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MODELING THE VOLUME OF BANK LOANS TO BUSINESS ENTITIES USING SYSTEM DYNAMICS METHODS

One of the important components of ensuring the sustainable economic development of Ukraine is the improvement and further development of bank lending to business entities. Lending to business entities significantly reflects the development of the banking system as a whole, since the share of loans granted to business entities is more than 80% of the total volume of loans granted by banking institutions. That is why the disclosure of the key features of this type of active banking operations is relevant not only in terms of the efficiency of the banking sector, but also in terms of the economic development of the country as a whole. Banks, which occupy a substantial part of the financial, investment and industrial sectors of the economy, form the basis of the banking system. By redistributing temporarily free funds between economic entities, banks redirect them to those economic agents who need to raise additional capital.

For a long time, banking institutions are not able to be a "source of economic viability", acting as an accelerator of economic development of Ukraine. The supply of credit by banks remains significantly restricted due to the lack of own funds of commercial banks, the practical impossibility of raising funds for the long term, instability of passive transactions, etc. Such an unfavorable tendency for the development of bank lending is a consequence of socio-political and economic instability, deficits of the state budget, growth of public debt, low creditworthiness of economic entities, a large share of non-performing loans, etc.

Today, the lending process is still rather limited, first of all, due to the rather high cost of credit resources and high risk of borrowers, although gradual positive trends in lending volumes and creditworthiness of borrowers can be traced. In addition, banks are optimistic about lending prospects, in particular, expect lending to grow and hope to improve credit quality.

It is important to conduct a comprehensive study of the volume of bank loans to business entities, both in terms of analyzing demand for credit resources and in terms of their supply to commercial banks. From the supply side, the main factors that affect the volume of loans granted by banks are:

- the assets of banks: the large banks are usually more diversified, they have large funds and more accessibility to borrowers and they are able to give a greater level of credit facilities;

- the amount of deposits, which is the main sources of funds for banks. The high amount of deposits have a positive impact on the rate of growth in the credit provided to business: bank is able to offer more money that can be lent;

- the rise in the proportion of the non-performing debt to the total loans leads to a decline in the strength of the banking sector and the volume of the loans granted;

- interest rate on loans: the interest rate on loans is considered the most important source of income for the bank. The effect of the interest rate might be positively or negatively effective on the volume of bank lending because the increase in the interest rate may encourage banks to provide more loans, but at the same time could lead to reduced demand for loan borrowers because of their high interest rates;

- the high inflation leads to an increase in the interest rates on loans because of increase of discount rate of central bank, which cause the decline in the demand for loans.

In order to define the demand side of bank landing, the simplified model with using system dynamics methods was built (Figure 1).

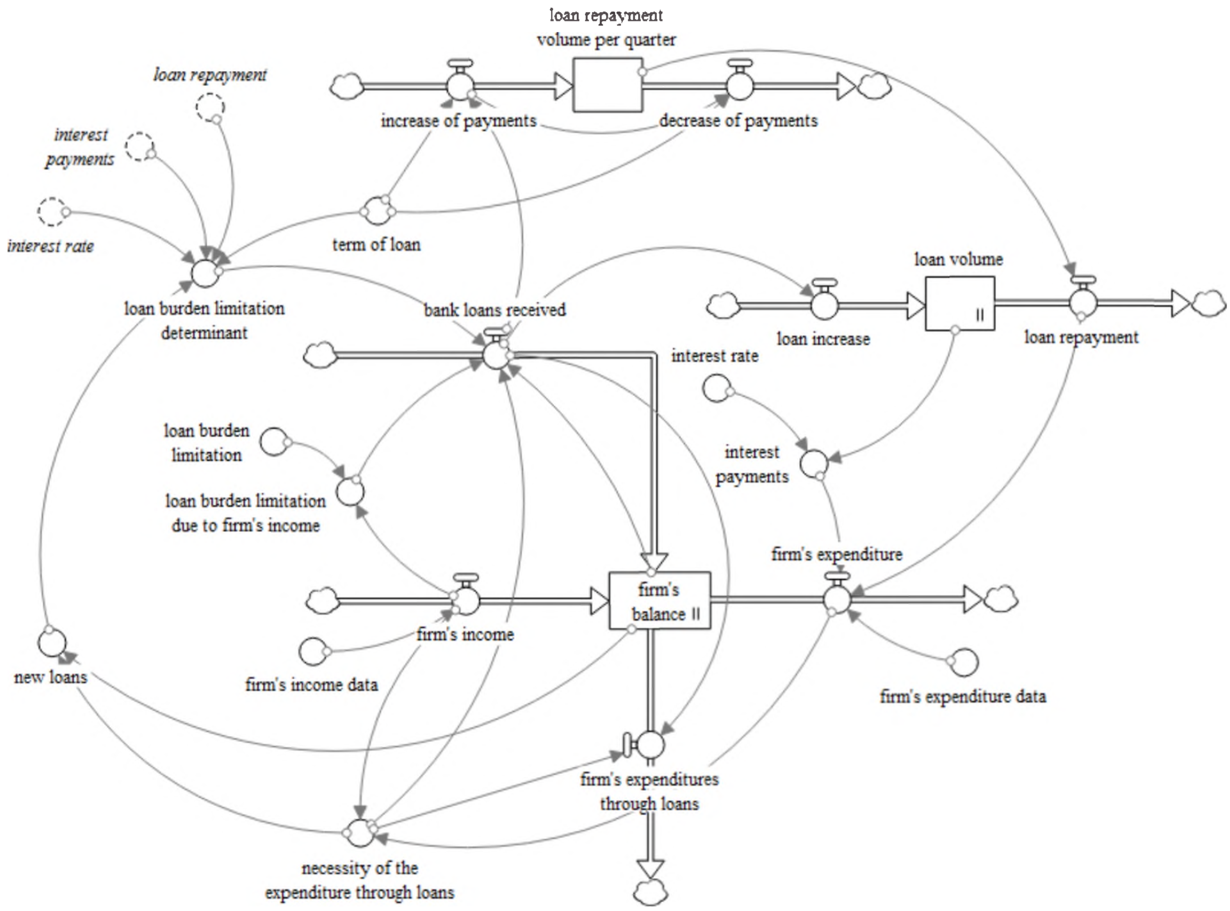

Figure 1. Model of bank lending in terms of business entities' balance sheet using system dynamics methods

Assuming the demand side, the main factors affecting the demand of companies for bank loans are:

- the less interest rate on loans provides greater demand on them, so the amount of loans the business would like to get increases;

- additional financing will effect on increasing of expenditures of companies. For example, they will invest borrowed money in buying new equipment;

- expenditures of companies increase because they have to pay interest payments on using borrowed money;

- the additional financing of business will have positively effect on company's output, so also on the whole output – and will increase the GDP.

Using system dynamics methods allows analyzing the behavior of the system over time, depending on the structure of system elements and their interaction, including causal relationships, feedbacks and possible delay of the impact of one indicator on other. In the model above such main factors were taken into account: the amount of bank loans received by economic entities in accordance with the income and expenses of enterprises, their expected costs from credit funds, as well as interest payments on loans and repayment of loans received.

This model includes three major outflows: the balance of enterprises, the volume of loans received and the volume of loans repaid. The balance of an enterprise as a stock variable increases due to inflows: firm's income and bank loans received. And, accordingly, it is reduced by outflows: firm's expenditures by their own and through loans. Firm's income and expenses are determined on the basis of exogenous variables (quarterly income and expenses). Whereas, credit costs arise when there is a need to raise credit, namely when income is less than expenditures. If the need to obtain loans arises, the company will take new loans to distinguish between the need for credit and the balance of the enterprise. This value will represent the demand for credit from economic entities. The volume of bank loans received is calculated according to the demand for loans, taking into account the fact that the credit received does not exceed the maximum credit load.

According to the amount of the loan received and the term of the loan, the amount of quarterly loan contributions (loan repayments) is calculated. In addition, the amount of borrowings determines the total amount of loans (stock variable), on the basis of which the interest expenses of the enterprises are calculated, which are accordingly included in the total expenses.

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