 421 1469 481">• very low (1)- country has a free-market economy with informal market in such things as drugs and weapons. <li data-bbox="512 504 1469 564">• low (1.5 – 2)- country may have some informal market involvement in labor or pirating of intellectual property. <li data-bbox="512 586 1469 674">• moderate (2.5 – 3)- country may have some informal market activities in labor, agriculture and transportation and moderate levels of intellectual property rights. <li data-bbox="512 696 1469 784">• high (3.5 – 4)- country may have substantial levels of informal market activity in such areas as labor, pirated intellectual property and smuggled consumer goods, and in such services as transportation, electricity and telecommunications. <li data-bbox="512 806 1469 831">• very high (4.5 – 5)- country's informal market is larger than its formal economy.

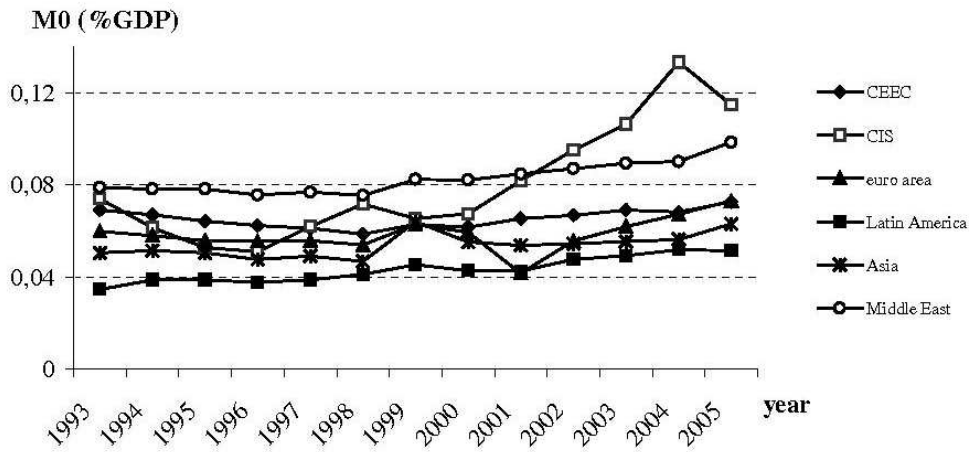


Figure 5: Evolution of M0/GDP ratio.

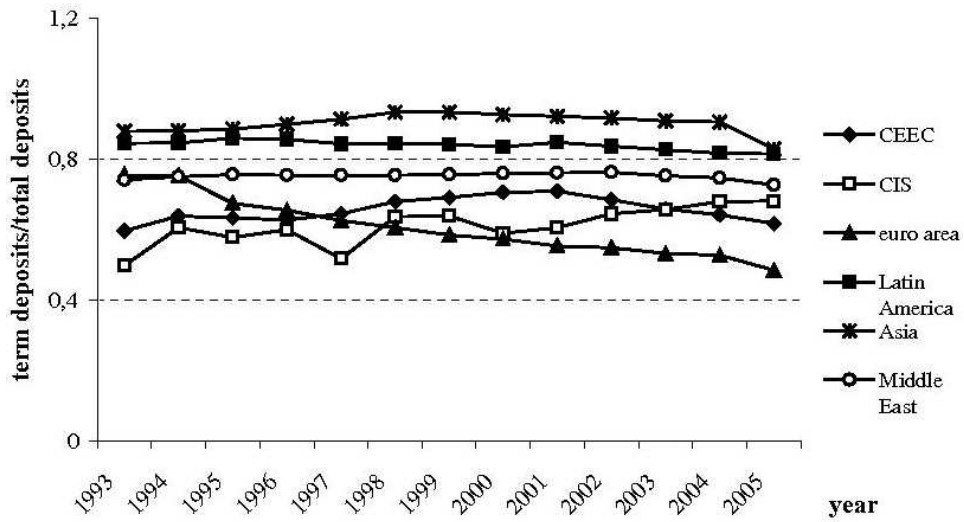


Figure 6: Evolution of term deposits/GDP ratio.