

UKRAINE'S CURRENCY CRISIS IN
SEPTEMBER-AUGUST 1998:
FINANCING A BUDGET DEFICIT
THROUGH DEBT

by

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Abstract

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This thesis analyzes the currency crisis that Ukraine experienced in August-September 1998. It is shown that due to a budget deficit, a current account deficit and low level of reserves, Ukraine was highly vulnerable to a currency crisis and a fixed exchange rate regime was not sustainable in the long-run. Nevertheless, capital inflows, namely in the form of portfolio investment in Ukrainian Treasury bills, provided some artificial stability to the economy, while at the same time increased its vulnerability to a crisis. As capital inflows suddenly stopped in September 1997 any negative expectations became self-fulfilling and led to collapse of both stock and T-bill markets. Rough estimates show that the T-bills debt to foreign investors exceeded the foreign exchange reserves at that time. Ukraine certainly faced a problem of illiquidity, even though it was still considered by foreign investors as solvent. Although Ukraine borrowed extensively in the first half of 1998, it reached some binding constraints on international borrowing and was not able to reduce the T-bills debt-to-reserves ratio. Analysis suggests that both Asian and Russian crises, although they could have severe impact on Ukraine, in fact were of little importance. The currency crisis is the first manifestation of government's attempts to follow a Ponzi scheme of financing: borrow more and more in order to repay previous debt.

TABLE OF CONTENTS

1. Introduction	1
1.1 A Chronology of Events Leading to the Crisis.....	1
2. Theoretical Models of Crises.....	5
2.1. First-generation Models	6
2.2. Second-generation Models	7
2.3. Balance Sheet Crises	9
2.4. Herding Behavior.....	10
2.5. Contagion Effects.....	11
3. Do First-generation Models Explain the Crisis?.....	14
3.1. Empirical Determinants of Currency Crises: An Overview	14
3.2. Behavior of Main Macroeconomic Variables	20
4. Role of Capital Inflows and Outflows for Financial Stability in Ukraine ..	30
4.1. Supply and Demand for T-bills	31
4.2. Development of Ukrainian T-bills Market.....	32
4.3. External Borrowing as Soft Budget Constraint	46
5. Conclusions.....	48
Appendix 1.....	49
References.....	51

LIST OF FIGURES

<i>Number</i>	<i>Page</i>
1. Empirical Regularities During Balance of Payments Crises	19
2. Real Exchange Rate	21
3. Monetary Aggregate M1	22
4. Foreign Exchange Reserves Excluding Gold	24
5. M2/Reserves	24
6. Nominal Exchange Rate	32
7. Inflation, monthly % change of CPI	33
8. Treasury Bills Market	34
9. Monthly Structure of T-bills Sale in 1997, by maturity, %	35

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Chapter 1

INTRODUCTION

On August 13, 1998 one of the world's leading financial players Mr. G.Soros, in the letter to *The Financial Times*, made a proposal to devalue the ruble by 25-30%.

On August 17, 1998 the Central Bank of Russia announced a new currency corridor: in two days the exchange rate devaluated by 50% and the Russian Government defaulted on its payment obligations (HIID, 1998a, p.7). On August 21 the Ukraine's official exchange rate, which is determined at the Ukrainian Interbank Currency Exchange (UICE), approached the upper limit of the announced band (2.25 UAH/USD). The National Bank of Ukraine (NBU) maintained the hryvnia at 2.25 UAH/USD for several days, then closed the UICE and, a few days later, announced a new corridor of 2.5-3.5 UAH/USD. It was the first manifestation of the Ukrainian crisis. The crisis cost a lot for Ukraine: the hryvnia devaluated by 60%, domestic prices increased by 20%, the NBU lost 40% of its gross reserves (ICPS, 1998, p.4).

The aim of this thesis is to analyze the roots of the currency crisis. I will try to answer the following question. Can existing theories of, and empirical facts about, currency crises explain the Ukraine's crisis?

1.1 A Chronology of Events Leading to the Crisis

Since independence, Ukraine has always had a budget deficit. While there is some positive dynamics in fiscal policy, the situation with state finance is very dangerous. An ordinary investor borrows money and invests in projects whose returns exceed the interest on debt. A government should borrow money if it can successfully invest in the economy and obtain positive growth of GDP. In the case of Ukraine, this means that the government should use borrowed

money only for restructuring the economy and conducting real reforms. Otherwise, the only way to pay debt is to borrow more and more and finally default on payment obligations. This way of financing is called Ponzi scheme.

Before 1996 the budget deficit was financed by printing money and the build-up of wage arrears. This caused hyperinflation. At the end of 1995 the government adopted a package to switch financing the budget deficit from seignorage to borrowing. This package included the following features. First, in the second quarter of 1995 the government established the bond market and issued T-bills. Second, the NBU introduced a currency corridor (fixed exchange rate with bands). The goals were to reduce expectations of inflation and attract foreign investors who would operate on the Ukrainian T-bill market. T-bills financed 37% of the budget deficit in 1996 and 71% in 1997 (HIID, 1998a). Since investment in Ukrainian T-bills was risky, the rate of return was high in order to attract foreign investors. The effective annual rate of return was 143% in 1995, 102% in 1996 and 43% in the first quarter of 1997 (HIID, 1998a). At such rates, even a small budget deficit becomes very difficult to sustain. For comparison, the interest rate on T-bills is below 5% in USA. The high yields also attract domestic banks.

The performance of the T-bill market showed some positive dynamics until September 1997. The government was able to reduce yields, increase maturity of issued bonds and a volume of transactions. It seems that the government policy deserved credibility from foreign investors. Nevertheless, the situation changed rapidly in September 1997. Here I present events that occurred in September, while the impact of these events on the collapse of the T-bills market and the currency crisis I discuss in Section 4. First, the financial crises in Asian countries took place between July and December 1997. They reduced the investors' confidence in "emerging markets". The Ukrainian stock market crashed in September. The stock exchange index Pro U-50 reached its maximum on September 1, 1997 and after that, started going down continuously (ICPS, 1998). At the same time yield on T-bills reached its lowest level 22% in August 1997 and, thus, T-bills became less attractive for non-

residents. In addition, during this period the government decided to pay back its wage arrears. Credit from the Bank of Luxembourg was spent for this purpose (HIID, 1998a). The increase in the domestic money supply combined with the fall in non-residents' demand for the hryvnia forced the currency to depreciate. Finally, in September 1997 the IMF refused to grant the second tranche of its stand-by loan (about USD 49 mln) because Ukraine exceeded the budget deficit limit, one of the basic requirements of the loan (HIID, 1998a). All these events contributed to investors' withdrawing their funds from the T-bill market. Since that time the NBU started losing its reserves. Since the beginning of 1998 the NBU was major buyer of T-bills. The NBU tried to stabilize the situation: it increased the discount rate from 17% to 25% and then to 35%, and required reserves from 11% to 15% (HIID, 1998a). The tight monetary policy postponed the time occurrence of the crisis.

During January-September 1998, the Ukrainian government had borrowed UAH 10.6 bln (USD 3.1 bln) in domestic and foreign loans, 95% of which was spent on debt servicing. The Finance Ministry issued three groups of eurobonds (HIID, 1998a). Two tranches of deutsche mark-denominated three-year Eurobonds were issued in February and May. In March the Ministry issued Euro-denominated Eurobonds with two-year maturity. In June, it turned out that there were no buyers for Ukraine's eurobonds even with very attractive rates (HIID, 1998b).

The NBU introduced a new currency band in September after Russia's financial crisis, the exchange rate reached its upper limit very soon and the NBU imposed strict administrative controls regulating the official forex market (UEPLAC, 1998a, p.4). All transactions have to go through unique window of the Kyiv exchange, which implies a ban on direct inter-bank transactions. A list of 'critical' imports has been decreed and foreign currency is provided in principle only to the corresponding importers, with adequate justifications. The exporters are required to surrender 50% of their currency earnings. Finally, the rate for cash in exchange points is regulated and only a narrow margin around the official rate is allowed. The government, in turn, imposed administrative

controls over some prices in July 1998, even before the crisis. These measures reduced “quantitative” indicators of the crisis, such as rate of inflation or devaluation, but caused other damage to the economy.

Section 2 is devoted to theoretical models of crises. In Section 3 I discuss to what degree first generation models may explain the crisis. In Section 4 I analyze the impact of a sudden stop of capital inflow on the crisis and discuss why foreign investors left Ukrainian T-bills market. In Section 5 I conclude.

Chapter 2

THEORETICAL MODELS OF CRISES

Generally, a currency crisis exists when there is an abrupt nominal devaluation accompanied by a large and abrupt change in the real exchange rate. The presence of both nominal and real devaluations is needed to exclude a nominal devaluation caused by hyperinflation from the definition of a currency crisis. Technically, definitions of a currency crisis are different. Some authors consider that a currency crisis has occurred when the accumulated three-month real exchange rate change is 15 percent, others use a 25 percent change of nominal exchange rate as a threshold value. Some authors define a currency crisis as when the one-month change in the real exchange rate (RER) is several times higher the country-specific standard deviation of the RER monthly growth rate. On any definition, Ukraine experienced a currency crisis in September 1998.

One of the necessary conditions of a currency crisis is that the exchange rate is somehow fixed. Under some conditions, which will be discussed below, market participants start buying excessively the foreign currency to which the domestic currency is linked. This excessive buying is called as a speculative attack. Sometimes, the central bank succeeds in fighting off speculative attacks by using its foreign exchange reserves, and, thus, there is no devaluation. If, however, the central bank loses most of its reserves, this event is called as a balance-of-payments crisis. So, the difference between a currency crisis and a balance-of-payments crisis is in ability of the central bank to defend the fixed exchange rate. Although, consequences of a currency and balance-of-payments crisis may be different, reasons for both types of crises are identical.

2.1 First-generation Models

Krugman (1979) developed the first model of a currency crisis. There are two assets in his model: domestic and foreign currency. Expansionary monetary

policy leads to higher rates of inflation and market participants are willing to change their portfolios and hold more foreign currency. Thus, there is excessive demand for foreign currency and if the exchange rate is fixed, the central bank intervenes to cover the excessive demand. Thus, his model shows that, under a fixed exchange rate, domestic credit expansion in excess of money demand growth leads to a gradual but persistent loss of international reserves and, ultimately, to a speculative attack on the currency. This attack immediately depletes reserves and forces the authorities to abandon the parity. The process ends with an attack because economic agents understand that the fixed exchange rate regime will ultimately collapse, and that in the absence of an attack they would suffer a capital loss on their holdings of domestic money. This model suggest that the period preceding a currency crisis would be characterized by a gradual but persistent decline in international reserves and a rapid growth of domestic credit relative to the demand for money. Since the excessive money creation may result from the need to finance the public sector, fiscal imbalances and credit to the public sector could also serve as indicators of a currency crisis. For that matter, central bank credit to troubled domestic financial institutions would play the same role.

A number of papers have extend Krugman's basic model in various directions (see survey in Garber and Svensson, 1994). Some of these extensions have shown that a real appreciation of the currency and a deterioration of the trade balance would generally precede speculative attacks. These results have been derived from models in which expansionary fiscal and credit policies lead to higher demand for traded goods (which causes a deterioration of the trade balance) and nontraded goods (which causes an increase in the relative price of these goods, and thus a real appreciation of the currency). They also follow from models in which expectations of future crisis lead to an increase in nominal wages, which, in the presence of sticky prices, results in higher real wages and lower competitiveness. Also, the authorities can raise interest rates to defend the parity and reduce loses of foreign exchange reserves. Thus, these models suggest that the evolution of the real exchange rate, the trade or current

account balance, real wages, and domestic interest rates could be used as leading indicators of crises.

2.2 Second-generation Models

“Perhaps the best way to describe what is wrong with the canonical model (first generation model) is to say that it represents government policy (though not the market response) in a very mechanical way. The government is assumed to blindly keep on printing money to cover a budget deficit, regardless of the external situation; the central bank is assumed to doggedly sell foreign exchange to peg the exchange rate until the last dollar of reserves is gone” (Krugman, 1998, p.3). In reality both the government and the central bank have much wider policies to defend the exchange rate, including in particular the ability to tighten domestic fiscal and monetary policies. Of course, there are costs to such policies and “defense of an exchange rate is a matter of tradeoffs rather than a simple matter of selling foreign exchange until the money is gone” (Krugman, 1998, p.3).

Second generation models focus on the possibility of a crisis even when economic fundamentals do not deteriorate to a degree assumed by first generation models. In these models, economic policies are not predetermined but respond to changes in the economy, and economic agents take this relationship into account in forming their expectations. These models require three ingredients. First, there must be a reason why the government would like to abandon the fixed exchange rate. Second, there must be a reason why the government would like to defend the rate. Finally, the costs of defending the fixed exchange rate must increase as market participants expect that the rate might be abandoned.

Why might a government have a motive to abandon the fixed exchange rate? One possibility is if the government has a large debt burden denominated in domestic currency. In this case the government might reduce costs of debt servicing by inflation, but cannot do so as long as the exchange rate is fixed.

Another possibility is if the country suffers from unemployment and the government would like to adopt a more expansionary monetary policy.

Why might a government have a motive to defend the fixed exchange rate? One answer might be that it has a history of inflation and regards a fixed exchange rate as a guarantor of credibility. Another might be that abandonment of a fixed rate may cause foreign investors to withdraw their money.

Finally, why would public lack of confidence in maintenance of a fixed rate have the effect of making that rate more difficult to defend? Obstfeld (1994) emphasizes that a fixed rate will be costly to defend if market participants expected in past that it would be depreciated now. For example, debt-holders might have demanded a high rate of interest in anticipation of depreciation. Or unions, expecting depreciation, might have set wages at higher levels. Another alternative is to suppose that a fixed rate is costly to defend if people now expect that it will be depreciated in future. One channel involves short-term interest rates: to defend the currency in the face of future depreciation requires higher short-term rates that might depress output and employment.

As pointed out in Krugman (1996), it is possible to combine three ingredients to produce a general story about currency crises. Suppose that a country's fundamental tradeoff between the costs of maintaining the current parity and costs of abandoning it is predictably deteriorating, so that at some date the government is likely to abandon parity even without speculative attacks. Speculators expecting this would surely try to buy foreign currency ahead of devaluation; by doing so they would worsen the government's tradeoff, leading to an earlier devaluation. Therefore, a crisis would take place before the fundamentals would appear to make devaluation necessary.

Recent models also have suggested that crises may develop without any noticeable change in fundamentals. Nevertheless, it may be the case that the government will abandon the peg if faced with a sufficiently severe speculative attack. The result in such cases will be the possibility of self-fulfilling exchange

rate crises and multiple equilibria, when the economy moves from one equilibrium to another without a change in fundamentals. An individual investor will not pull his money out of country if he believes that the currency regime is in no imminent danger, but he will do so if a currency collapse seems likely. A crisis takes place if many individual investors pull their money out. The result is that either optimism or pessimism will be self-confirming. In the case of self-confirming pessimism, a country will be justified in claiming that it suffered an unnecessary crisis. An important implication of models with self-fulfilling crises is that predicting crises may be extremely difficult

2.3. Balance Sheet Crises

As stressed by Feldstein (1999), a country may come under attack even if it has a current account surplus and the exchange rate is not overvalued. This happens if private and government short-term liabilities denominated in foreign currencies exceed the country's foreign exchange reserves. Thus, the country is solvent, because it can repay its obligations in future, but has problems of illiquidity since it cannot meet its obligations in short-term. If foreign investors have confidence in the country they will continue to roll over the short-term debts. But if enough creditors believe that the country will not be able to meet obligations because other investors will withdraw their money, the country is forced to default or reschedule its payment obligations or to devalue its currency.

Dornbusch (1998) found that one of the reasons for the Asian crisis is mismatching of maturities in the balance sheet of the financial system. If emerging market banks and firms borrow short either because it is cheaper or nobody is willing to lend to them and use this money in long-term projects, then they are subject to liquidity risk - the sudden inability to roll over debts that moves the economy to a crisis. "Not a good idea to fund highways with
usch, 1998, p.2)

Balance sheet crises are very similar to financial panic in the model of a bank run developed by Dybvig and Diamond (1983). A panic takes place when

short-term creditors suddenly withdraw their loans from a solvent borrower. Dybvig and Diamond stressed that, in general, a panic can occur when three conditions hold: short-term debts exceed short-term assets; no single creditor is large enough to supply all of the credits necessary to pay the existing short-term debts; and there is no lender of last resort. Under these conditions, it is rational to withdraw credits if the other creditors are also fleeing from the borrower, even though each creditor is willing to lend if the other creditors will do the same. Korea's experience in 1997 is a good example of a balance sheet crisis (see Dean, 1998).

2.4. Herding Behavior

Both the first and second generation models assume that exchange markets are efficient, they make the best use of the available information. Nevertheless, there is very little evidence that such markets are in fact efficient. Crises may occur as a result of herding behavior of speculators, when investors based their decisions on limited information and observations what other investors do. Krugman (1998) provides a good example of such behavior. Suppose that investor 1 has insider information about stock market, investor 2 has special information about the financial conditions of banks and investor 3 has confidential information about government policy. If, for example, investor 1 receives negative information about prospects of stock market, he can withdraw money. Investor 2, observing that investor 1 goes away from the market, can also sell even though his information is neutral or even slightly positive. Finally, investor 3 also sells even though his private information is positive, because he may conclude that information obtained by investors 1 and 2 is negative, while in fact only the first investors received bad news.

Krugman (1998) provides another explanation of herding behavior that is based on the fact that much of the invested money is managed by agents rather than by principals. If performance of managers is evaluated by comparison with other managers then managers have strong incentives to act alike. Krugman express the behavior of managers in the following way: "I will

probably feel worse if I lose money in a Thai devaluation when others do not than I will if I lose the same amount of money in general rout” (Krugman, 1998, p. 6).

2.5. Contagion Effects

Currency crisis in one country can cause strong pressure on exchange rates and asset prices in other countries and lead to crises in these countries. There are several reasons why a crisis in one country causes a crisis in other countries. First, a crisis in one emerging market may affect the macroeconomic fundamentals in other emerging markets, for instance because devaluation reduces the price competitiveness of other countries. Second, a crisis in one country can conceivably trigger a crisis elsewhere for reasons unexplained by macroeconomic fundamentals. Third, a crisis may spread from one country to another if the two countries have macroeconomic or financial similarities. Some authors consider all three channels as contagion. Masson (1998) proposes to distinguish these various reasons and applies the term contagion only to the second category, while the first category is called “spillovers” and the third category is called “monsoonal effects”. In this paper I will follow his definitions and, thus, will distinguish spillovers, monsoonal and contagion effects.

Eichengreen, Rose and Wyplosz (1996) in their empirical study find that crises appear to spread more easily to countries which are closely tied by international trade linkages than to countries in similar macroeconomic circumstances. Glick and Rose (1998) also find empirical support that patterns of international trade are important in understanding how currency crises spread; by way of contrast, macroeconomic and financial influences are found not to be associated with the cross-country incidence of speculative attacks.

One explanation of pure contagion between seemingly unlinked economies is provided by Drazen (1997). Countries may be perceived as a group with some common, but imperfectly observed characteristics. For example, countries may share common culture and if investors see one country with that culture to abandon its exchange rate under pressure they may revise downward their

estimates of the willingness of other such countries to defend their exchange rates.

Calvo (1999) provides another model that incorporates contagion and herding behavior. The key point of the model is that knowing about emerging market economies involves large fixed cost relative to the size of investment projects. Learning about any single country is costly and requires a team of experts continuously monitoring macroeconomic and political variables. In the case of emerging market monitoring is even costly since the economy transforms rapidly. Thus, fixed cost generates economies of scale. This makes it plausible to assume that there is a set of informed investors and a set of uninformed investors. Since informed investors know better about a given project they have incentives to borrow to finance this project and, thus, are potentially liable to margin calls. If investors lose money in one country they are subject to margin calls and will withdraw money from other countries. Uninformed investors, in turn, observe price and some details of investment strategy followed by informed investors. If they see that informed investors sell emerging market securities they cannot determine whether this selling is caused by changes in fundamentals or because informed investors are subject to margin calls. Thus, they face what sometimes is called as a “signal extraction”. If they also decide to sell securities and withdraw money then a country faces capital outflow that may be not related to its fundamentals. So, this model provides the channel through which a crisis in one emerging economy may spread to all emerging economies.

Goldstein (1998) provides another view of contagion. In his model contagion operates through changes in expectations for unchanged values of fundamentals and a crisis in one country creates a “wake up call” for another country. In this view, fundamentals are in fact poor, but investors did not realize this until a crisis somewhere else does not manifest problems with fundamentals.

It should be mentioned that some authors refer to contagion effects as a part of second-generation models.

Chapter 3

DO FIRST GENERATION MODELS EXPLAIN THE CRISIS?

First, Ukraine had a budget deficit. Second, Ukraine adopted an exchange rate-based inflation stabilization plan. Third, although the government financed a budget deficit mainly by borrowing abroad rather than by printing money, capital inflows were not sterilized and, thus, one could expect a growth in money supply. These three facts imply that first generation models may explain the Ukraine's currency crisis.

First generation models provide channels through which a crisis may take place, but they do not answer the questions: what budget deficit is sustainable, what growth in money supply is dangerous and so on. In order to answer these questions we need to look at empirical facts about crises. For these purposes, I review empirical studies on the determinants of currency crises and present stylized facts about them.

3.1. Empirical Determinants of Currency Crises: An Overview

The main goal of this subsection is to review approaches that are used for an analysis of currency crises, such as single-country and multi-country studies, "warning system" approach, and stylized facts, emphasizing variables that were found as leading indicators of crises.

There are a large number of empirical studies on the determinants of currency crises. All the studies were driven by desire of authors to analyze potential causes and symptoms of currency crises and to develop a warning system that would help to monitor whether a country may face a crisis. Financial market participants are interested in a warning system because they want to make money, policymakers because they wish to avoid the crisis, and academics because they "have a long history of fascination with financial crises "

(Kaminsky, Lizondo, Reinhart, 1998, p 2). These studies can be divided in two types. One focuses on analysis of the determinants of crises in a single country. The other relies on multi-country analysis, and uses either a cross-section of countries or a panel-data structure.

The single-country studies usually relate the timing of devaluation to the behavior of several macroeconomic indicators. The classical study was done by Blanco and Garber(1986) who analyzed the devaluations of the Mexican peso between 1976 and 1982 and showed that large exchange rate adjustments in Mexico were preceded by substantial increases in the ex-ante probability of devaluation. Subsequent studies focused on Argentina (Cumby and Van Wijnbergen, 1989), Mexico in the 1980s (Goldberg, 1994), Mexico between 1982 and 1994 (Pazarbasioglu and Otker, 1997), and the experiences of several European countries in the context of the European Monetary System (Otker and Pazarbasioglu, 1997). For more detailed review of these studies, see Kaminsky, Lizondo, Reinhart (1998). These works have generally found that macroeconomic indicators play a key role in determining currency crises. Crises tend to be preceded by foreign reserve losses, expansionary fiscal and monetary policies and by high interest rate differentials. However, these results, although suggestive, are somewhat limited since they are obtained from a small number of countries during very specific situation.

Multi-country studies avoid the limitations of country-specific analyses due to the higher variability associated with cross-country information. Although there is a huge number of multi-country studies I will review only some of them (for more detailed survey see Esquivel and Larrain (1998) and Kaminsky, Lizondo, Reinhart (1998)).

Frankel and Rose (1996) use a panel of annual data for 105 developing countries from 1971 through 1992 to analyze the determinants of currency crises. They find that low levels of foreign direct investment, low international reserves (as a share of imports), high domestic credit growth, high foreign interest rates and overvaluation of the real exchange rate are useful in

predicting crises. Interestingly, the authors find that neither the current account deficit nor the fiscal deficit has a significant effect on the likelihood of a crisis.

Kaminsky, Lizondo, Reinhart (1998) propose the monitoring of indicators that tend to exhibit unusual behavior prior to a crisis. A currency crisis is defined to occur when a weighted average of monthly percentage depreciations of the exchange rate and monthly percentage declines in reserves exceeds its mean by more than three standard deviations. The authors choose 15 indicators based on theoretical priors and on the availability of monthly data. An indicator issues a signal whenever it moves beyond a given threshold level. A “good” signal is one that is followed by a crisis within 24 months. An “optimal” set of thresholds is calculated, defined as a set that minimizes the noise-to-signal ratio: i.e., the ratio of false signals to good signals.

Thresholds are defined relative to the percentiles of the distribution of the indicator by country. For example, the threshold for real exchange rate deviations might be the 85th percentile, so that any value of the real exchange rate deviation above this percentile would constitute a signal. The percentiles are calculated relative to each country’s empirical distribution of the variable in question. To continue the example, the threshold value of the real exchange rate deviation for each country is the 85th percentile of that country’s distribution of real exchange rate deviations. Thus, minimizing the noise-to-signal ratio for the sample of countries yields a percentile for each indicator that is uniform across countries, but the corresponding country-specific thresholds associated with that percentile will differ across countries.

The variables that have the best track record in anticipating crises include output, exports, deviations of the real exchange rate from trend, equity prices, and the ratio of broad money to gross international reserves. The evidence does not provide support for some of the other indicators that were considered, including imports, the differential between foreign and domestic real deposit interest rates, the ratio of lending to deposit interest rates, and bank deposits.

Unfortunately, the developed warning system cannot be applied to Ukraine, since it requires more than 6 years of data available for Ukraine.

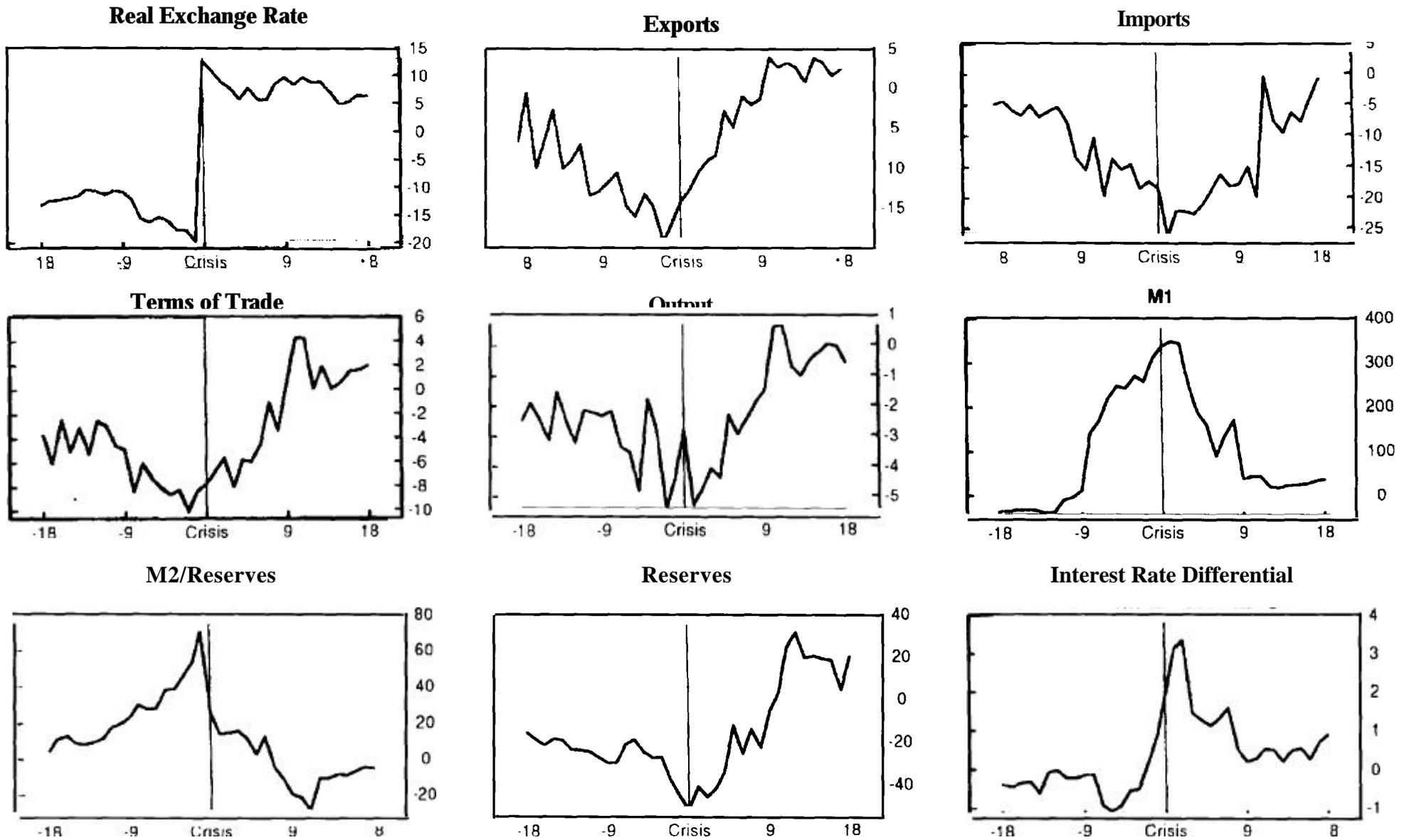
Esquivel and Larrain (1998) use a panel dataset with annual information for 30 countries during the period 1975-96. Their paper considerably departs from other empirical studies. First, the number of countries in their sample is second largest among empirical studies. Second, unlike studies that have focused exclusively on either developed or developing countries, their paper uses a diverse group of 15 high-income and 15 middle-income countries. Finally, the empirical approach differs from previous studies in that it represents the first attempt to simultaneously test the main predictions of both first and second-generation models of currency crises.

The explanatory variables closely associated with first-generation models are seignorage, real exchange rate misalignment, current account balance, and M2/reserves ratio. In the light of second-generation models, they choose terms of trade shock, per capita income growth and contagion effects. Interestingly, the results indicates that the insights developed by second-generation models complement rather than substitute for the explanation provided by first-generation models.

Kaminsky and Reinhart (1996) examine a large number of countries that experienced crises and find that there are macroeconomic “stylized facts” that are common for those countries. In particular, they examine the behavior of: real exchange rates, the value of exports and imports (in US dollars), the terms of trade (defined as the unit value of exports over the unit value of imports), the ratio of M2 (converted into dollars) to foreign exchange reserves, and domestic-foreign interest rate differentials. Interest rate differentials are reported in levels, while real exchange rate in the percent difference in the index level relative to tranquil times. All the other variables are reported as 12-month percent changes, again, relative to tranquil times. Since it is difficult to say what times are tranquil for Ukraine, we cannot apply these stylized facts directly but for sure can draw some conclusions.

Figure 1 is taken from their article. As can be seen, the real exchange rate is overvalued and continues to appreciate before a crisis. The large real appreciation before the crisis is, not surprisingly, accompanied by deterioration in the performance of export, as shown on the next panel. As the real exchange rate appreciates, we should expect growth in imports. Nevertheless, as can be seen from the next panel, imports falls before the crisis. This can be explained by slowdown in economic activity and the deterioration of the terms of trade, and a decline in output shows that economic activity decreases. The next two panels show the evolution of monetary aggregates. The first panel shows M2 and the next one shows M2-to-reserve ratio. The months preceding crises are characterized by expansionary monetary policy as follows from theory. With fixed or nearly fixed exchange rate regime, it is reasonable to expect that the central bank stands ready to back some portion of the monetary base. As reserves fall and monetary aggregate M2 grows prior a crisis, M2-to-reserves ratio increased sharply. The next panel shows the 12-months percentage change in foreign reserves. As expected, reserves fall substantially prior a crisis. Finally, the last panel shows the evolution of interest rate differential. The high (relative to normal times) interest rate differentials observed immediately before crisis

Figure 1. Empirical Regularities during Balance of Payments Crises



Source: Kaminsky and Reinhart (1998)

could be a sign that monetary policy was tightened in order to stem reserve losses.

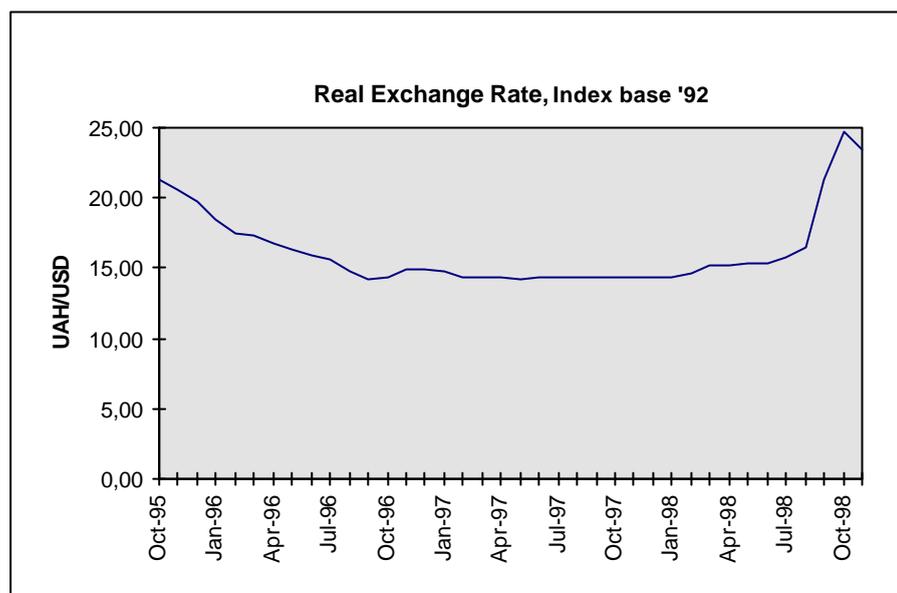
3.2. Behavior of Main Macroeconomic Variables

The variables used in analysis are chosen in light of theoretical considerations and empirical determinants of currency crises.

Real Exchange Rate. Dornbush, Goldfajn and Valdes (1995) stressed that the real exchange rate is overvalued, relative to its equilibrium level or its average level during tranquil times, in periods presiding the currency crash. Kaminsky, Lizondo and Reinhart (1998) in their empirical study identified the real exchange rate as the best leading indicator of currency crises. Real exchange rate appreciation often arises when a government adopts exchange rate-based inflation stabilization plans, but domestic inflation fails to converge to international levels.

In Ukraine successful attempts to reduce inflation have been made since the introduction of a new currency, the hryvnia, in September 1996. In January 1997, the NBU established currency corridor (fixed exchange rate with bands). During that time, real exchange rate remained almost constant, thus, indicating that the exchange rate-based inflation stabilization plan did not lead to significant cumulative real exchange rate appreciation. On the other hand, the exchange rate could be overvalued before 1996, when Ukraine experienced huge inflation. In 1993 and 1994, for example, the real exchange rate appreciated by about 60%. On the other hand, at the end of 1992 the nominal exchange rate devalued in excess of inflation and, therefore, consequent real exchange rate appreciation might be explained as a return of the real exchange rate to equilibrium after the overshooting. Also, as mentioned by Roubini and Wachtel (1997), “the real exchange rate appreciation can represent changing real sector fundamentals that alter the balance of savings and investment. In this case any real appreciation is an appreciation of, or return to, the long-run equilibrium exchange rate”

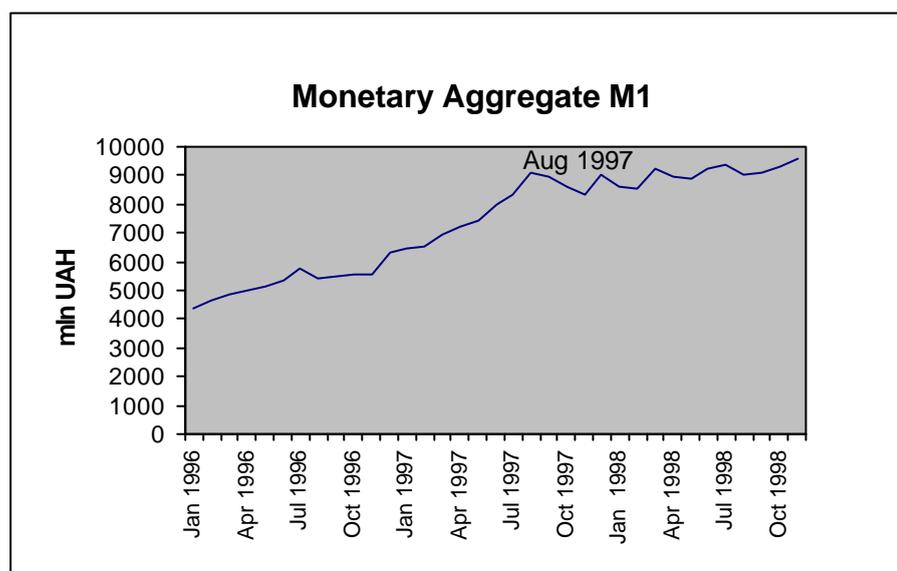
It is difficult to say to what degree the exchange rate is overvalued in Ukraine. One conclusion can be drawn from the discussion above. If the real exchange rate misalignment indicated a crisis, it indicated a crisis for both 1997 and 1998 years, since the real exchange rate did not appreciate significantly during 1996 and 1997.



Source: *Ukrainian Economic Trends*. 1998. November

Monetary Aggregates. Since the original source of problems in first-generation models is the excessive creation of domestic credit to either finance fiscal deficit or to provide assistance to a weak banking system, the months preceding the crisis should be characterized by a highly expansionary monetary policy. The monetary aggregate M1 grew by approximately 70% in the period August 1996- August 1997. At the same time a rate of inflation was relatively low, indicating an increase in money demand. This can be explained by a confidence effect, the stabilization of the exchange rate increased the confidence to the national currency and the banking system: in 1997, the household deposits in the national currency increased by 70% (Dekhtiarchuk, 1998). Second, the development of government security markets and high yield of this kind of securities increased the non-residents' demand for the hryvnia.

Thus, the described phenomenon is remonetization of the economy. The economy was significantly demonetized during the period of hyperinflation, when foreign currency played the roles of medium of exchange and store of value. The maximum 12-months percentile growth of M1 was about 70% in August 1997. This number is sufficiently below usually observed growth preceding crises in other countries: 200% - 300% relative to tranquil times (Kaminsky and Reinhart, 1996, see figure 1). Therefore, the money growth was not so expansionary as in other countries that faced crises. However, it should be mentioned that the sensitivity of the economy to money growth depends on the level of monetization. An economy with the level of monetization equal to, say, 70% is less sensitive to money growth than an economy, like Ukraine, where the level of monetization is about 15%.



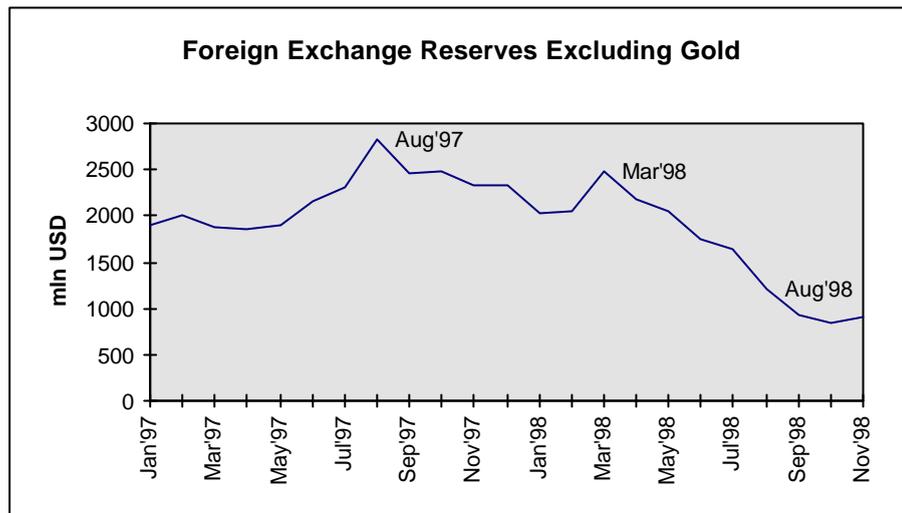
Source: *Ukrainian Economic Trends*. 1998. November.

Current Account Balance. Roubini and Watchel (1997) stressed that a current account deficit may be a reflection of both the strength and weakness of a developing economy. “On the one hand, a current account deficit may be a reflection of the strength, if it measures resources coming into the economy to finance investment demand in excess of national saving. On the other hand, a current account deficit can reflect a dangerous and unsustainable imbalance

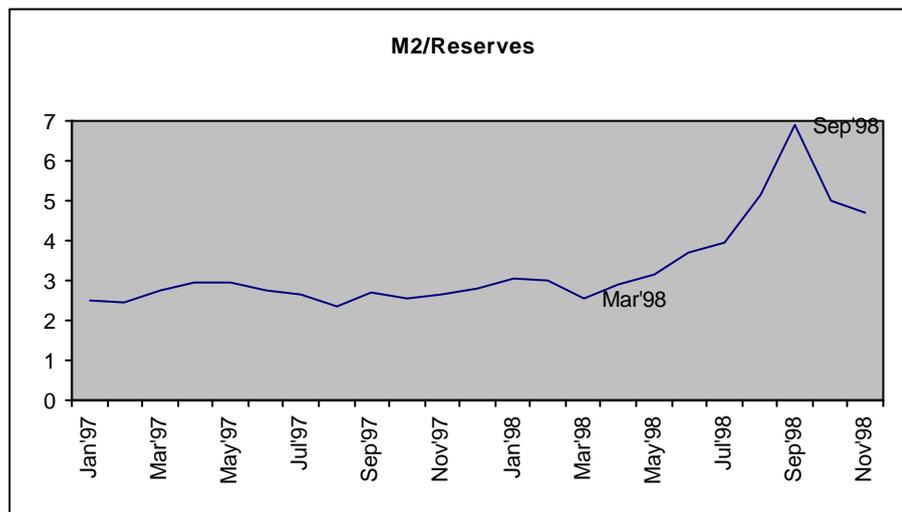
between national savings and domestic investment and the accumulation of debts that cannot be serviced". A deterioration of the current account balance is expected in anticipation of a currency crisis. In 1996 and 1997 current account deficit was 2.7% of GDP (ICPS, 1998).

Economic Activity. The slowdown of economic activity is usually observed before crisis (Kaminsky and Reinhart, 1996). This slowdown may be reflected in a decline in output, the terms of trade and import. Since Ukraine has never experienced growth in output, we cannot use this indicator in our analysis, since we cannot distinguish whether a decline of output is due to transformation of the economy or due to slowdown of economic activity prior to a crisis. Exports and imports grew by 9% and 17% in 1996 respectively (UEPLAC, 1998). But in 1997 exports and imports fell slightly (by less than 1%). In the first nine months of 1998 export and import fell more radically, export by 13% and import by 17% (PBU, 1998). This can be partly explained by a decrease of exports to Asian countries due to the Asian crisis (Asia had imported approximately 70% of Ukrainian metallurgical export (ICPS, 1998b)) and partly by an agreement between Russia and Ukraine under which Ukraine reduced prices on gas transport, while Russia reduced prices on gas sold to Ukraine (Volchenko, 1998). Also, government has adopted seven decrees and increased more than 400 rates of duty for first six months 1998 in order to reduce import (Volchenko, 1998).

M2/Reserves Ratio and Reserves. It is clear that the lower reserves are, the higher the probability of speculative attacks and currency crisis. The higher is the M2/Reserves ratio, the higher probability. The NBU's gross reserves started continuously declining in September 1997. The fact why this occurred in September 1997 will be explained later. M2/Reserves ratio remained relatively constant and was equal to 2.5 until March 1998.



Source: *Quarterly Predictions*, 5 (1998).



Source: *NBU, Quarterly Predictions* 5.

Summarizing the above discussion, I would like to stress the following. First generation models imply that expansionary monetary policy leads to higher rates of inflation, and higher inflation in turn causes excessive demand for foreign currency, and for tradable and nontradable goods. Both higher inflation and a deterioration of the trade balance have to be reflected in the real exchange rate appreciation. The fact that the real exchange rate did not appreciate significantly since introduction of the fixed exchange rate implies

that factors explaining the crisis lie outside first generation models. Analyzing behavior of main macroeconomic variables, I would like to distinguish three major periods: (i) January-September 1997, the period of relative stability, when the NBU is able to increase reserves, inflation and devaluation are low; (ii) October 1997 - March 1998, the NBU loses its reserves and uses tighter monetary policy, the M2-to-Reserves ratio is constant; (iii) April - September 1998, reserves continue to fall, but now more than monetary aggregate M2 does.

As can be seen from the behavior of reserves and the M2-to-reserves ratio, Ukraine started moving to a crisis sufficiently before the crisis in Russia. If the tendency in their behavior had remained the same, Ukraine would have probably experienced a crisis in September-December 1998 without any external shock, such as the Russia's crisis. This suggests that a contagion, spillovers or monsoonal effect of the crisis in Russia on the Ukraine's crisis was of minor importance.

Although first generation models do not explain the Ukraine's crisis, it is interesting to evaluate the probability of this type of crisis for Ukraine, since if a country is vulnerable to this type of crises, it is vulnerable to practically any type of crises. For these purposes, I choose the empirical model developed by Esquivel and Larrain (1998). I choose it for several reasons. First, the model uses variables emphasized in theory. Second, a dataset includes 15 high-income and 15 middle-income countries and, thus, uses a more diverse group of economies. Their panel data set contains 21 years of observations for 30 countries, and 117 crisis episodes.

I now describe their approach to estimate the determinants of currency crises. The variable to be explained (y_{it}) is dichotomous, and takes the value 1 if a currency crisis occurred during year t and 0 otherwise. There is an unobservable variable (y^*_{it}) which is described by

$$y^*_{it} = \beta * X_{it-1} + u_{it}$$

where X_{it-1} is a vector of explanatory variables from country i in period $t-1$, β is a vector of coefficients to be estimated, and u_{it} is a composite error term. The observed currency crisis variable behaves according to

$$y_{it} = 1 \quad \text{if } y^*_{it} > 0$$

and

$$y_{it} = 0 \quad \text{otherwise}$$

The authors use a probit model with random effects and the probability of a crisis can be then calculated as

$$\text{Prob}(\text{Crisis}_{it}) = \Phi(\beta X_{it-1})$$

where Φ represents the standard normal distribution.

Running the regression, they obtained the following results (t-statistics in parenthesis).

$$y^* = 0.05 * \text{Seignorage} + 0.014 * \text{RERMisalignment} - 0.049 * \text{CAB} + 0.34 * \text{Log}(M2/\text{Reserves})$$

(1.84) (1.98) (-3.00) (3.50)

The dependent variable is the unobservable variable and its threshold level is 0.3. Thus, if estimated y^* is greater than 0.3, the country is expected to face a crisis, otherwise tranquil times are predicted for the next year. The explanatory variables, which are associated with first-generation models of crises, are seignorage, real exchange rate misalignment, current account balance and M2/Reserves. Seignorage is defined as the annual change in reserve money as a percent of GDP. Since seignorage is usually caused by the need to finance a budget deficit, this variable can be directly linked to a budget deficit. RER Misalignment is defined as the negative percentage deviation of the RER from its average over the previous 60 months. CAB is current account balance as percent of GDP.

	19 96		19 97	
	y*		y*	
Seignorage	1.7%	0.085	2.6%	0.13
RER	?		?	
Misalignment				
CAB	-2.7%	0.1323	-2.7%	0.1323
M2/Reserves	2.5	0.1353	2.5	0.1353
Total		0.3526		0.3976
Probability of a crisis		64%		65%

Putting numbers for Ukrainian economy even without real exchange rate misalignment, we obtain that a crisis was highly probable for both 1997 and 1998. On the other hand, the model uses the growth in reserve money, while theory implies that domestic credit expansion **in excess** of money demand growth leads to a crisis. I do not use RER Misalignment since theory considers misalignment of real exchange rate relative to its equilibrium level, while this model uses RER misalignment relative to average rate over previous 60 months, that cannot be directly applied to Ukraine because during that time the economy transformed quickly and RER index fell from 121.4 in the first quarter in 1994 to 14.4 in 1997. As can be seen, current account balance and the M2-to-reserves ratio account to $p=0.26$ while the threshold level is $p=0.3$. This indicates that the level of current account balance is not sustainable under a given level of reserves.

The analysis of this section suggests that due to a budget deficit, a current account deficit and low level of reserves Ukraine is highly vulnerable to a currency crisis through channels of first generation models. However, behavior of main macroeconomic variables demonstrates that, in fact, first generation models do not explain the crisis. One explanation to this “paradox” is the following. The purpose of first generation models is to show that expansionary monetary policy and fixed exchange rate are not sustainable. Since sooner or later any government may face constraints on its ability to borrow externally, these models assume for simplicity that there are no capital inflows. But in Ukraine there were capital inflows, namely in the form of portfolio investments,

before September 1997. Due to these inflows, supply of dollars on the forex market usually exceeded demand and the NBU increased its reserves by interventions. Thus, capital inflows provided stability to the forex market and hrvnia devaluated only by about 6% from September 1996 to September 1997. The stability of exchange rate, in turn, sufficiently reduced the rate of inflation.

Nevertheless, in September 1998 capital inflows changed to capital outflows, it is reasonable to expect that further development would follow channels of first generation models. In fact, Ukraine faced some constraints on its ability to borrow in 1998. Although Ukraine has borrowed extensively, 95% of these loans was spent on debt servicing (HIID, 1998a). Thus, the only remaining source of financing the budget deficit was seignorage that according to first generation models could lead to higher rates of inflation and higher devaluation pressure on the domestic currency. Why that was not so can be explained by the NBU's policy. First, since September the NBU has tightened monetary policy: refinance rate was changed from 16% to 23.9% (Nov-97), then to 35% (Dec-97), to 42.4% (Feb 98), to 43% (May-98), to 51% (Jun-98), to 76% (Jul-98), and finally to 82% (Aug-98). Also, the NBU increased the required reserves from 11% to 15%, and then to 17%. The broken shape of the M1 on the above figure can be explained in the following way. The NBU increases money supply, then tightens monetary policy, then again increases money supply by printing money, again decreases it due to tight monetary policy and so on. Second, the NBU imposed more severe administrative controls over the foreign exchange market (see Bereslavskaya, 1998a), which can be interpreted as constraints on the banks' ability to buy dollars just because they prefer to hold more dollars.

We see that capital inflows play an important role in providing stability. The reasons why there were capital inflows despite weak fundamentals of the economy, why foreign investors left Ukraine and what was the impact of capital outflows are discussed in the next section.

Chapter 4

ROLE OF CAPITAL INFLOWS AND OUTFLOWS FOR FINANCIAL STABILITY IN UKRAINE

There are four major types of capital inflow: portfolio investment, foreign direct investment, bank loans and official lending. Portfolio investment, bank loans and official lending are forms of debt finance. “The issuer of the instrument must repay a fixed value (the sum of principal plus interest) regardless of economic situation.” (Krugman, Obstfeld, 1997, p. 653). Foreign direct investment is a form of equity finance. “It is a claim to a firm’s profits, rather than to a fixed payment, and its payoff will vary according to circumstances” (Ibid.). Thus, debt instruments are more dangerous in the case of adverse economic events. Among them, official lending from international agencies like the IMF, the World Bank or directly from foreign governments is a debt instrument more open to negotiations and quite often possesses interest rates below market rates. According to Ukraine’s Balance of Payments, capital inflow was mainly in the form of portfolio investment in 1997:

Ukraine’s Balance of Payments (mln USD)

	1995	1996	1997
Net direct investment	257	526	581
Net portfolio investment	4	198	1603
Other investment	1099	1090	319

Source: PBU(1998)]

Since foreign portfolio investors purchase mostly Ukrainian T-bills in the next two subsections I consider the development of the T-bills market and discuss its efficiency. For this purpose I introduce main factors that influence interest rates in the Subsection 4.1.

4.1. Supply and Demand for T-bills

In economics, market equilibrium occurs when the amount that people are willing to buy equals the amount that people are willing to sell. The price of T-bills is determined by the same principles. I use supply and demand analysis that is frequently referred as the loanable funds framework (see Mishkin, chapter 6). I analyze the primary T-bills market, so the supply of T-bills is determined by the current need to finance the budget deficit and redeem previously issued bills. Since T-bills debt grows, the supply of T-bills has growing trend, implying that the interest rate should go up, *ceteris paribus*.

If in the developed countries T-bills are considered risk-free securities, they certainly possess some risks in emerging markets and, thus, buyers require risk premium on them, shifting the demand curve and increasing interest rate. All the definitions are taken from Fabozzi, Modigliani and Ferri (FMF, p. 180).

Default risk or credit risk premium. The default risk premium is the reward for taking on the risk of default in the case of a loan or bond or the risk of loss of principal for other assets.

Liquidity premium. The liquidity premium is the reward for investing in an asset that may not be readily converted to cash at a fair market value.

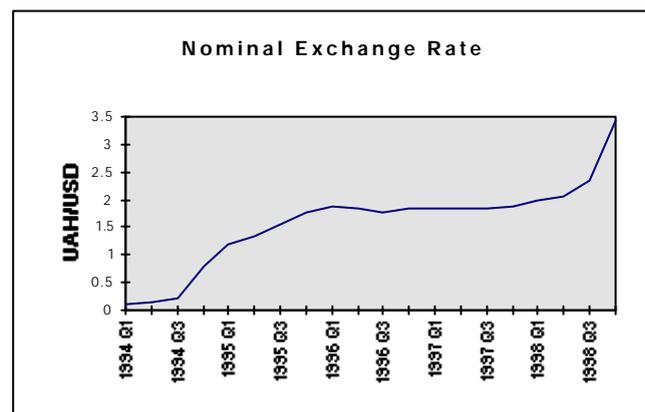
Exchange-rate risk premium. The exchange-rate risk premium, which is the reward for investing in an asset that is not denominated in the investor's home currency.

Inflation premium. The inflation premium is the compensation for the expected decline in the purchasing power of money lent to borrowers.

4.2. Development of Ukrainian T-bills Market

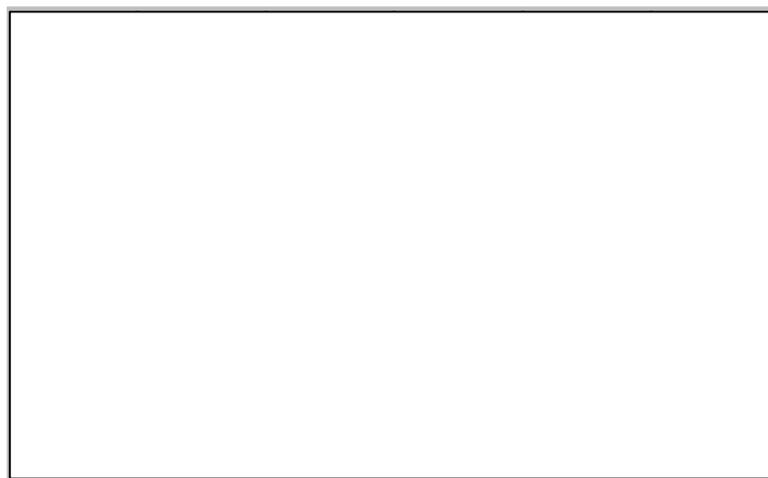
Ukrainian T-bills market has a short but very dynamic history of development. Its establishment was a part of a package adopted by the government, the main goal of which was to shift the focus from financing a budget by seignorage to

financing it through debt. The first Ukrainian T-bills were issued in March 1995. At that time they did not play an important role: raised funds accounted to 304.1 mln hryvnia and covered 7% of the budget deficit (HIID, 1998a)¹. This relatively small amount was borrowed at high costs, the average effective yearly rate of return was about 140%. The major endeavors of the government and the NBU were forced to provide stability to the exchange rate and reduce inflation. By imposing tight monetary policy, the NBU reduced money supply in the second half of 1995 and tried to keep its growth low in 1996. The NBU actively intervened on the foreign exchange market by selling dollars, but at the same time was able to increase its reserves mainly due to credits from the IMF and the World Bank. The stability of the exchange rate since the beginning of 1996 pushed down the rate of inflation which stabilized at a low (for Ukraine) level in the second half of 1996.



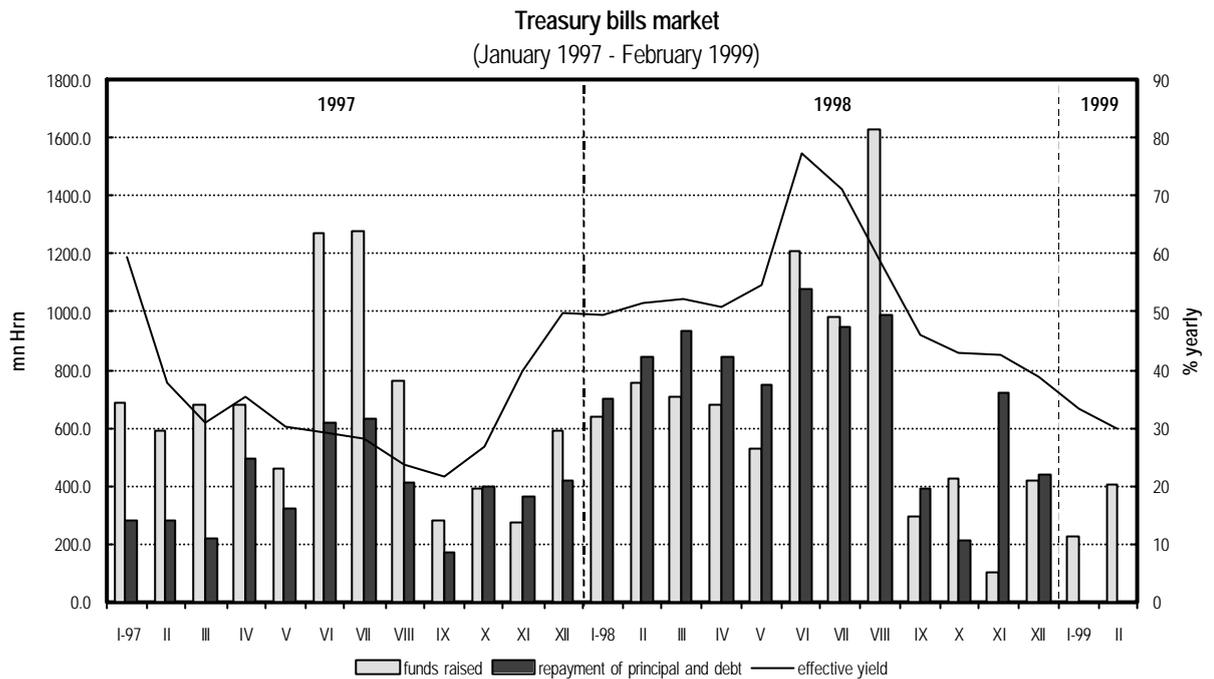
Source: UEPLAC

¹ According to UEPLAC's data, raised funds were equal to 30.5 mln UAH (UEPLAC, 1998)



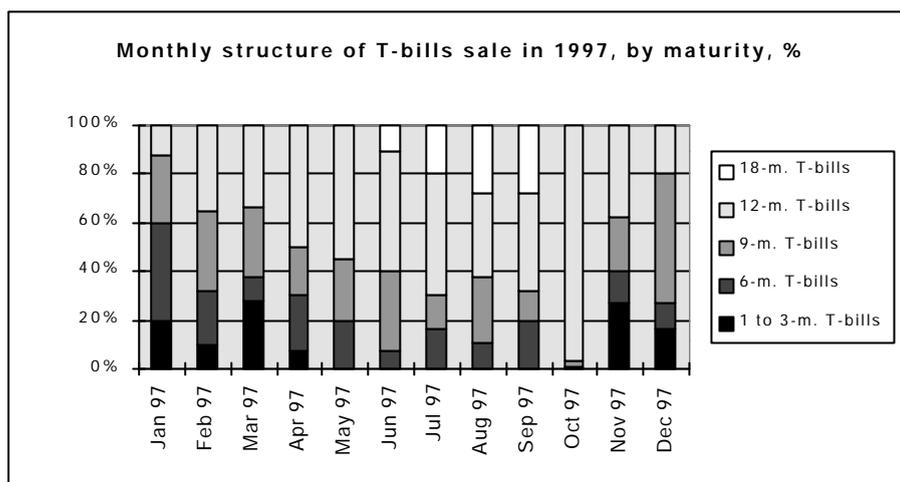
Source: UEPLAC

Lower inflation and stabilization of the national currency helped build investors' confidence in the market and starting from the second quarter of 1996 funds raised from the T-bill market have increased significantly at lower costs, the yearly effective rate of return reduced to 64% in December 1996 (UEPLAC, 1998). In terms of risk premium, this can be explained by a decrease of short-term exchange-rate risk due to stabilization of the exchange rate and by a decrease of inflation premium. However, the long-term exchange-rate risk is expected to increase since the real exchange rate appreciated before October 1996. The liquidity premium is expected to decrease due to development of the secondary market. Funds transferred to the budget amounted to 3145.1 mln hrvnia and financed 37% of the budget deficit in 1996 (HIID, 1998a). The positive dynamics of the T-bill market continued in the first half of 1997, issued T-bills were enough not only to redeem previously issued bonds but also to cover 60% of the budget deficit. 4360.6 mln UAH was transferred to the budget. It seems that policy of the government and the NBU deserved more and more credibility. As can be seen from the next two figures, yields continue to fall and investors' interest shifts to longer bonds.



Source: Adopted from the *Ukrainian Economic Trends* (UEPLAC, 1999, p.19)

High yields on T-bills and stability of the exchange rate attracted foreign investors. From months to months they purchase more and more T-bills and their share in the market grows from 30% in 1996 to 60% in 1997 (HIID, 1998a). Since the number of T-bills in circulation also grows gradually while price of these bonds falls, the increase in their share implies growing capital inflows to Ukraine. According to Myhailychenko (1999), 30% of supply of dollars on the foreign exchange market was due to portfolio investments in 1997, and because of these investments supply of dollars usually exceeded demand and the NBU intervened by buying foreign currency.



Source: HIID, 1998c, p.3

Despite the achievements of monetary policy and relatively positive performance of the T-bills market, it faced severe problems in September - December 1997. As can be seen from the above figures market participants purchased mostly bonds with maturities 9, 12 and 18 months and decreasing yields in the preceding months, implying that neither foreign investors nor domestic banks had expected a crash of the T-bills market. As any unexpected crash, the collapse of the T-bills market started from relatively small events whose marginal contributions were minor, but taken together they were able to destroy the Ukrainian financial system. Since an impact of each event considered separately is insignificant, it is difficult to build cause-effect relationships among them.

Before presenting some facts, I consider what if capital inflow changes to capital outflows for whatever reasons. As shown in the section 3.2, a fixed exchange rate is not sustainable in the long run in Ukraine, due to low level of reserves and a trade deficit. As capital flies away, defending the fixed exchange rate becomes even more difficult, since reserves would decrease not only due to current account deficit, but also due to capital account deficit. Since the government faces difficulties to finance a budget deficit by borrowing, it is reasonable to expect that the only way of financing available to the government would be by printing money. A decrease in the reserves and devaluation pressure on domestic currency leads to inflationary expectations and lower

credibility of the government, and lower confidence of population. Thus, it is highly probable that monetary growth would be in excess of demand and would lead to even higher inflation and because of this to even higher pressure on the local currency. All these factors suggest that the exchange rate would be extremely devalued in future. As second generation models suggest, domestic currency is attacked now if market participants expect that it will be depreciated in future. We see that capital inflows, although providing artificial stability to the financial system, in fact increase its vulnerability to a crisis since any bad news can change expectations of future capital inflows and any negative expectations become self-fulfilling.

In the second half of August, the government decided to partially pay back wage arrears. Credit from the Bank of Luxembourg (396 mln dollars) was spent for this purpose (Bereslavska, 1997). This credit with some lags returned to domestic banks and banks used this money to buy dollars on the foreign exchange market. Relatively small amount of T-bills had to be redeemed in September (less than 200 mln hrivnia) and the Ministry of Finance (the issuer of T-bills) decided to reduce yields of issued bonds. In most countries, an issuer of T-bills announces supply of T-bills for sale while a stop yield is determined by the competition among bidders, but in Ukraine stop yield is determined by the issuer. There were auctions when the issuer announced the number of T-bills for sale while sold in fact more or less than this announced number. Since the Ministry of Finance planned to issue eurobonds (bonds denominated in foreign currency) with rate of return of 12%, it tried to equalize this rate to an expected rate of return in foreign currency of T-bills (Ohrimenko, 1997, *Business*, October 20, p.23)².

It should be mentioned that the exchange rate bands for the next year were not announced at that time. If the exchange rate does not exceed the limit 2.1 UAH/USD at the end of 1998, 18-months bonds will give at least 13.5% of

² *Business* is the most professional Ukrainian newspaper in the areas of economics, business and finance. Mr. Ohrimenko holds the degree of Candidat of Science in Economics and works as a dealer of the Joint-Stock Commercial Bank "Societe Generale Ukraine".

returns in dollars on a date of redemption; 12-months bonds will give 14% at the exchange rate 2 UAH/USD; 9-months bonds will give 13% at the exchange rate 1.95 UAH/USD (Ohrimenko, *Business*, October 6, 1997, p. 24). If the government is going to issue eurobonds with rate of return 12%, which possess less currency risk since they are denominated in foreign currency, than the rate of return in foreign currency of T-bills should be higher and probably higher than 13-14% of **expected** returns of T-bills. This factor can explain why foreign investors were less interested in buying T-bills at the rates proposed by the Ministry of Finance.

Since the Ministry of Finance issued relatively small number of T-bills, supply of dollars from nonresidents was low and the hrvnia was under devaluation pressure. By interventions on the forex market, the NBU started loosing its reserves. This caused inflationary expectations. Given rising inflationary expectations, rates of return on the secondary market were higher than on the primary market (Ohrimenko, 1997, *Business*, September 22, p. 24). Nevertheless, the Ministry of Finance did not want to raise rates on the primary market, trying to sell T-bills to foreign investors who do not participate on the secondary market.

Ukrainian stock market also experienced difficulties. The Stock exchange index Pro U-50 reached its maximum on September 1, 1997 and after that, started going down continuously (ICPS, 1998). As quite often happens on stock markets, sometimes it is enough for traders not to buy securities for several days as all the participants realize that the only reason why they bought securities was that they had expected that somebody else would buy them in future. As these expectations crash, all traders start selling securities since they expect that other will do the same. A date of a stock market crash is highly unpredictable and a crash may take place due to a lot of reasons.

In the beginning of October, CS First Boston and some other foreign investments groups and banks announced that they left the Ukrainian T-bills market and would not invest or reinvest in T-bills (Trotskyy, *Business*, October

13, 1997, p.23). It is clear that such an announcement might only worsen negative expectations of other market participants. The NBU tried to stabilize the situation and announced the exchange rate bands 1.75-1.95 UAH/USD until June 30, 1998 (HIID, 1999). Since October 1997 the Ministry of Finance has started raising yields on the primary market. The secondary market has responded in an unexpected way and also raised yields so they again were higher than on the primary market. Given nonresidents' desire to leave the market, Ukrainian banks could not absorb the supply of T-bills even if they are very profitable, since the biggest Ukrainian banks such as "Ukraina", "Prominvestbank" and others have to subsidize different sectors of the Ukrainian economy, while the capital of the other banks is very small. In this situation, the only player that has necessary capital is the NBU and from month to month its share of T-bills in circulation grew. The second aspect why the T-bills market become more illiquid is that some domestic banks were more interested in buying dollars rather than T-bills, indicating that their expectations of future devaluation were different from the adopted bands and that the credibility of the government's policy was quite low.

Not surprisingly, devaluation pressure on hrivnia, raising inflationary expectations, difficulties of the T-bills and stock markets led to speculative attacks on foreign currency. According to Trotsky's analysis of the demand for dollars on the foreign exchange market in the beginning of November, 1997, speculative demand accounted to 20-25% of the total demand (Trotsky, 1997, *Business*, November 10, p. 21). Due to negative expectations, exporters in turn are expected to reduce the supply of dollars. Under these conditions, the NBU becomes the only seller of dollars.

As a response to the increased demand for foreign currency and the reduced supply, the NBU tightened monetary policy. The NBU increased the refinance rate from 16% to 23.9%, and required reserves from 11% to 15%. As stressed by Sachs (1998), an increase in interest rates to defend the currency results in lower confidence among money managers. As an additional tool, the NBU tightened an administrative control over the foreign exchange market. How the

NBU can administratively control the market is beyond this MA thesis (for more details, see for example Bereslavska (1998a)).

In September-December 1997 some foreign investors left the T-bills market, while some still operated on it, since January 1998 the NBU is major buyer of T-bills and foreigners invested only about 60 mln UAH in T-bills in the first quarter of 1998 (Bereslavska, 1998b). According to Bereslavska (1999), 60% of T-bills in circulation were in hands of foreign investors as of the end of 1997. Given that the government T-bill debt including interest was 8761.6 mln UAH (ICPS, 1998a, p.87) and the exchange rate was 1.9 UAH/USD, it is easy to calculate T-bills debt to foreigners in foreign currency: about 2768 mln USD. If we use data published by the UEPLAC (UEPLAC, 1998, p.18), then the net outstanding debt including principals and interests was 7628 mln UAH. Calculating in the same way the debt to foreign investors, we obtain about 2400 mln USD. The NBU's gross reserves were 2340 mln USD as of the end of 1997 (ICPS, 1998a, p.87). On the other hand, Ohrimenko (*Business*, 1997, October 13, p. 24) reported that foreigners' share of T-bills in circulation was about 48% (or about 1.5 bln USD) as of the end of September 1997. Since foreign investors were leaving the T-bills market in October-December, there is obvious contradiction between Bereslavska's and Ohrimenko's data. Another source of data is Ukraine's Balance of Payments, but data is presented as portfolio investments from foreigners without specifying investments in particular securities and includes only principals. I try to estimate T-bills debt to foreign investors (see for more details Appendix 1). For this purpose, I take data about portfolio investments from the Ukraine's Balance of Payments (PBU) and multiply quarterly data by the corresponding effective annual rate of return taken from the *Ukrainian Economic Trends* (UEPLAC, 1998, p. 18). In this way, I obtain that the debt to foreigners was about 1950 mln USD. Since before September 1997, foreign investors usually rolled over their T-bills I add to this sum total net debt to foreigners as of the end of 1996 multiplied by 1.3 (30% is roughly average (not weighted) rate of return in 1997) and obtain that the debt

to foreigners was about 2417 mln USD, suggesting that Bereslavska's estimation of foreigners' share is more reliable.

Since the T-bills debt exceeded reserves of the NBU, Ukraine faced the problem of illiquidity, it could not repay its obligations in short-run. It should be mentioned that a critical short-term debt-to-reserves ratio for Ukraine is less than 1, since Ukraine has to use reserves to cover a trade deficit and service other debts (credits from international organizations and others). If this money had been borrowed by Ukrainian banks, a crisis would have taken place in September-December of 1997, since all the conditions for financial panic were met: short-term debts exceeded short-term assets; no single creditor was large enough to supply all of the credits necessary to pay the existing short-term debts; and there was no lender of last resort. Since, on the one hand, T-bills are securities guaranteed by the government and, on the other hand, the secondary market in Ukraine was very illiquid, foreign investors could not leave Ukraine suddenly and had to wait until redemption. These factors postponed the time occurrence of the crisis. The above discussion suggests that due to weak fundamentals Ukraine is not ready for financial liberalization. One of the reasons why Russia's crisis was considerably deeper than the Ukraine's crisis is that financial markets were more liberalized in Russia (see HIID, 1998b). Ukrainian banks unlike Russian ones have not managed to take loans at the international market and have not entered the large scale of derivative operations. Ukrainian stock market was underdeveloped relatively to Russian one.

The currency crises in Asian countries that took place in July - December 1997 could have severe impacts on Ukraine. First, fundamentals of Asian countries were sufficiently better than those of Ukraine. The fact that Asian countries experienced currency crises could lead foreign investors to revalue a currency crisis risk in Ukraine and, thus, the crises in Asia could create a "wake up call" for Ukraine. Second aspect is that foreign investors could treat all emerging markets as similar and the Asia's crises could reduce their confidence in all emerging markets. It is difficult to say when exactly the Asia's crises had an

impact on Ukraine (in September, October or November, 1997), but it is reasonable to expect that these crises might have an impact. In fact, when a short-term debt exceeds borrower's liabilities, it is not so important what is an initial cause of money withdrawal. In this context, any bad news can cause investors to withdraw their money.

Ukraine tried to find other sources of financing. The Ministry of Finance issued two tranches of special hryvnia denominated hedged securities in December 1997 and August 1998. The December issue raised 750 mln UAH through Merrill Lynch and the August issue raised 330 mln UAH through ING Barings bank (HIID, 1998a). The Ministry of Finance also issued three groups of eurobonds (HIID, 1998a). The first in February 1998, raised 732 mln DEM with a three-year maturity and an annual yield 16% in DEM. The second group, floated on March 17 and denominated in ECU, raised 488 mln ECU. The bonds have a two-year maturity and an annual yield 15.94% in ECU. The third tranche was denominated in DEM and gave Ukraine 259.35 mln. The bonds have a three-year maturity with annual yield 14.99%. We see that foreign investors expected a currency crisis in Ukraine since they did not buy Ukrainian T-bills denominated in hryvnia, while they bought other securities issued by the Ministry of Finance and denominated in foreign currencies, which possessed less currency crisis risk. Even though Ukraine borrowed extensively, 95% of domestic and foreign loans was spent on debt servicing (HIID, 1998a). Comparing the T-bill debt to foreigners and the foreign exchange reserves, we see that the government was not able to reduce the probability of a currency crisis, since it was not able to reduce the debt-to-reserves ratio:

Table 2. Comparison of T-bills debt to foreign investors and foreign exchange reserves , mln USD (end of period)³.

³ The T-bills debt is calculated by subtracting from the initially estimated debt (\$2400 mln) capital outflows from the T-bills market reflected in Ukraine's Balance of Payments (PBU, 1998) and by correcting these values due to exchange rate devaluations. Data for the foreign exchange reserves is taken from *Quarterly Predictions* (ICPS, 1998). It is quite probable that T-bills debt estimations contain some significant errors.

	Dec 1997	1st Quarter, 1998	2nd Quarter, 1998	3rd Quarter, 1998
T-bills debt to foreign investors	2400	2074	1530	1050
Reserves	2340	2400	1171	1080

Source: PBU(1998), ICPS(1998), Bereslavska (1998b), author's estimations

The Ukrainian government tried to follow Ponzi scheme of financing, to borrow more in order to repay previous debt. The only problem of this scheme is that at some point creditors are unwilling to lend whatever high rates of return are. In June 1998 the Ministry of Finance was not able to sell new tranche of eurobonds, even though rates were very attractive (HIID, 1998b).

Russia's crisis somehow "helped" Ukraine, in the sense that it gave the Ukrainian government some rights to say that the Ukraine's crisis was caused by the crisis in Russia. Of course, the crisis in Russia led to speculative attacks on hryvnia. According to Yuschenko, the demand for dollars on the foreign exchange market increased by 10-20%, while the supply was three-four times less (Yuschenko, 1998). In September the NBU introduced the severe administrative control over the foreign exchange market: a list of 'critical' imports has been decreed and foreign currency is provided in principle only to the corresponding importers, with adequate justifications; the exporters are required to surrender 50% of their currency earnings; the rate for cash in exchange points is regulated and only a narrow margin around the official rate is allowed (UEPLAC, 1998a, p.4), these speculative attacks could not sufficiently exhaust the NBU's reserves. According to Mihailychenko (1999), 88% of foreign exchange reserves was used in 1998 for debt servicing: 45% to service external debts and 43% to repay the T-bills debt. Whether Ukraine would have experienced a crisis without the Russia's crisis depends on whether Ukraine would have been able to borrow externally in September - December 1998 in order to repay the T-bills debt. If not, a crisis would have been highly probable. If Ukraine had experienced the crisis alone, it would probably have resulted in political instability. The fact that Ukrainian crisis took place several days after

the crisis in Russia gives to politicians some incentives to say that the Ukrainian crisis was caused by the crisis in Russia. In Russia the financial crisis quickly turned into government crisis.

The questions that remain unanswered are why foreign investors did not expect the T-bills market collapse before September 1997 and why interest rates went down instead of going up. As can be seen from the next table, in 1996 the NBU increased its reserves by more than portfolio investment, in 1997 portfolio investment exceeded the increase in reserves.

Foreign portfolio investment vs increment of reserves (mln USD)

	19 96				1997		
	1 st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter
Portfolio investment	30	11	37	120	345	404	391
Increment of Reserves	-361	216	373	645	87	257	189

Source: PBU (1998)

Since portfolio investment presented in the table includes only principal, while T-bills debt includes also interest, it is clear that T-bills debt-to-reserves ratio increases. An increase in this ratio leads to higher probability of default and, thus, implies higher interest rates. Since a government expecting difficulties with repayment of T-bills debt can devalue the domestic currency instead of default on payment obligations, increased debt implies higher exchange-rate risk. In the same way, increased T-bills debt, regardless of reserves, in excess of some critical value leads to lower liquidity, since foreign investors do not participate on the secondary market, while capital of domestic banks is limited. In the first half of 1997 portfolio capital inflow was such that the supply of dollars on foreign exchange market exceeded the demand. Let us define the capital inflow KI_0 that equalizes the supply and the demand on the foreign exchange market, so that the NBU's reserves remains unchanged. Any capital inflow in excess of KI_0 does not reduce inflation, because it does not influence the exchange rate. The net effect of all the considered factors is positive, so

interest rates should go up. Even if we assume that this consideration is static, while in reality market participants need some time to monitor the situation and review risks, the factors do not explain how it might occur that at the end of 1997 T-bills debt exceeded the NBU's reserves.

What other factors may influence the demand? "Changes in expected returns on other assets can also shift the demand curve for bonds" (Mishkin, p.111). Thus, a fall in expected returns on stocks can increase demand for bills. The stock market also experienced growth in the first half of 1997. The Ukrainian stock market index KAS 20 grew by 170% since January to August 1997. Of course, actual growth may be different from expected one, but the fact is that the stock market did not experienced difficulties at that time.

Treasure securities markets often play an important role in fiscal stabilization by providing an intermediary mechanism between the government and investors. The government has a mobile source of borrowing of needed money at lower transaction costs, while investors can invest in risk-free instruments. Thus, fiscal policy and a budget deficit can affect prices of T-bills. But in Ukraine the budget for 1997 was accepted by the parliament only in June 1997, so the T-bills market operated half of year even without an approved budget. In the first half of 1997 the reform package was discussed in the parliament, but then it was rejected in July. If the package had been important for investors, the market would have reacted quickly. Nevertheless, interest rates fell in August. Moreover, the budget deficit on a cash basis grew to 6.7% of GDP in 1997 from 4.86% in 1996 (Dabrowski et al.). Slow, if any, progress in structural and institutional reforms suggests that the real economy could not positively influence the T-bills market.

Why, nevertheless, did interest rates go down? Following Calvo (1999), it is plausible to assume that there are large fixed costs relative to the size of investments. These large fixed costs arise because learning about any single country costly, it requires a team of experts continuously monitoring macroeconomic and political variables. Learning about transition economies is

even more costly since institutional framework and environment are different. This creates incentives for herding behavior especially for small investors that invest in T-bills just because others invest and withdraw money if others do the same. However, it seems that monitoring of the debt-to-reserves ratio is not too costly in principal, although it may be difficult to do due to low transparency of the market.

I would like to propose the following explanation. The package which Ukraine adopted at the end of 1995 and which included the stabilization of the exchange rate and establishment of the T-bills market was suggested by the IMF. Thus, foreign investors could treat Ukrainian T-bills as risk-free, assuming that the IMF implicitly would support them. This may explain why interest rate decreased, it adjusted to long-run risk-free equilibrium level. In September 1997, the IMF refused to grant the second tranche of its stand-by loan because Ukraine exceeded the budget deficit limit. Foreign investors could consider this fact as a sign that the IMF was dissatisfied with Ukrainian policy and might not support Ukrainian T-bills. Given that T-bills debt to foreigners exceeded foreign exchange reserves and that the IMF would not probably support Ukraine, it was reasonable for foreign investors to leave the market. In fact, Ukraine did not receive any credits from the IMF during September 1997 – March 1998. Moreover, Ukraine was not able to sign any contract with the IMF at the end of 1997, suggesting that the IMF was reluctant to support Ukraine. I think that the IMF had realized that the T-bills market was an unlimited source of funds for Ukraine and a kind of soft constraint that resulted in softer fiscal policy. That is why the IMF did not give credits to Ukraine and did not support Ukrainian T-bills.

4.3. External Borrowing as Soft Budget Constraint

I show here that easy source of borrowing, such as the T-bill market, has negative impact on Ukrainian fiscal policy and was a kind of soft constraint. First, the budget deficit increased to 6.7% of GDP in 1997 from 4.86% in 1996 (Dabrowski et al.). Second, the Ministry of Finance issued T-bills by 47.7%

more than was planned, while it was not able to borrow more from other external sources and borrowed only 62.6% of planned funds in 1997 (Yuschenko, 1998b).

On the other hand, as Ukraine reached some constraints on external borrowing in 1998, when foreign investors withdrew their money from the T-bills market, and when the Ministry of Finance was not able to sell the fourth tranche of eurobonds in June 1998, the government was forced to make budget corrections in July 1998. Government expenditures were reduced by 4.4 bln hryvnia, and the budget deficit was reduced to 2.34 bln UAH from 3.4 bln UAH, initially planned (HIID, 1999). Ukraine ended up with the budget deficit 2.766 bln UAH in 1998, that is quite close to the revised budget, taking into account higher inflation at the end of 1998 (HIID, 1999).

Chapter 5

CONCLUSIONS

The main roots of the currency crisis are the budget deficit and absence of structural and institutional reforms. In 1993-1995 financing the budget deficit by seignorage caused hyperinflation, while financing budget deficit through debt in 1996-1997 led to the currency crisis. Capital inflows provided artificial stability to the economy. If Ukraine had used that time of financial stability for structural reforms, the crisis may not been so dangerous. Instead, the government used borrowed money for everything except reforms and tended to borrow more and more, which resulted in softer fiscal policy.

Although Ukraine was vulnerable to a currency crisis through channels of first and second-generation models due to weak fundamentals, tight monetary policy and administrative control over the foreign exchange market eliminated the possibility of these types of crises for Ukraine. The crisis took place mainly due to capital outflow from the Ukrainian T-bills market, that is, through channels of balance sheet crises. T-bills debt to foreign investors exceeded the foreign exchange reserves as of the end of 1997 and Ukraine reached some constraint on its ability to borrow externally in 1998.

A p p e n d i x 1

ESTIMATION OF T-BILLS DEBT TO FOREIGNERS INCLUDING
PRINCIPAL AND INTEREST

According to Ukraine's Balance of Payments (PBU, 1998), foreign portfolio investments were the following:

Foreign portfolio investment (end of period, mln USD)

	1995	19 96				19 97			
		1st Quarter	2nd Quarter	3rd Quarte r	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Portfolio investment	4	30	11	37	120	345	404	391	463

Since the Ministry of Finance issued special hryvnia denominated hedged securities in December 1997 that raised 750 mln UAH (or about 395 mln USD), we subtract this amount from the total portfolio investment in the fourth quarter of 1997 and obtain that investment in T-bills was about 68 mln USD. Summing up portfolio investments for four quarters of 1997, we obtain that the total portfolio investment in T-bills was 1.208 bln USD in 1997. Yuschenko (1998b) reported that foreigners invested in T-bills about 1.213 bln USD in 1997. Thus, portfolio investment reflected in Ukraine's Balance of Payments is investment mostly in T-bills.

Multiplying quarterly investments by corresponding average rates of returns (UEPLAC, 1998), we obtain:

T-bills debt to foreigners (mln USD)

	1995	19 96				19 97			
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Investment in T-bills	4	30	11	37	120	345	404	391	68
Average Rates of return, yearly	115	148.6	125.4	69.1	64.7	42.9	25.4	25.7	40.6
Debt	8.6	74.58	24.794	62.567	197.64	493.005	506.616	491.487	95.608
Sum	8.6	83.18	107.974	170.54	368.181	861.186	1367.802	1859.289	1954.897

Since before September 1997, foreign investors usually rolled over their T-bills I add to this sum total net debt to foreigners as of the end of 1996 (368.2) multiplied by 1.3 (30% is roughly average (not weighted) rate of return in 1997) and obtain that the debt to foreigners was about 2433 mln USD as of the end of 1997.

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