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Impact of Credit Information on the Banks Stability: Global Experience And Lessons for Ukraine

1. Abstract

A quality of the credit portfolio is one of the most important factors of banking system reliability. It is obviously, that there is a direct relationship between this indicator and financial stability of the bank. In turn, the quality of the loan portfolio depends on many factors that are investigated in scientific and educational literature. In this paper, we propose to focus on a group of factors of credit risk that are connected with the availability of information about the borrower.

The low efficiency of the national system of collecting information about borrowers in Ukraine in comparison with foreign models was confirmed by the quantitative analysis. This tendency cases the high level of credit risks and low financial stability level of domestic banks. It is necessary to make active efforts on improving the effectiveness of credit bureaus in Ukraine by establishing public credit registry and also to focus on solving other problems associated with the collectionю and use of information about borrowers.

Introduction

System of credit information dissemination is not often considered in scientific literature. This trend could be explained by the fact that this problem has already been solved for developed countries. For example, first credit registries appeared in Western Europe in 30 years of XX century, and the peak of international scientific publications on the subject was about 20 years ago. On the other hand, due to the global financial crisis of 2008-2009, a significant part of banks' credit portfolios (mainly in developing countries) is not monitoring now. So this countries including Ukraine, must continue to search for systemic solutions seek systemic solutions in the field of improving the management of credit risks. These solutions provide for the improvement of the system of centralized information collection, processing and dissemination. The relevance of this topic is confirmed by attempts to reform the legislation that governing the procedure for collection and dissemination of information about borrowers.

In 2015 the draft law number 3111 [2] was introduced for the Verkhovna Rada of Ukraine review. This draft law provided the establishment and maintenance of the Credit Registry of the National Bank of Ukraine. Information in this register should be accumulated by mandatory submission of relevant information about borrowers by all banks operating in Ukraine. The appearance of the draft law intensified discussions within the expert community and among scientists in the part of necessity to disclosure information about borrowers in Ukraine. Our paper investigates this issue in the light of international experience.

Government body which deals with the accumulation and dissemination of credit information (Public credit registers) operates in many developed countries. It is controlled mainly by the central bank. It should be noted that provision of information in the state database (as opposed to private credit bureau) is mandatory for all borrowers. The legal framework for the functioning of private credit bureaus in our country was founded in 2005 by adopting a special law [3]. However, it provides an opportunity to obtain information by credit bureau from borrower only with the written consent of borrower. In addition, it is not provides the possibility of forming public credit bureau, and not clearly defines the procedure for exchanging information between the credit bureaus. These and other shortcomings make it impossible to create high-quality national mechanism for the formation of comprehensive information on the credit history of borrowers in Ukraine that would provide effective procedures for information exchange between credit bureaus.

Implementation of the quality system of credit information collection and processing will cause long-term effects that will promote formation of positive impulses for credit market development. For example, Tullio Jappelli and Marco Pagano's in their study identify four main positive effects of credit bureaus functioning: 1) improving the banks' knowledge of applicants' characteristics and permission more accurate prediction of their repayment probabilities; 2) reducing the informational rents that banks could otherwise extract from their customers, that accelerates and reduces the cost of credit; 3) improving payment discipline of borrowers because of their awareness of reputation (moral) risk from the distribution of the information about absence of payment by credit bureau; 4) elimination of the borrowers' incentive to become over-indebted by drawing credit simultaneously from many banks without any of them realizing. Thus, the task of finding areas for developing credit information processing system in Ukraine is actualized.

2. Literature review

All research on the problems of this article can be divided into two groups. The first one is publications which examine individual (mainly practical) aspects of the formation and use of credit information. The second one is comprehensive researches and analytical reports of state bodies and NGOs.

We would like to analyze some studies from the first group. The cost-effectiveness of gathering and disseminating of information about the payment discipline of legal entities by the example of a world leader in this field (American

company Dun & Bradstreet, that was founded in 1841) was analyzed in the paper [4]. The authors conducted the first practical study aimed to assess the importance of this information in decision-making on crediting. It is concluded that usage of company's database provides improvements in credit risk assessment.

A.Jorge Padilla and Marco Pagano's [5] placed greater focus on improving the credit discipline of borrowers because of their awareness of the fact that information about possible non-payment of the credit will be available through the mechanism of credit bureaus for majority of creditors. However, sharing more detailed information can reduce this disciplinary effect: borrowers' incentives to perform may be greater when lenders only disclose past defaults than when they share all their information.

Comparing the efficiency of public and private credit registries is one of the main issues that is considered in the scientific literature and has significant relevance in Ukraine. For example, authors of the report [6] realized a comparative analysis of private credit registries functioning in the European Union according to the following key criteria: ownership structure; clients' structure; creditors' participation; type of data stored; additional services provided to creditors; the use of restrictions in the process of collecting information; degree of detail of the information provided; coverage. Notwithstanding the criteria according to which public and private institutions of collecting credit information were compared, authors [1, 6, 8] came to the conclusion that ownership of credit bureaus is not the principal factor that determines its effectiveness. Public credit registries may be more effective in countries where there is no mechanism for dissemination of information through private credit bureau or these mechanisms are primitive and limited.

Employees of the Central Bank of Argentina described the evolution of credit bureaus in their country [9]. Initially the Central Bank formed the basis for credit activity monitoring of largest borrowers, and then all loans of the banking system were included to this base. This experience may be interesting for the National Bank of Ukraine, as it collects via commercial banks certain statistics information about credit transactions and can modify this system for introducing the public credit registry. Authors also examined non-standard direction of using credit bureaus' information: evaluating the effectiveness of regulatory requirements to the capital adequacy and reserves of the bank. The mathematical model that was developed by scientists showed that it is necessary to strengthen the requirements to capital and reserves for Argentines banks.

Researchers quite often study areas of optimizing using the information that is accumulated and distributed by credit bureau for improving credit risk assessment [10, 11, 13]. In particular, GG Chandler and LE Parker [13] analyzed the impact of the amount of information about the borrower, which may be given by credit bureau, on the reliability of credit risk assessment. The authors a comparative analysis of the credit risk assessment based on five types of input data, which were grouped in terms of information value (from 2 to 16 indicators) obtained from credit bureaus. The authors concluded that the usage of credit bureaus data

considerably improves results of credit risk assessment. Also positive link between the levels of specification of the information and reliability of ratings was found.

Some authors use credit bureau information to study the institutional framework and legal regulation of certain types of credits. In particular, Simeon Djankova, Caralee Mc Liesha, Andrei Shleiferb realized a comparative analysis of the credit facilities in more than 120 countries. Researchers used data from public and private credit registries [12]. The results of analysis show that key prerequisites for intensification of crediting are: establishment of an appropriate regulatory framework concerning the protection of creditors' rights and functioning of the institutions that collect and disseminate information about borrowers.

The second group of publications allows us to make detailed analysis of the subject of our research. For example, the databases of the central banks, which contain micro (non-aggregated) information about economic agents, were comprehensively reviewed in the report of the Committee on Central Bank Statistics that was published in 2014 in the Bulletin of the Bank for International Settlements [14]. Information of public credit registers is one of the main places among the various statistical and financial reports, surveys and reviews of companies, databases of payment systems and oversight bodies by its characteristics: breadth of coverage, informative value, structuring and usefulness. The report analyzes the experience of public credit information processing systems in Malaysia, Armenia, Ireland, Brazil, Portugal and the EU.

In our opinion the experience of the European Union is the most interesting because of the European vector of Ukraine. The report of the expert group on credit histories [6] provides detailed data that describes the credit European Credit Reporting System. As a whole it is possible to make a conclusion that most countries have both public and private credit registers. Only Luxembourg has no credit register. In the whole European Union, there are more private credit bureaus than public credit registers. In a few countries, there is more than one credit bureau. In several countries, operates more than one private credit bureau. In addition, the report contains recommendations for further development of credit information processing systems of the EU. Authors made a conclusion that it is inappropriate and unreality to create a single pan-European credit bureau. However, experts work towards more convergence or harmonization in the interpretation of data protection rules and in their practices in order to facilitate the process of cross-border credit data exchange.

The first steps in this direction were made by countries (Portugal, Austria, Belgium, France, Germany, Italy, Spain, Czech Republic and Romania) which have signed the Memorandum of Understanding aiming at facilitating the exchange of credit data between their respective PCRs. [15]. In 2003, the Governors of seven European Central Banks signed a Memorandum of Understanding aiming at facilitating the exchange of credit data between their respective private credit registers.

As a result of literature review we can make a conclusion about the availability of alternative versions of forming the system of credit information

collection and dissemination. There are key problems that may arise during the process of implementation and development of credit information system: 1) the relationship between public and private mechanisms, the dosage between black and white information sharing; 2) terms and procedure of storing and using of retrospective information; 3) problem of monopolization of information flows; 4) using information for the purpose of identifying business groups; 5) development of cross-border lending); 6) protection of private data; 7) ways of reconciling the interests of public credit registries and private credit bureaus [1, 6, 8]. Effective solution of these problems will create a quality system of credit information.

It is necessary to conduct a quantitative analysis of the effectiveness of the national system of collecting information on borrowers in comparison with foreign models to make informed decisions about further development of this system in Ukraine.

3. Methodology

To achieve the objectives we have formed the basis of indicators based on indicators published by the World Bank [16]:

1) Bank nonperforming loans to total gross loans (NPL);
2) Depth of credit information index (0=low to 8=high);
3) Private credit bureau coverage (% of adults).

The first indicator is the ratio of bank nonperforming loans (which are not serviced by borrowers) to total gross loans, a measure of bank health and efficiency, helps to identify problems with asset quality in the loan portfolio.

The second indicator is the depth of credit information index. It measures rules affecting the scope, accessibility, and quality of information available through public or private credit registries. The index ranges from 0 to 8. Higher values indicate the availability of more credit information. •

The third indicator is private credit bureau coverage. It characterizes the number of individuals or firms listed by a private credit bureau with current information on repayment history, unpaid debts, or credit outstanding as a percentage of the adult population.

In view of the above-described information base of research we can clarify objectives that were set out in Article. The first one is to check whether the depth of credit information and the private credit bureau coverage have the influence on the share of bank nonperforming loans. The second one is to determine whether the direction of relation that was identifying according to first objective depends on the group of countries (cluster).

We used an algorithm that consists of three successive stages to solve these problems. First of all cluster analysis for forming of homogeneous groups of countries was conducted by using analytics software product STATISTICA. Then regression analysis for each cluster was conducted in order to understand how (shape and direction of impact) the dependent variable changes when any one of the independent variables is varied. Thus, cluster analysis was also used to smooth the differences between the levels of averages for the studied countries parameters of different clusters. This formed the premise for a reasonable statistical regression

analysis to test hypotheses about the importance of effective communication between the dependent and independent variables.

At the last stage we conducted evaluation of form and strength of the relationship between bank nonperforming loans and soundness of banks with the help of regression analysis. Ten-year statistics data on the abovementioned indicators for 104 countries (out of 213 countries listed in the official website of the World Bank [16] only 104 have systematic statistics data on these indicators for the period 2005-2014) was used for calculations.

4. Results

As a result of cluster analysis three clusters of countries were highlighted. Then linear regression equations were constructed for each cluster and the population as a whole (equation 1):

$$y = a_0 + a_1 \cdot x_1 + a_2 \cdot x_2, \qquad (1)$$

where y – Bank nonperforming loans to total gross loans (%);

x_1 – Depth of credit information index (0=low to 8=high);

x_2 – Private credit bureau coverage (% of adults);

a_0, a_1, a_2 – Regression parameters.

The results of cluster and regression analysis are shown in Table 1. Mainly developed countries (23 countries) are in the cluster; the cluster 2 (32 countries) mainly consists of countries with medium level of development; cluster 3 (49 countries) mainly consists of countries with sufficiently low level of socio-economic development, including African and Arab countries and countries of the former Soviet Union.

The higher level of depth of credit information index is observed in cluster 1 (5.57 on average in the 1st cluster against 2.64 in the 3rd cluster). The first cluster also characterized with highest percentage of private credit bureau coverage (90.06 on average in the 1st cluster against 5.48 in the 3rd cluster) and the lowest value of bank nonperforming loans to total gross loans (3.97 on average in the 1st cluster against 7.17 in the 3rd cluster).

Table 1 – Estimation of relationships by cluster and regression analysis

	Cluster 1	Cluster 2	Cluster 3	As a whole
Quantity of elements	23	32	49	104
Countries that were included in cluster	Australia, Britain, Italy, Ireland, Canada, Germany, Norway, USA Czech Republic, Sweden Japan and others.	Brazil, Greece, Estonia, Kazakhstan, Lithuania, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, Thailand, Turkey and others.	Belarus, Bulgaria, Georgia, India, Moldova, Nigeria, Pakistan, Portugal, Tajikistan, Hungary, Uganda, Ukraine and others.	
Central tendency for ten years in the cluster/population:				
bank nonperforming loans to total gross loans (%)	3,97	5,28	7,17	5,88
depth of credit information index	5,57	5,13	2,64	4,05
private credit bureau coverage	90,06	42,97	5,48	35,72

Regression parameters				
$a0$ (t- statistics *for a0*)	21,62 (2,67)	11,42 (3,13)	9,27 (6,97)	8,049 (21,7)
$a1$ (t- statistics *for a1*)	-1,75 (-1,59)	-0,75 (-1,13)	-0,81 (-1,61)	-0,398 (-4,0)
$a2$ (t- statistics *for a2*)	-0,088 (-1,12)	-0,053(-0,92)	0,009 (0,067)	-0,016 (-2,4)
R – coefficient of correlationï (F-statistics)	0,45 (2,52)	0,31 (1,49)	0,27 (1,87)	0,22 (26,7)

Source: compiled by author

As a result of regression analysis the following conclusions were made. There is a statistically significant relation of medium strength when α = 0,05 for the population as a whole. The velocity constant on all 104 countries is: $y = 8,049 – 0,398 \cdot x1 – 0,016 \cdot x2$, thus all parameters of equation are statistically significant by Student t-test when α = 0,05.

That is, the greater level of depth of credit information index and percentage of private credit bureau coverage leads to the smaller the share of bank nonperforming loans.

At the same time, direction and power of relation for some clusters are ambiguous and not in conformity to the global trend. So for clusters 1 and 2 direction of indicators x1 and x2 influence on *y* is one that corresponds to the general population.

However, for cluster 3 the impact direction of factor x2 changes from the back to straight. This tendency means that with increasing percentage of the private credit bureau coverage the percentage of bank nonperforming loans is also increasing. It should be noted that this relation cannot be considered confirmed according to the Student t-statistics. These results are explained by the low average level of private credit bureau coverage in countries that are in the 3rd cluster (about 6% of the adult population). This fact prevents a significant impact on the effectiveness of bank lending in this group of countries.

We would like to make a comparative analysis of the dynamic of studied parameters in the context of studying the situation in Ukraine. The data of neighboring countries and two developed countries were compared (Table. 2):

Table 2 – Comparative analysis of indicators of Ukraine and selected countries

	Belarus	Britain	Poland	Ukraine	Japan
bank nonperforming loans to total gross loans (%)					
2005	3,1	1	11	58	1,8
2010	3,6	4	4,9	15,3	2,5
2014	4,4	2,7	4,9	19	1,9
depth of credit information index					
2005	0	6	4	0	6
2010	5	6	6	4	5
2014	6	8	8	7	6

private credit bureau coverage				
2005	0	76,2	38,1	0	61,2
2010	0	100	91,7	10,1	76,1
2014	0	100	84,3	48	100

Source: compiled by author on the base of [16]

Index of bank nonperforming loans to total gross loans in Ukraine, although decreasing, but it is one of the highest in the world (Figure 1).
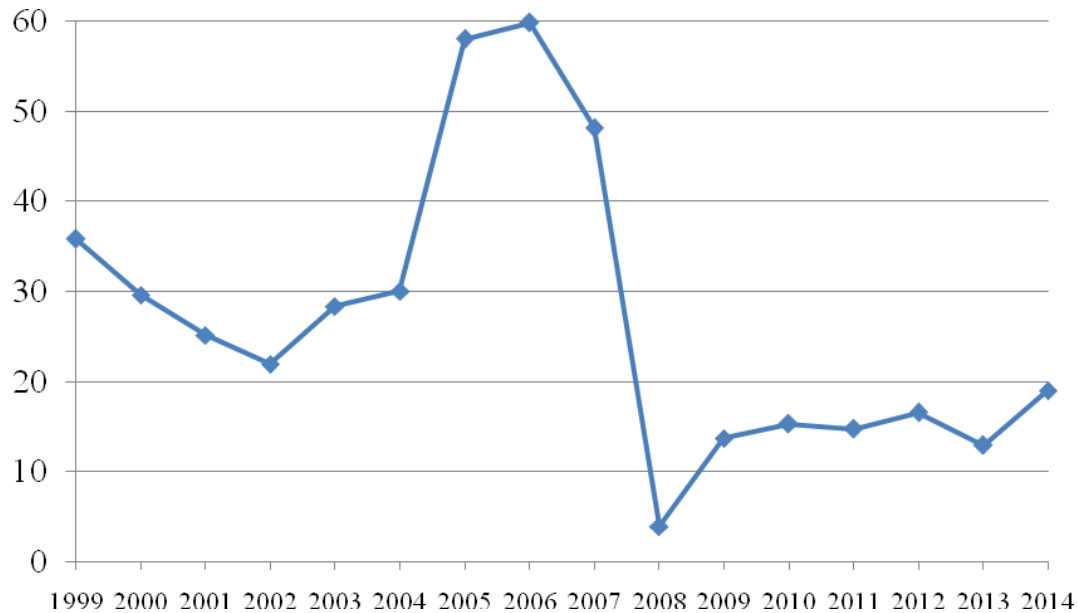

Figure 1 – Dynamics of NPL loans (according to the World Bank [16])

It should be noted that according to the World Bank definition nonperforming loans (NPL) are loans that are past due over 90 days. According to World Bank share nonperforming loans in their total volume in Ukraine is 42% in 2009-2010., but later this assessment was retrospectively reviewed, and now for the same period it reduced more than doubled (10 20%) [16]. However, even taking into account this factor, Ukraine has one of the largest percentages among all countries that provided the data to the World Bank. This index varies within 1-5% in most developed countries.

The difference between 15% of problem loans in crisis, according to the NBU and 42% according to statistics of the World Bank can be explained by different accounting requirements for consideration of debt (the amount of nonperforming loans by international practice determined not for the amount for which it was maturity period, but for all the amount of debt on this loan). In 2014 the NPL index in Ukraine was 19%/ It was one of the highest level in the world. It is impossible to predict the improvement of this indicator in Ukraine because of military and political upheavals in Ukraine.

However, Ukraine has demonstrated significant progress in the dynamics of the depth of credit information index for the past 10 years. Index grew up from 0 to 7 (with max = 8). In developed countries, index was high enough and has fluctuated within 6-8 during the study period.

During the study period the private credit bureau coverage in Ukraine also rapidly increased from 0 to 48%, but in selected for comparison developed countries the figure is close to 100% (Table. 2). As noted earlier in this article, it was done much towards the functioning of private credit bureaus during last ten years in Ukraine. According to information of the National Commission for State Regulation of Financial Services Markets, that conducts single register of the credit bureau, there are 9 credit bureaus with perpetual licenses in Ukraine. Moreover, their number has doubled during recent years. There are one or two private credit bureaus in most European countries (apart from the UK and Sweden – 3 and 6 credit bureaus accordingly) [6]. Thus, the trend of increasing the number of private credit bureau in Ukraine is not answerable to international experience, and also complicates the exchange of information between credit bureaus and creditors.

"Comprehensive Program of the Ukrainian Financial Sector Development up to 2020 " [17] provides development of infrastructure that will guarantee efficient storage and exchange of information about credit history of borrowers (including the development of cooperation between credit bureaus and consolidation of information available to regulator – the National Commission for State Regulation of Financial Services Markets) up to 12/31/2016. But now, in our opinion, this information exchange isn't effective. In order to have information about borrower's credit history, banks have to make several requests to different credit bureaus. This process complicates, slows down and increases the cost of requests processing.

In the context of our study, we consider that it is appropriate to determine the influence level of nonperforming loans on soundness of banks. The data about level of soundness of banks (which is given in paragraph 8.06 of the report published at the World Economic Forum [18]) was used. Study was conducted on the basis of statistical information concerning 113 countries (bank nonperforming loans to total gross loans and soundness of banks). The result of regression analysis is the following model (equation 2, Table 3):

$$Soundness_{GCI} = a0 + a1 \cdot NPL, \tag{2}$$

$Soundness_{GCI}$ – soundness of banks according to the report of GCI [16].

Table 3 – Regression parameters and its statistical significance

	Value
a0 (t- statistics for a0)	5,54 (54,5)
a1 (t- statistics for a1)	-0,08 (-8,6)
R- coefficient of correlationï (F-statistics)	0,63 (74)

Considering the data presented in Table 3, we can make a conclusion that the model is adequate at $\alpha = 0,05$ with a statistically significant parameters (equation 3):

$$Soundness_{GCI} = 5,54 - 0,08 \cdot NPL, \tag{3}$$

Thus, there is an inverse relationship between bank nonperforming loans and soundness of bank, which is consistent with hypothesis formulated earlier. We determined countries for which $Soundness_{GCI}$ (calculated by the equation 3) is significantly different from the actual value. Ukraine is one of the countries for which estimated value much greater than actual. In our opinion, this is due to accounting differences (that's why NPL value of 19% is significantly undervalued).

In reality this indicator varies 35-40% according to various experts estimations. We've got a figure of banks soundness - 2,974 by affixing indicator determined by experts in Equation 3 ($Soundness_{GCI} = 5,54 - 0,08 \cdot 35 = 2,74$). The obtained value corresponds to the actual value of Ukrainian banks soundness that is provided in the report on the Global Competitiveness Index «Global Competitiveness Index 2014-2015» (GCI). It should be note that 151 countries were analyzed in report and the value of Ukrainian banks soundness (2,974) is much lower than the average for all countries (4.9). Lower value of banks soundness was observed only in Slovenia, Cyprus, Greece and Ireland.

5. Conclusion

The quantitative analysis conducted in the paper confirms the low efficiency of the national system of collecting information about borrowers in Ukraine in comparison with foreign models. This tendency cases the high level of credit risks and low financial stability level of domestic banks. In our opinion it is necessary to improve the effectiveness of the bank's credit risk management by improving approaches to the development of credit information systems in Ukraine. Two main tendencies

Insufficient development of standards of the depth level of information about the borrower and lack of availability to the appropriate and reliable information about the borrower has influence on the bank's credit portfolios quality. This argument is valid in most countries, indicators of which were studied in this paper. However, developing countries (including Ukraine) have the most significant reserve of improving the efficiency of the credit market, based on the improvement of the collection and dissemination of information about borrowers.

Development and implementation of new standards of the provision and exchange of information is one of priorities of further Ukrainian banking system development after a period of its institutional framework reform (2014-2015). These standards will improve the stability of banking system. Also they should be generally consistent with the "General Principles for Credit Reporting" [19], including the organization of information exchange between credit bureaus.

The best world practice should be considered during the process of improving the system of collection and dissemination of information about borrowers.

The guidance provided by countries with similar levels of economic development should be especially interesting for Ukraine. For example, Martin Brown, Tullio Jappelli, Marco Pagano analyzed the impact of information dissemination mechanisms between banks on the efficiency of credit markets in Eastern Europe and the FSU Region. [7] As a result of critical study authors made

a conclusion that sharing of this information by banks will increase availability of credit recourses and reduce their costs for business. This relation is stronger for non-transparent companies (compared with transparent) and in countries with insufficient effective legislation.

Martin Brown, Tullio Jappelli, Marco Pagano in another paper considered theoretical approaches to the formation and improvement the system of credit information distribution in developing countries [1]. The authors outlined following key aspects of this process: 1) negative impact of the credit market segments that are not under effective state control (such as micro-credit by non-banking institutions); 2) lack of protection of creditor rights; 3) necessity need to change loan policy towards substitution of physical collateral by information collateral (quality information of credit bureaus); 4) ensuring the gradual (evolutionary) process of information structure complication that is processed by credit bureaus.

Currently, the draft law number 3111 [2] on the establishment of the Credit Registry of the National Bank of Ukraine was revoked. However, the question about expediency of its introduction in Ukraine continues to be relevant. Some experts point out that the establishment of such register could make functioning of credit bureaus uneconomical, reduce competition between them and reduce the quality of services [1].

In some countries, this problem is solved by limiting the minimum amount and type of credit information which is collected by public credit registry. On the other hand, private credit bureau can quite effectively operate on condition of their specialization in loans to individuals and small businesses.

In our opinion, Ukraine should use international models according to which public credit registries operate in parallel with private credit bureau. In particular, private credit bureaus can provide a greater level of detail for certain types of credits (mostly in small amounts) and provide additional services, and state registers have a broader base of credit histories. As a result, creditors will be able to accurately assess credit risks and to increase the effectiveness of the credit process as a whole.

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