THE CAUSES OF BANK RUNS.
EVIDENCE FROM UKRAINE
DURING THE CRISIS OF 2008-2009

by

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Abstract

THE CAUSES OF BANK RUNS.
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2009 YEARS

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The study investigates whether bank runs were determined by change in bank fundamentals or they were panic based. The answer goes through the analyzing monthly strictly balanced panel data which represents micro and macro variables referred to the banks' balance sheets and general economic situation in Ukraine. Model is estimated using Arellano-Bond GMM dynamic panel method. We have found that bank fundamentals and macro factors show statistically significant coefficients with signs predicted by economic theory in explaining bank runs.

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GLOSSARY

AUB - Association of Ukrainian Banks

DD - Diamond and Dybvig model

EURO - European currency

NBU - National Bank of Ukraine

UAH - Ukrainian currency, hryvnia

USD - US dollar

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INTRODUCTION

During the last three quarters situation on the world financial markets do not give optimistic expectations to the majority of its operators. US mortgage crisis originated in summer 2007 created problems for all the world financial system and for developing countries its consequences are much deeper then in other countries.

In the second half of 2008 year Ukrainian commercial banks have grappled with a problem of rapid liquidity decay. Causes of this deterioration were the following: substantial reduction in financing of banks by their "ultimate parents", mass failure to return loans, investments devaluation. These representatives from the assets side almost always coincide with recessionary processes from the liability side, major from which is deposits floating off. In turn, outflow began because of devaluation of national currency, setback in industrial production, reduction in personal income and distrust of the population to the banks. Simultaneous concentration of these factors created a state in the banking system of Ukraine which is known as "bank runs".

Bank run is a situation when most customers withdraw their deposits simultaneously because they fear that bank is likely to become bankrupt.

Loss in the credibility emerged in the last quarter of 2008 year when people began to withdraw their funds from banks. Reaction of the National Bank of Ukraine (NBU) was immediate – in order to save banking system from insolvency, the moratorium (October 2008) on deposit early withdrawal was imposed. This action was not efficient – at the end of January 2009 first deputy chairman of NBU stated that about 60 billions UAH were withdrawn from the banking system. In the March 2009 situation became as follows: many banks

fail to meet obligations in repaying deposits and interest on deposits to theirs customers. Moreover, there are a few banks in which National Bank of Ukraine has placed provisional administration. It was declared a moratorium for these banks, under which customers can not withdraw theirs deposits for 6 months.

The Ukrainian banking system has already faced bank runs at the end of 2004 year when there was a huge uncertainty in the political situation related to the third stage of president's election. People began to secure themselves by withdrawing deposits but, fortunately, the moratorium applied on the early withdrawals and stabilization of political life in the country made it possible for the banking system to come out of a recession with moderate losses.

Quite recently the International Monetary Fund published paper related to the systematic bank crises for the period of 1997-2007 (Leaven and Valencia 2008). According to this study a systematic crisis is a crisis which spreads over all banking system or its major part. There were 124 crises for the given period, 42 of which were classified as twin (accompanied with devaluation of national currency) and 10 as triple (characterized with default). Crises for these 27 years occurred as in developed so in developing countries and for developing countries consequences were more severe than for developed. Similar work of Hutchison and Noy (2005) examined twin crises for the period 1977-1997 and concludes that the cost of such distress is very high; particularly, currency and banking crisis leads to the reducing output in real economy by 13-18% for the period of 2-4 years.

From the facts mentioned above it is obvious that discovering the determinants of bank runs is important and have essential practical value.

There are no studies of this class which are related to Ukraine and it is the first attempt to examine the factors affecting bank runs. The analysis is based on macroeconomic components and financial indicators of Ukrainian commercial banks and econometric technique for dynamic panel data would be

applied. The conclusion obtained from this work could be useful for improving government policies related to the banking industry, as well as understanding which macroeconomic variables the most influenced on bank runs.

Banking industry was chosen non-randomly – it is the basic institution on which the growing market economies rely (Wachtel 2002).

Paper is organized in the following way. In the next chapter we make review of the existing literature which is relevant to our research. Third and fourth chapters are devoted to describing data set we have and analyzing the model construction. Paper will end up with the discussion of results obtained, policy recommendation and possible extension of this work.

LITERATURE REVIEW: THEORETICAL BACKGROUND AND EMPIRICAL EVIDENCE

Literature review is divided into two parts. Firstly, we make review of theoretical explanations that analyzed bank runs and secondly, we examine recent empirical papers which have studied basic indicators of banking activity and factors which determine bank runs.

One branch of existing literature considers bank runs as outcome of lack of trust to the banks. Prominent work of Friedman and Schwartz (1963) was the engine of this theory. Authors analyzed Great Depression of 1930 and arrived at a conclusion that cause of most bank failures was bankruptcy of the Bank of United States which was catalyst of increasing lack of confidence to the banking system. Empirical studies of panic during distress of 1930 did not validated the assumption that bankruptcies were provoked by contagion effect (Calomiris, Mason(2000)).

Similar theory was developed by Kindleberger in the book "Manias, Panics and Crashes" (1978). He stated:"*By no means does every upswing in business excess lead inevitably to mania and panic. But the pattern occurs sufficiently frequently and with sufficient uniformity to merit renewed study. What happens, basically, is that some event changes the economic outlook. New opportunities for profits are seized, and overdone, in ways so closely resembling irrationality as to constitute a mania. Once the excessive character of the upswing is realized, the financial system experiences a sort of 'distress,' in the course of which the rush to reverse the expansion process may become so precipitous as to resemble panic. In the manic phase, people of wealth or credit switch out of money or borrow to buy real or illiquid financial assets. In panic, the reverse movement takes place, from real or financial assets to*

money, or repayment of debt, with a crash in the prices … in whatever has been the subject of the mania".

Theoretical paper of Diamond and Dybvig (1983) continues the analysis of the previous two papers. They investigated bank runs as the effect of coordination problem among bank customers. Authors analyzed three-period model based on the assumption that main purpose of the bank is to provide help in transformation of illiquid assets. When depositors invest money at the beginning of the game (at period zero), they do not know when this money will be demanded – in the near (first type customers) or distinct future (second type). Depositors recognize which type they are after investing money. Diamond and Dybvig demonstrated that relationship between banks and their clients has two equilibria. On the one side, such instrument as demand deposit has the advantage which give possibility to diversify risks related to the liquidity shocks – that is in first equilibrium each type of depositors withdraw funds when money are needed to make purchases.

Assets accumulated by banks are limited. Since the bank serves customers by rotation (sequential constraint) then there are constraints on the bank's payments to depositors each period. Apparently, if in the first period most customers asked theirs money back, then assets of the bank would be exhausted and there will be no money for payments in the second period. Therefore, there exists one more Nash equilibrium in the model given: if every depositor expects early money withdrawing by others, then he (she) prefers do exactly the same. This strategy would be also preferable for the second type of agents – they also would withdraw holdings in the first period under fear of bank failure. At the end, regardless of the depositor's type, customers who withdraw money from their deposit accounts first, get full amount of holdings; those who withdraw at the end get nothing. This type of bank run is known as "self-fulfilling prophecy".

Later, authors of similar studies modified DD model. Two main distinctions from the original model were made:

- depositors are not identical. There are two groups of customers – informed and uninformed. The matter of depositors' awareness is that in the first period they got the signal which helps to conclude what value of return will be obtained in the second period. Therefore quality of the information is put in the forefront. This conclusion is especially important in a context of studying bank panics which affect not only problem but also stable banks (Chen (1999); Chen and Hasan (2008)).

- depositors make decision about withdrawals sequentially (in DD model customers move simultaneously), so they can observe actions of each other. More informed clients have more accurate information about realization of the projects in which bank invested money borrowed from depositors. Based on this information, clients decide whether to withdraw money or not. Uninformed customers are compelled to make similar decision which depends only on the signals from informed agents. They choose strategy that proceeds from their own assumption what is known to the informed depositors. Thus, the probability of bank run depends directly on the correctness, by which the uninformed agents interpret the signals received. Under these assumptions, Chari and Jaganathan (1988) built the model which made it possible to reveal how uninformed depositors make decision if they posses generally known information about whether banks projects were successful or unsuccessful and observing moves of informed agents. Uninformed customers of the second type oversee withdrawals of deposits but they can not distinguish who exactly withdraw funds. It may be depositors of first type or informed depositors who have got negative signals from the market. Authors came to the conclusion that bank run is the only equilibrium which can be realized even when informed agents have no negative information: in this case uninformed depositors

incorrectly interpret the signals from the behavior of informed agents, taking money withdrawals of the informed agents connected with shocks in liquidity, as withdrawals connected with negative information.

Diamond and Dybvig as well as theirs followers did not look at the causes of bank panic. Later, authors of other different empirical studies have found that bunk runs can not be explained by DD model (Calomiris, Gorton (1991)).

According to the second theory, bank runs are consequences of changes in economic fundamentals, such as investment yield letdown.

It was elaborated by Wesley Clair Mitchell. In the book "Business Cycles and Their Causes" (1941) he considered bank crises as inherent component of business cycles. In times when economy rushes to recession, returns on assets are falling and debtors will have troubles with credit payments. Depositors, foreseeing boosted number of non-performing loans, will withdraw their funds and bank will fall into the trap between illiquid assets (loans) and liquid liabilities (deposits). Possible outcome is bank bankruptcy. Even though the result is the same as in DD model, Mitchell succeeded in identifying the determinants of panic.

Gorton (1988) undertook empiric work in which he settled apart three models, among which were DDs' and Mitchell's. He analyzed bank runs during 1863-1914 years period, which is known as U.S. National Banking Era. Author obtained results which are matched with the "business cycle model", according to which when leading economic indicator attained some critical value, the crisis occurs. Gorton discovered that such variables as risk, deposit to currency ratio, interest rates and liabilities of failed banks were significant in explaining bank runs. Also it was shown that loses in real sector of economy "Granger cause" deposits withdraw and subsequent bank failures. Conclusions of this paper are as follows:

- bank runs can be predicted, based on the information that panics have systematic character;

- adoption of deposit insurance scheme can substantially change behavior of bank customers (Gorton made econometric analysis for the period after 1934 year and detected that deposit to currency ratio and interest rate equations underwent considerable structural changes).

In the more resent paper Calomiris and Mason (2003) revised crises between 1930 and 1933 years and found that three out of four crises were induced by fundamentals shocks. In the definition of fundamentals they included both – the characteristics that represent particular bank and economic exogenous shocks that distress banks' strength. Also authors doubted whether policy directed only on the assistance to the banks could help to avoid losses during Great Depression and concluded that only remedies concentrated on the expansionary monetary policy directed to prevent contraction in business conditions and help to the banking system could have averted banks from bankruptcy.

Based on the evaluation of the relevant literature, it can be stated that both areas of theoretical reasoning behind bank runs are important. However, Mitchell's point of view is more suitable for econometric analysis.

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METHODOLOGY

First we specify variables that can be useful in determining bank runs and then, we move to the description of an econometric technique used for our dataset.

1. Variables at Consideration

There are many studies that used different fundamentals in order to explain bank runs. Our choice of variables is based on the recent work of McCandless, Gabrielli and Rouillet (2003) in which macro and micro components of bank runs were analyzed for Argentina during the crisis of 2001.

Our work differs from the one mentioned above in the sense that we have the data on total deposits (in UAH, US dollars and Euro) denominated in national currency of Ukraine. It brings some imperfection into econometric part but on the 01.10.2008 *68* percents of the total deposit accounts were in UAH. (Bulletin of NBU, № 12/2008 (189)), we expect to solve this problem by introducing exchange rates UAH/USD and UAH/EURO in order to control for devaluation of hryvnia. Unfortunately it is impossible to obtain deposits divided by currency because this information is subject to bank secrecy. `

Let's define variables:

▪ **dependent variable** is the monthly change in the accounts of public fixed term deposits. It is computed as the first difference of deposit base of the particular bank i at time t. This variable was chosen because we assume that bunk runs are the most vulnerable to rapid change in term deposits. Our assumption is based on the facts that:

- term deposits are not influenced by seasonality as demand deposits (money are withdrawn from an accounts before holidays, vacation periods).

- 78 percents of total deposits of natural persons in our sample is composed from its demand part;

- most of employers pay wages through demand deposits accounts, so these deposits have large weight in total deposits of juridical persons and are not suitable for analysis because they are less responsible for bank runs.

Control variables are divided into two classes. The first one contains macro variables, which change over time and affect banks in the almost same way. In the second group we included bank specific characteristics.

▪ *bank-specific factors* :

- willingness to keep deposits in the bank can be influenced by the information about owners of this institution. In case of problems with liquidity state banks may attract large sum of money because they are subject to strong assistance and support from government. These banks would be among firsts who get financial aid, so they are safer then others. Ukrainian banks with foreign capital can get help from their maternity organizations. So bankruptcy of foreign banks has small probability. Private banks, in case of crisis, can rely only on themselves and government help, however only strong banks will get support from state because funds will not suffice to cover losses of all banks. Based on this information we build three dummy variables (for state, foreign and private banks) to control for the bank ownership.

- we also included as explanatory variable change in 6 month UAH interest rate on deposits. As were indicated, at the beginning of crisis most of the deposit accounts were in UAH, so this rate can better capture general trend in changes in deposits. Also this rate is the most widespread among bank deposit products.

- it is important to note that the information about bank activities became available to the public with the lag of one-two month(es) after the end of reporting period, thereby we should include lags of variables into regression.

- public loans are also included into regression because they are directly related to the deposits. If demand for credits is huge and bank can not cover this shortage by own assets it must attract money from external sources. The easiest way to do it is to obtain funds from depositors. However there can be reverse causality. This problem is discussed in the second part of this chapter.

- financial result – variable which show whether bank was profitable or it incurred loss. Finding out this information depositor decides whether to put money in the bank or not.

▪ **macro variables:**

- change in market exchange rates of UAH/USD and UAH/EURO. These rates are introduced to control for national currency devaluation.

2. Description of econometric model

Data analysis is performed for different time horizons: first – for the period January 2008 - October 2008, second – from November 2008 to March 2009. Main objective of such analysis is to understand which determinants of deposits flow have changed since the crisis occurred.

From the all econometric procedures for panel data we selected Arellano-Bond estimation method with instrumental variables for the dynamic panel data. This technique is preferred because it controls for the bulk of problems that can appear during estimation:

- some variables as lagged difference in deposits, interest rate public loans and others may be endogenous. So there may exist the causal relation between change in deposits and endogenous variables thereby these variables may have correlation with composite error term.
- because of dynamic behavior of change in deposit accounts, we need to include lags of this change into regression and this obviously leads to autocorrelation;
- unobserved specific characteristics (fixed effects) of each bank may be correlated with regressors;
- Arellano-Bond technique was built for large N and small T (N – number of panels, T – number of time periods) and our dataset have this particular characteristic.

Specification of the model is following:

$$\Delta D_{i,t} = \beta_1 \sum_{f=1}^{S} \Delta D_{it-f} + \beta_2(R_{it} - R_{it-1}) + \beta_3(X_{it} - X_{it-1}) + \beta_4(Z_{it} - Z_{it-1}) + \beta_5(X_{it-1} - X_{it-2}) + v_{it}$$

$$v_{it} = u_i + \varepsilon_{it}$$

where ΔD_{it} - change in term deposits;

ΔD_{it-f} - lagged difference in fixed term deposits (predetermined variable), where s – number of lags;

$R_{it} - R_{it-1}$ - change in 6 month interest rate on deposits in UAH;

$X_{it} - X_{it-1}$ - change in micro variables;

$X_{it-1} - X_{it-2}$ - first lagged difference in micro variables;

Z_{it} - first difference in the macroeconomic variables;

v_{it} - composite error term;

u_i - unobserved time-invariant attribute of particular bank;

ε_{it} - disturbance term.

Constant term was excluded from regression in order to estimate separate intercepts for the respective form of ownership.

Arellano and Bond (1991) have shown that second and further lags of dependent variable which are treated as endogenous can be used as relevant instruments, assuming that $E(\varepsilon_{it}) = E(\varepsilon_{it}\varepsilon_{is}) = 0$ for s=t for these lags. The other explanatory variables can be used as valid instruments but only if these regressors are strictly exogenous. Making estimation of our model, we also use robust estimation of covariance matrix in order to deal with heteroscedasticity among cross-sectional units as well as among time periods.

Described above methodology allow us to get consistent estimates of the coefficients but it leads to the loss in the number of observations because we are enforced to use lagged values as instruments.

In our case exogenous variables are changes in exchange rates and dummies which represent ownership. We assume these do not determined by the rest of regressors.

Endogenous variables are: lagged differences of personal fixed term deposits, changes in public loans and 6 month UAH interest rate, change and lagged difference in financial result.

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C h a p t e r 4

DATA DESCRIPTION

The greatest part of data (bank fundamentals) used in this work is the data reported by banks which was taken from the website of "Association of Ukrainian Banks (AUB)" (http://www.aub.com.ua/). The dataset consists of main indicators of banks activities, which are presented on the monthly basis. The balance sheet information contains the major part of variables needed for econometric analysis. Period which is analyzed is 2008 year and first quarter of 2009. The first nine months of 2008 are considered as "normal", while period from November 2008 to March 2009 are regarded as critical phase. October was excluded from the crisis period because first bank run happened on October, 7 (provisional administration was placed in "Prominvestbank"), so it can not be regarded as "critical" nor as "normal" due to the fact that monthly data is used for estimation (see graph 1 below).

Interest rates on the public fixed term deposits with payment at the end of contract were taken from two sources:

- http://finance.ua/ - web site which provides information about economic news, exchange rates, share quotations, deposit and credit rates, etc.
- http://www.dengi.ua/ – electronic version of magazine "Dengi", which make review of different markets, including market of deposit rates.

Macro variables - monthly market exchange rates (average between BID and ASK rates) were computed based on the information about daily rates. This information was downloaded from http://www.udinform.com/ .

There are some limitations of our data set. Initially dataset was consisted of 155 banks (information on 01.01.2008) but later it was reduced to 70. Firstly, interest rates for analyzed time periods are not available for all banks from the previously mentioned resources and secondly, some portion of banks did not reported information about their financial indicators for several months. A factor that caused the absence of information: whenever for AUB members, public reporting is obligatory, for non-members it is voluntary. Investment banks and banks which do no work with public were also not taken into account as they do not deal with public deposits. Also there were excluded banks which are under NBU provisional administration because these are under moratorium on withdrawal of all deposits for the 6 months; those banks which have not reported information about capital ownership were also struck off.

Representativeness of sample is near 80 % relatively to capital, assets, and liabilities. (See appendix.) Deviation from ownership is nearly 5 % for foreign banks and 1-2 % for others.

It is believed that this dataset is consistent. Moreover this data is available for banks' clients which can use this information before deciding withdraw or do not withdraw deposits. Most rating agencies (Moody's, Fitch and Standard & Poor's) use part of this information in their analysis of banks stability and base their ratings which are later presented through internet recourses or printed media.

Descriptive statistics for two periods is given below. At average values of micro variables are higher in normal period than in the critical. During January 2008 -September 2008   Ukrainian hryvnia was "strong" over this time

with some small devaluation for August-September 2008. Second period characterized by substantial fall in UAH.

Table 1. Descriptive statistics for January 2008-September 2009

Period	Variable	Obs.	Mean	Std. Dev.	Min	Max
January 2008 -September 2008	Diff in deposits	560	32.84	102.38	-436.65	1030.72
	Lagged diff in deposits	490	32.68	104.25	-436.65	1030.72
	Second lagged diff in deposits	420	34.44	105.04	-253.34	1030.719
	Diff in 6 month interest rate on deposits in UAH	560	0.21	0.69	-1.5	5
	Diff in ex. rate, 100 usd	560	-2.36	10.91	-15.31	22.13
	Diff in ex. rate,100 euro	560	-5.58	18.19	-31.12	31.01
	Owner (1- private, 2 – state, 3 - foreign)	630	1.37	0.53	1	3
	Diff in public loans	560	57.37	162.88	-1011.73	2175.92
	Lagged diff in public loans	490	58.9	171.21	-1011.73	2175.92
	Diff in financial result	560	7.59	24.2	-148.9	157.3
	Lagged diff in financial result	490	8.06	23.36	-148.95	157.34

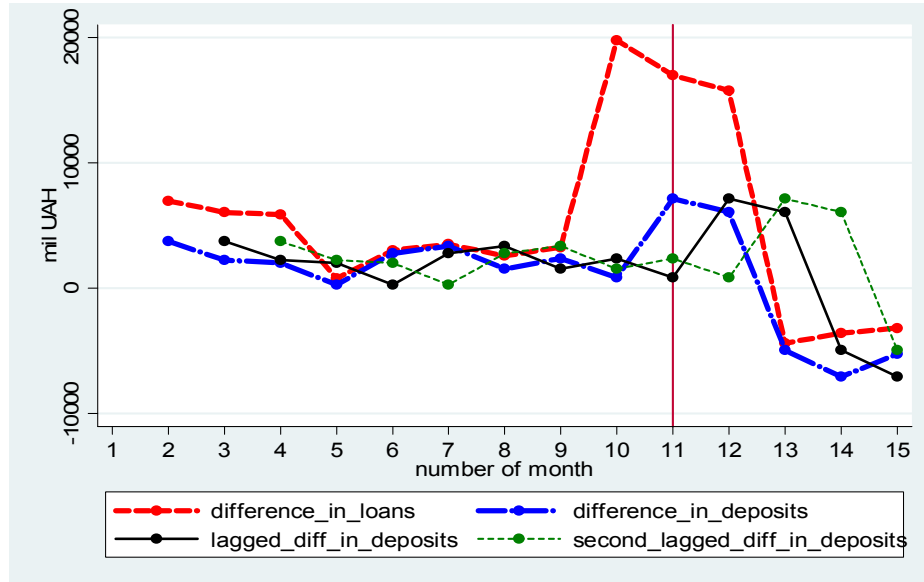Table 2. Descriptive statistics for November 2008-February 2009

Period	Variable	Obs.	Mean	Std. Dev.	Min	Max
November 2008 - March 2009	Diff in deposits	280	-39.82	215.87	-1782.2	1529.3
	Lagged diff in deposits	210	-28.11	223.86	-1782.2	1529.3
	Second lagged diff in deposits	140	8.3	204.66	-868.61	1529.3
	Diff in 6 month interest rate on deposits in UAH	280	0.79	1.71	0	12.5
	Diff in ex. rate, 100 usd	280	56.65	67.37	-3.42	168.06
	Diff in ex. rate,100 euro	280	78.18	113.23	-24.58	265.94
	Owner (1- private, 2 – state, 3 - foreign)	350	1.37	0.53	1	3
	Diff in public loans	280	16.56	331.69	-776.62	3280.6
	Lagged diff in public loans	210	37.2	368.3	-774.25	3280.6
	Diff in financial result	280	-24.7	118.29	-1226.87	301.27
	Lagged diff in financial result	210	-26.53	129.08	-1226.87	301.27

Measurement units:

- difference in deposits, mil UAH;

- change in interest rate, %;

- change in exchange rate, usd – UAH for 100 USD;

- change in exchange rate, euro – UAH for 100 EURO;

- owner, 1 – private, 2 – foreign bank, 3 - state;

- difference in public loans - mil. UAH.

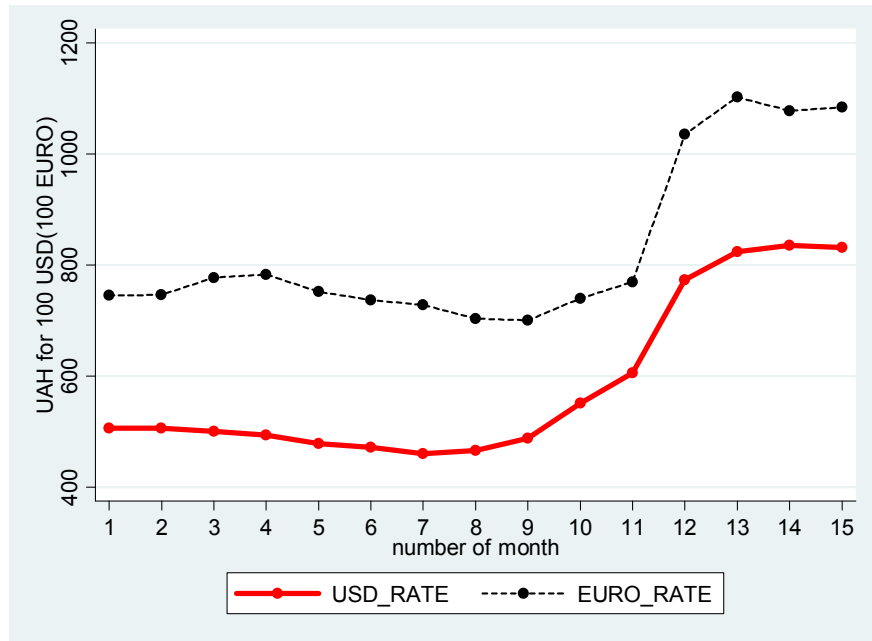- difference in financial result - mil. UAH.

Shortage of these tables is that variables do not show any dynamics, so following graphs represent some of our micro and macro variables.

Figure 1. Change in micro variables

Lagged values of the dependent variable replicate movement of its difference with corresponding lag. From the graph it can be seen that critical phase (outflow of deposits) began from November 2008 (axial point 11 – difference between November and October). It is worth to note that value of loans from 9 to 10 points substantially increased. This can be explained by the fact that banks mostly lend out money (cars, apartments were financed mostly in foreign currencies (EURO, USD)), so after UAH devaluation, loans automatically grew. Reduction in UAH relatively to USD began from August 2008 and to EURO from September. On the graph presented below trend in exchange rate is shown.

Figure 2.Trend in exchange rates

Chapter 5

EMPIRICAL RESULTS

In the table 4 is presented summary of empirical results. Two columns contain outcome of regressions for the normal and crisis periods.

Before interpreting coefficients we would like to review tests needed to perform unbiased and consistent estimation. The first is Arrelano-Bond test which analyzed whether model contain enough lags to control for possible autocorrelation. Null hypothesis is that there is no serial correlation. Results contained in the table 3   shows that specification of the model is valid – we have no second order autocorrelation for the normal periods (p-value 0.238) For November 2008 – March 2009 this test has been performed in levels because we have not enough time periods (second lags of change in term deposits was included), so it can not be done in differences. For this period p-value is equal to 0.403.

The second is Hansen test of over identification – a test that checks joint validity of GMM and IV instruments. In our two time horizons this test is satisfied under the null of joint validity of these instruments. Also it is worth to note that "rule of thumb" for these periods was satisfied – number of instruments do not exceed number of panels (groups). If this condition is not met then we can not rely on the Hansen tests, which in most cases is weak.

Hansen test excluding group as well as difference-in-Hansen tests show validity of IV and GMM instrument subsets apart. The null of first test is that excluded instruments, as a group, are not correlated with independent variables (those which were assumed to be endogenous); the second test check whether instruments are exogenous. All eight p-statistics imply that we can not reject null that the instruments used in GMM and IV parts are valid.

Table 4 Tests results

Period Test	January 2008 – September 2008	November 2008 – March 2009
Number of groups (panels)	70	70
Number of instruments	28	27
Number of observations	420	140
Arellano-Bond test for AR(1) in levels Pr > z (null – no autocorrelation)	-	0.403
Arellano-Bond test for AR(2) in first differences Pr > z (null – no autocorrelation)	0.238	-
Hansen test of overid. restrictions Prob > chi2 (null – the instruments as a group are exogeneous)	0.555	0.470
GMM instruments Hansen test excluding group Prob > chi2	0.938	0.541
Difference-in-Hansen tests of exogeneity of GMM instruments Prob > chi2 (null – instruments are exogeneous)	0.212	0.375
IV instruments Hansen test excluding group Prob > chi2	0.388	0.400
Difference-in-Hansen tests of exogeneity of IV instruments Prob > chi2(null – instruments are exogeneous)	0.728	0.536

There are four significant coefficients in the first column, signs of which are consistent with economic theory. Autoregressive term is significant with positive sign, which implies that during normal period depositors respond to new information as quickly as they can with no correction in the following period. Banks which were profitable (lagged change in financial results is positive) have attracted more deposits. It shows that depositors were driven to put money in the banks that had operated in previous period more effectively than other banks.

Table 4. Empirical results for three time horizons

Period ⟍ Variable	January 2008 – September 2008	November 2008 – March 2009
Lagged diff in deposits	0.83*** (0.19)	0.63*** (0.11)
Second lagged diff in deposits	0.07 (0.14)	-0.33*** (0.1)
Diff in 6 month interest rate on deposits in UAH	162.64* (96.3)	0.92 (3.45)
Diff in ex. rate, UAH for 100 USD	1.21 (0.98)	-336.93*** (29.7)
Diff in ex. rate, UAH for 100 EURO	1.38 ** (0.65)	-164.02*** (14.56)
Diff in public loans	-0.30 (0.22)	0.43*** (0.11)
Lagged difference in public loans	0.12 (0.15)	0.08 (0.16)
Lagged difference in financial results	1.2*** (0.41)	0.11 (0.09)

Own_dum1 (private)	-25.8 (26.7)	-143.29*** (15.45)
Own_dum2 (foreign)	-17.8 (33.7)	-117.77*** (16.26)
Own_dum 3 (state)	-36.23 (50.11)	dropped due to collinearity

Significance levels: *** 1%, ** 5%, * 10

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Macro variables are not significant for the first period as well as ownership dummies.

Positive coefficient near EURO exchange rate tells us that when exchange rate increased on 1 hryvnia (UAH devaluated), deposits rise on one million. This term enclose two effects:

- automatic effect – in banks' balance sheets all deposits in foreign currencies are denominated in UAH, so when hryvnia devaluates it leads to the automatic increase in the value of deposits reflected in reports.

- under the assumption about rational behavior, in time of growth people have tended to convert their deposits from UAH to EURO, as consequence total value of deposits in balance sheet increases.

Real "driving force" of inflow of deposits was change in interest rate. That was the time of credit boom, so in order to be more profitable banks were forced to attract new clients by increasing interest rates.

During the crisis, both, micro and macro variables present support to the theory that fundamentals are main determinants which lead to bank runs. The results support idea that the past behavior of depositors influence on the present decision, about putting money into bank. Negative sign near the second lagged difference in deposits can be explained by the overreaction of depositors – with time people obtain new information about bank

fundamentals and macro situation in country, so if this information initially is negative and after passing of some time is positive, then people tended to put money, that were withdrawn initially, into the bank.

Coefficient near EURO and USD exchange rates tell us that people have withdrawn their money from banks and keep it at home or in deposit cells in order to insure themselves from uncertainty because no one knew to what value UAH devaluated and what will be with the banking sector of Ukraine.

Positive coefficient of the change in public loans may show that contraction in the consumer lending was taken by the depositors as signal about problems with liquidity of some banks.

Outflow from foreign banks was less then from the private ones. Depositors know that in case of problem with liquidity foreign banks always will receive support from their central offices. This support as usual is concentrated on the growth of capital and extension of credit facility for liquidity support.

State dummy for the ownership was dropped due to collinearity because we have small number of time periods and only two state banks.

CONCLUSIONS

In this study we analyzed whether bank runs were caused by panic or by the change in fundamentals. For this reason we used balanced panel data on bank specific characteristics and macroeconomic variables for three time periods. Sample of 70 banks is used for this analysis. This sample represents 80 per cent of capital accumulated by overall banking industry.

We use Arellano-Bond dynamic panel GMM estimation to find factors that caused Ukrainian crisis in banking sector.

As a result we can say that the largest negative effect is caused by devaluation of national currency which is responsible for bank runs. So Ukrainian banking crisis can be regarded as currency crisis. Also during the economical upturn people do not react to new information as rapidly as for the period of downturn.

Bank fundamentals are also important in determining bank runs. For instance credit expansion can smooth outflow of deposits.

Policy recommendation that can be applied in the future to the Ukrainian banking sector in the case bank runs are following: hryvnia must be devaluated smoothly, not rapidly. Example is Russia – according to the information of Deposit Insurance Agency of Russian Federation, peak of deposit outflow happened in October 2008 and in December customers began to return money in banks. Devaluation of rouble was smoothed by funds from Stabilization Fund so it is very important to have similar fund in Ukraine. At the same time this remedy must be combined with general help to banking sector.

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APPENDIX

Table A.1 *Representativeness of sample*

Month	Assets, sample, mil UAH	Assets, population ,mil UAH	Weight of sample	Liabilities sample, mil UAH	Liabilities, population, mil UAH	Weight of sample	Capital, sample, mil EURO	Capital, population, mil EURO	Weight of sample
January 08	456869,3	567161,9	**0,81**	405923,5	500668,7	**0,81**	7423,0	9633,8	**0,77**
February 08	464026,9	578203,7	**0,80**	409785,8	508151,5	**0,81**	7732,0	9927,2	**0,78**
March 08	486241,3	612104,8	**0,79**	428699,9	537607,7	**0,80**	7884,2	10137,2	**0,78**
April 08	494912,8	618625,6	**0,80**	436452,3	543878,0	**0,80**	7977,8	10203,4	**0,78**
May 08	504327,1	630952,7	**0,80**	445588,0	554799,9	**0,80**	8509,9	11004,6	**0,77**
June 08	527856,6	659241,5	**0,80**	466731,6	580229,0	**0,80**	8718,1	11251,2	**0,77**
July 08	540522,5	679247,9	**0,80**	475924,5	596445,9	**0,80**	9245,8	11875,1	**0,78**
August 08	558838,3	703326,1	**0,79**	492798,9	617216,3	**0,80**	10038,3	13095,0	**0,77**
Septembe r 08	570404,4	722400,3	**0,79**	503943,1	634980,6	**0,79**	10328,1	13585,8	**0,76**
October 08	602333,4	758993,0	**0,79**	533411,0	668144,5	**0,80**	10015,8	13198,6	**0,76**
Novembe r 08	650029,9	811218,4	**0,80**	577387,2	717272,2	**0,80**	9139,4	11823,1	**0,77**
Decembe r 08	717547,2	892546,0	**0,80**	626903,8	777857,0	**0,81**	8956,2	11384,1	**0,79**
January 09	703418,1	862301,9	**0,82**	609068,7	745602,9	**0,82**	9927,2	12321,4	**0,81**
February 09	686335,7	840627,8	**0,82**	591517,5	724137,5	**0,82**	10531,3	12963,0	**0,81**
March 09	677873,5	826981,4	**0,82**	584410,8	716038,5	**0,82**	10250,4	12182,3	**0,84**