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Microcredits for Sustainable Development of Small Ukrainian Enterprises: Efficiency, Accessibility, and Government Contribution

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Abstract: The purpose of the study was to assess the efficiency and accessibility of microcredits for small Ukrainian enterprises and to justify the feasibility of strengthening government contributions in lending to ensure the sustainable development of small businesses. Indicators for evaluating the efficiency and accessibility of microcredits are systematized. Methodological approaches to assessing the efficiency of lending for the creation and development of microenterprises have been improved. A model for evaluating the efficiency of microcredits aimed at the survival of microenterprises in a deteriorating environment was developed. It has been revealed that the level of efficiency of microcredit creation for firms in some time intervals depends quadratically on the share of microcredits in the total amount of funds directed to the creation of firms. A linear relationship between the relative amount of credit received and the growth rate of firms' assets has also been established. However, there is no significant impact of the microcredit's amount on labor productivity. A method has been developed for evaluating the budgetary efficiency of microcredits when such a lending is carried out using funds from state or local budgets. It was found that improving these lending conditions through budget financing can significantly increase its attractiveness for microenterprises without significantly reducing the budgetary efficiency of microcredits. This article substantiates the need to strengthen state support for microcrediting of small Ukrainian enterprises in the context of the COVID-19 pandemic.

Keywords: small Ukrainian enterprises; efficiency; accessibility; assessment; government contribution; pandemic COVID-19

1. Introduction

Ensuring a steady and lasting improvement in the living standards of the population in the face of constraints on natural and other resources requires governments to implement the concept of

sustainable development. This development should be considered both at the national level and at the level of individual regions, industries, enterprises, and households. At the same time, the role of enterprises in achieving sustainable development is particularly great because, to a large extent, the implementation of goals and objectives of this development depends largely on them [1,2].

In general, there are many goals and objectives of sustainable development [3] which determines its complexity and versatility. In particular, if we consider the essence of sustainable development at the national level, it is appropriate to understand it as "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [4]. If we consider enterprises, their sustainable development will be a stable long-term improvement of economic, social, environmental, and other performance of these enterprises.

It should be noted that, in order to ensure the sustainable development of the country, there must be sustainable development of most of its enterprises, regardless of their industry affiliation and size. In particular, if we consider such goals of sustainable development as overcoming poverty and increasing employment, the development of micro-entrepreneurship plays a significant role in solving them. As a result of this development, a significant number of unemployed people with low levels of welfare can obtain jobs and stable incomes while engaging in socially useful activities. In this regard, the gradual increase in the number of people who engage in micro-entrepreneurship can be considered as an important factor in ensuring sustainable socioeconomic development, especially in low-income countries [5].

However, on the way to the development of micro-entrepreneurship, there are certain barriers, the main one of which is the lack of adequate financial resources for many potential and existing micro-entrepreneurs to start and develop their business [6,7]. One of the main tools to cover the lack of these resources is microcredit [8]. Therefore, microcredit can be considered as one of the tools to ensure the sustainable development of microenterprises.

Assessing the impact of microcredits on the sustainable development of small businesses requires consideration of three factors: the efficiency of microcredit, its availability, and government incentives for this lending. In particular, with regard to the efficiency of microcredit, it is appropriate to understand the quantitative value of various types of economic, financial, social, environmental, and other consequences that result from such lending. There are many of these consequences and, accordingly, there are many indicators of the efficiency of microcredit. Therefore, it is important to choose in advance those indicators that will characterize the level of sustainable development of enterprises.

Regarding the microcredit availability, this characteristic is largely related to their efficiency. Indeed, on the one hand, the microcredit efficiency in absolute terms directly depends on the volume of loans used and these volumes depend on their availability, both physical and economic. On the other hand, the microcredit affordability is largely determined by their efficiency for potential borrowers.

Finally, government incentives for microcredits, in particular, partial or full government reimbursement of interest on microcredits, can be seen as an important factor in improving the microcredit efficiency and affordability. However, the state contribution should be made with appropriate efficiency of the respective state expenditures, in particular, taking into account the microcredit impact on the sustainable development of small enterprises.

Thus, there is a relationship between the microcredit efficiency, its availability, and government incentives. The study of this relationship is particularly relevant for countries with high poverty and unemployment. Such countries include Ukraine. At present, this country is one of the poorest countries in Europe, with a high level of hidden unemployment and a significant number of citizens who are labor migrants [9]. At the same time, among the reasons that determine the poor socioeconomic situation of Ukraine, there is an armed conflict that has been going on in its Eastern region since 2014 [10,11]. As a result, more than one million people became refugees, which, accordingly, significantly complicated the situation on the job market and in the Ukrainian economy as a whole. The burden on the state social security system of Ukraine is also significant [12]. Under these conditions, the development of

micro-entrepreneurship can be considered an important condition for creating additional jobs and for increasing the level of income of the population of Ukraine. This opinion is shared by the government of Ukraine, which develops and implements programs of state support for small businesses, which, among other things, provide for an increase in its microcredit [13].

In general, in recent years, microcredits in Ukraine have been rapidly developing. In particular, its amount is growing and the number of microfinance organizations is increasing [14]. In addition, some Ukrainian banking institutions are also engaged in microcredit [15,16]. At the same time, microcredits are received by both individuals for personal consumption and entrepreneurs for opening and building their businesses. In particular, microcredits for energy saving, primarily for thermal modernization of residential premises, have become widespread in Ukraine [17]. This makes it possible to significantly reduce household consumption of energy carriers [18] and, thereby, to increase the level of energy independence of Ukraine [19].

At the same time, currently, microcredits in Ukraine mainly concern the provision of loans to individuals who have a temporary lack of funds as well as the provision of loans for the purchase of household appliances. However, as for microcredits to entrepreneurs, the amount of such lending in Ukraine is not yet very high.

It should be noted that the sectors of Ukraine's economy in which small enterprises are most involved, in particular trade, services, and agriculture, are characterized by significant potential development. However, Ukrainian small businesses do not have adequate financial resources. Therefore, given the relatively high level of poverty and unemployment in Ukraine, microcredits can be seen as a means of ensuring the sustainable development of small Ukrainian enterprises. Under this development, it is expedient to understand "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [15].

Therefore, it is important to assess the existing level of microcredit efficiency for small Ukrainian firms. This level is characterized by absolute and relative data obtained as a result of microcredits. Evaluation of these data, among other things, makes it possible to establish the conditions under which such lending is attractive to potential loan recipients. Also, evaluating the efficiency of microcrediting to small businesses helps identify factors that are detrimental to the level of this efficiency. In turn, such a study will make it possible to choose the best means of state support for microcrediting to entrepreneurs. This support has become particularly relevant as a result of the spread of the COVID-19 epidemic, which has led to the termination of many micro-entrepreneurs and an increase in the unemployment rate. Therefore, there may be a need to strengthen government regulation of relations in the field of microcredits, in particular, the provision of state financial assistance. On the other hand, microcredits can play a positive role in overcoming unemployment, which was caused by the spread of the COVID-19 epidemic. However, even in this case, it may be necessary to take appropriate measures of government regulation of microcredits to entrepreneurs, in particular, measures aimed at reducing the cost of microcredits.

Taking this into account, the main goal of our research was evaluating the efficiency and accessibility of microcredits for small Ukrainian enterprises and substantiating the feasibility of expanding government contributions in this lending to ensure sustainable development of small business. In the process of achieving this goal, we have obtained some new results, both theoretical and applied.

Firstly, certain methodological bases for evaluating the efficiency of microcredit firms were improved. In particular, the indicators of such an assessment by systematized, methodological approaches to assessing the efficiency of lending for the creation and development of microenterprises were improved, and a model for evaluating the efficiency of microcredit aimed at the survival of microenterprises in a deteriorating environment was built. Our analysis of a selection of microenterprises that used microcredits to finance their creation or development made it possible to establish several empirical regularities. In particular, it has been revealed that the level of microcredit efficiency creation of firms in some time intervals depends quadratically on the share of microcredits in the total amount

of funds directed to the creation of firms. A linear relationship between the relative amount of credit received and the growth rate of firms' assets has also been established. However, there is no significant impact of the microcredit's amount on labor productivity.

Secondly, some factors that constrain the process of microcredit for small businesses have been modeled. Due to this, a model of the impact of microcredit efficiency on its accessibility has been built. The level of demand and microcredit accessibility according to a sample of small Ukrainian enterprises belonging to three sectors of the economy was assessed.

Thirdly, a method has been developed to assess the budgetary efficiency of microcredits when such lending is carried out using funds from state or local budgets. It was found that improving these lending conditions through budget financing can significantly increase its attractiveness for microenterprises without significantly reducing the budgetary efficiency of microcredits. These results of the study can be used to justify the need to strengthen government support for microcredits in the context of the COVID-19 epidemic.

The achievement of this research goal has led to the need to solve many problems. For example, Section 2 reviews the literature data. Section 3 presents the methodological basis for evaluating the efficiency of microcrediting to firms and for justifying state support in lending. Section 4 provides an empirical assessment of microcredit efficiency to Ukrainian firms and identifies opportunities to strengthen the role of the Ukrainian state in the production of such lending. Section 5 discusses the obtained results. Section 6 summarizes the findings of the study. Section 7 specifies the limitations and prospects for further research.

2. Literature Review and Hypothesis Development

2.1. Microcredit Efficiency and Their Role in Ensuring Sustainable Development

Considering the existing methodological approaches to assessing the efficiency of microcredits for small businesses, it should be noted that there are various criteria for such an assessment. Criteria such as the growth rate of firms [20], their productivity [21], profitability [22], income and net assets [23], poverty reduction [24], women's empowerment [25,26], and so on are applied.

Special attention in the scientific literature is paid to the issue of the impact of microcredits on the productivity of agricultural microenterprises. In particular, in [27], it was found that such lending allowed to increase the yield of rice for farmers in Bangladesh by 14%. Similar results were obtained from the data of Pakistani rice producers [28]. An assessment of the impact of agricultural loans on maize yield, according to which the impact is 3.8%, is also noteworthy in [29]. There are also many studies on the impact of lending on the growth rate of enterprises. In particular, it is noted that the tightening of loan restrictions leads to a decrease in the average growth rate of the studied firms [30]. Studies conducted on the example of Kenyan manufacturing firms [31] have shown that, if they survive, firms that use loans grow faster than those that do not. At the same time, smaller firms grow faster, which, according to the authors [31], confirms the convergence hypothesis. However, firms that grow faster pay higher interest rates for loans [20].

The existence of a positive impact of lending on the growth of small enterprises is also confirmed [32]. However, in [33], where Mexican microenterprises were studied, it was found that attracting loans does not cause an unambiguous acceleration in the growth rate of these microenterprises. This inconsistency in the results obtained by different authors who have studied the impact of microcredits on the growth of small businesses can be explained by differences in the conditions for providing microcredits as well as in the economies' functioning of the countries that were studied. Thus, it was found that the productivity of firms increases from their access to loans [34]. In [35], it is stated that firms that use loans in the initial year of their activity are significantly more likely to survive and achieve a higher level of income three years after the establishment of the firm. Therefore, in [36], we considered the long-term consequences of lending to enterprises, namely, we studied the presence of a certain lag between the moment of taking a loan and the moment of receiving returns from it. It is

worth mentioning the results of a study conducted in [37], which found a significant positive impact of microfinances on household income, spending, and savings.

The efficiency of small businesses can be affected not only by the size of lending but also by the correctness and validity of the loan policy chosen by the firms. In particular, based on a study of a selection of Nigerian manufacturing firms [22], it was found that their loan policy significantly affects the growth of the profitability of these firms. In total, most studies contain conclusions about the positive impact of microcredits on the activities of small enterprises. However, it was found that loan restrictions do not significantly affect the productivity of small and medium-sized Chinese firms [21]. There are also research papers that note the fact that microcredits have a generally positive impact on the activities of microenterprises but not by all indicators of such activities. In particular, based on a study of a selection of small agricultural enterprises, the positive impact of microcredits on technology and investment was established [37]. However, the impact of microcredits on the amount of income and profit of the studied enterprises was ambiguous. In [38], a study was conducted on the impact of microcredits on the performance of small-scale enterprises in Malawi. Calculations have shown that the use of microcredits has led to an increase in the efficiency of these enterprises and caused an increase in financial results. Besides, there was an increase in company competition, which was reflected in an increase in its market share. At the same time, microcredits negatively affected the financial stability of the studied enterprises.

Since microcredits can cause financial leverage in enterprises, this effect was the object of many studies [39,40]. However, the results obtained by different authors differ significantly. Thus, it was noted the negative impact of financial leverage on the efficiency of firms [40]. Also, it was indicated the need to optimize financial leverage [41]. At the same time, a positive relationship between small business efficiency indicators and financial leverage has been established [42]. In [43], it was noted that this relationship has a different nature for different performance indicators of enterprises, while in [44], this relationship was not detected at all.

However, despite the different results obtained by different scientists, most authors noted the presence of a significant impact of microcredits on the emergence and development of small businesses. Thus, microcredits to enterprises can be a powerful incentive for their growth and, consequently, can ensure sustainable economic and social development of regions [45,46]. Accordingly, this increases the role of microfinance institutions in ensuring such development [47,48]. However, the positive impact of microcredits on the development of small businesses largely depends on both the general economic situation and the specific conditions under which firms receive microcredits.

2.2. Microcredit Accessibility and Barriers to Their Attraction

The vast majority of microcredit issues studies note that micro-entrepreneurs are forced to turn to it due to their limited access to lending resources. The problem of such limitations is considered by many scientists. Thus, an analysis of the activities of small firms in eleven European countries in the period of 2014–2016, which was performed in [49], showed that these firms experienced great difficulties in accessing banking services. As mentioned in [50], small businesses, especially in countries with transition economies, may face greater difficulties in accessing external sources of finance. This is especially relevant to newly formed firms. Similar results are presented in [51], where it is mentioned that firms with smaller assets are mainly limited to internal sources of funds while firms with larger assets also attract funds from external sources.

Thus, the size of enterprises, according to scientists, significantly affects the ability to access loans. Concerning other factors that determine the level of loan availability for firms, it is argued in [52] that small firms can increase this level if they are able to make a deposit. In general, high demands on borrowers from financial institutions are the main barriers to obtaining microcredits [53]. Such barriers also include lack of information [54], lack of financial literacy [55], etc. At the same time, the high profitability of small firms does not significantly affect the facilitation of obtaining a loan [52]. Also, the reasons that make it difficult to obtain loans for small businesses in India include the gender

of the entrepreneur—women are less susceptible to getting loans [56]. On the other hand, as mentioned in [57], women are on average more punctual in returning microcredits than men.

The factors that hinder enterprises from attracting loans are the risk of their activities [58]. As mentioned in [59], bank lending is an important source of firms' financing; however, firms that experience greater uncertainty tend to get less loans. At the same time, the increase in the risk of firms' activities has a negative impact on the number of their investments, in particular, in improving labor productivity [60] and in the introduction of resource-saving technologies [61]. Accordingly, the risk of loan default taken for the investment of enterprises increases. Therefore, enterprises should take a balanced approach to obtaining loans, including microloans [62].

2.3. Government Support for Microcredits

Even though in recent years microcredits in many countries have been developing quite rapidly, it has certain problems that exist both in developed countries [63] and in developing countries [64]. In particular, this applies to the presence of the above barriers to obtaining microcredits. Overcoming these barriers allows one to create more favorable conditions for microcredits.

Ensuring such conditions largely depends on how balanced the government regulatory policy in the field of microfinance is [65,66]. This policy can be implemented both by regulating the activities of microfinance institutions and other subjects of microfinance services markets and through direct participation of state and local authorities in the provision of these services [67]. In particular, such participation can occur through the provision of microcredits with the budget funds, compensating the interest from microcredits, or the provision of loan guarantees [68]. It is important to assess the budgetary efficiency of the relevant activities.

It should be noted that the need for direct participation of state and local authorities in the provision of microcredit may be due to a lack of necessary financial resources of financial institutions that provide these loans [69]. Under such conditions, state subsidies are quite justified. However, this subsidy should be provided under the appropriate level of microcredit efficiency [70].

Finally, it should be noted the possibility of indirect government influence on microcredits through the implementation of prudent macroeconomic policies [71]. In particular, this policy should restrain the growth of interest rates. It should be borne in mind that the general macroeconomic situation and institutional features have a significant impact on the activities of microfinance institutions [72]. This, in particular, may explain the above differences in the results of studies conducted in different countries. It is also necessary to take into account the impact of the development of the financial sector in the countries on the activities of the microfinance sector. This impact is positive in terms of macroeconomic growth and negative if there is a general economic downturn [73].

2.4. Unresolved Issues and Research Hypotheses

Thus, there is currently a lot of research on efficiency and microcredit accessibility to enterprise assessment. However, there is a need to systematize the indicators of such an assessment. At the same time, researchers have not fully analyzed the impact of the intensity of microcredit use on their efficiency. In particular, this applies to microcredits in the enterprises' creation and expansion. Also, insufficient attention is paid to evaluating the efficiency of microcredits, the purpose of which is not the growth of enterprises but their survival. Besides, it is necessary to improve the methodological basis for assessing the budgetary efficiency of government regulatory policy measures in the field of microcredits to small businesses.

It should also be noted that, currently, there is no detailed study on the efficiency and accessibility of microcredits in the context of sustainable small business development in Ukraine. In this regard, the question arises as to whether it is possible to extrapolate the results obtained from other countries to Ukraine. To answer this question, we must first formulate several research hypotheses.

In particular, concerning the abovementioned effect of financial leverage, it is advisable to test the possibility of a certain compromised option of its impact on the performance of microenterprises. To this end, we formulate the following hypothesis:

Hypothesis 1. *The efficiency of the equity of Ukrainian microenterprises increases with the increase of the received credit but to a certain extent.*

It is also advisable to assume a generally positive impact of microcredits on enterprise development. To this aim, we formulate the following hypothesis:

Hypothesis 2. *Larger volumes of loans cause greater growth in assets of Ukrainian microenterprises.*

It should be noted that, in Ukraine, microcredits aimed at updating technology are rarely used. Therefore, we can assume that the relative performance of microenterprises does not depend on the volume of their lending. Thus, we can express the following hypothesis:

Hypothesis 3. *Indicators of return on capital, energy consumption of products, energy consumption structures, as well as labor productivity and average wages of employees of Ukrainian microenterprises do not depend on the volume of microcredits.*

Particular attention should be paid to the case when microenterprises take loans to overcome the solvency crisis. In this case, the loans are aimed at replenishing the current assets of enterprises. It can be assumed that, in this case, too high lending can only deepen the financial crisis in enterprises. Thus, there are grounds to express the following hypothesis:

Hypothesis 4. *Attracting relatively small amounts of loans may contribute to the exit of Ukrainian microenterprises from the solvency crisis. However, too much credit will only deepen this crisis.*

3. Methodology

3.1. Systematization of Indicators for Assessing the Efficiency of Microcredits for Small Businesses and the Methodological Principles of such an Assessment

The systematization of indicators for evaluating the microcredit efficiency for small enterprises requires consideration of several aspects that characterize the procedure of such an evaluation.

Firstly, such an assessment can take place from the positions of various stakeholders. In particular, the stakeholders may be micro-entrepreneurs themselves, their employees, microfinance institutions, other providers of microcredits, state and local authorities, etc. Different individuals will be interested in different consequences of microcredits. Accordingly, the indicators for assessing its efficiency may differ for different individuals.

Secondly, the effects of microcredits can be displayed by various indicators, in particular, both absolute and relative. For instance, microcredits under certain conditions can cause both an increase in the enterprise's profit and an increase in the profitability level of its assets or equity.

Thirdly, the assessment of microcredits' efficiency can be carried out both in absolute and relative terms. In the latter case, the amount that characterizes certain consequences of microcredit should be compared with the amount of loan received or the amount of interest paid for using it.

Fourthly, the impact of microcredits on enterprises can be assessed not only by comparing two alternatives: obtaining a loan or refusing to invest in the creation or development of a microenterprise. There are also a couple of alternatives: getting microcredits or using other sources of funds. However, to do this, the micro-entrepreneur must have potential access to such sources.

Fifth, only some of the indicators for assessing the microcredit efficiency for small businesses can act as criteria for their sustainable development (Figure 1). For example, if taking microcredits has

led to energy-saving technological changes in the enterprise, it will be one of the signs of sustainable development. Accordingly, the indicator of a reduction in energy consumption due to the use of microcredits will reflect its efficiency and, at the same time, will be one of the characteristics of sustainable development of the enterprise. If, as a result of obtaining a microloan, the company introduces labor-saving technological changes, then reducing the need for workers will be a characteristic of the microcredit efficiency but not a criterion for sustainable development.
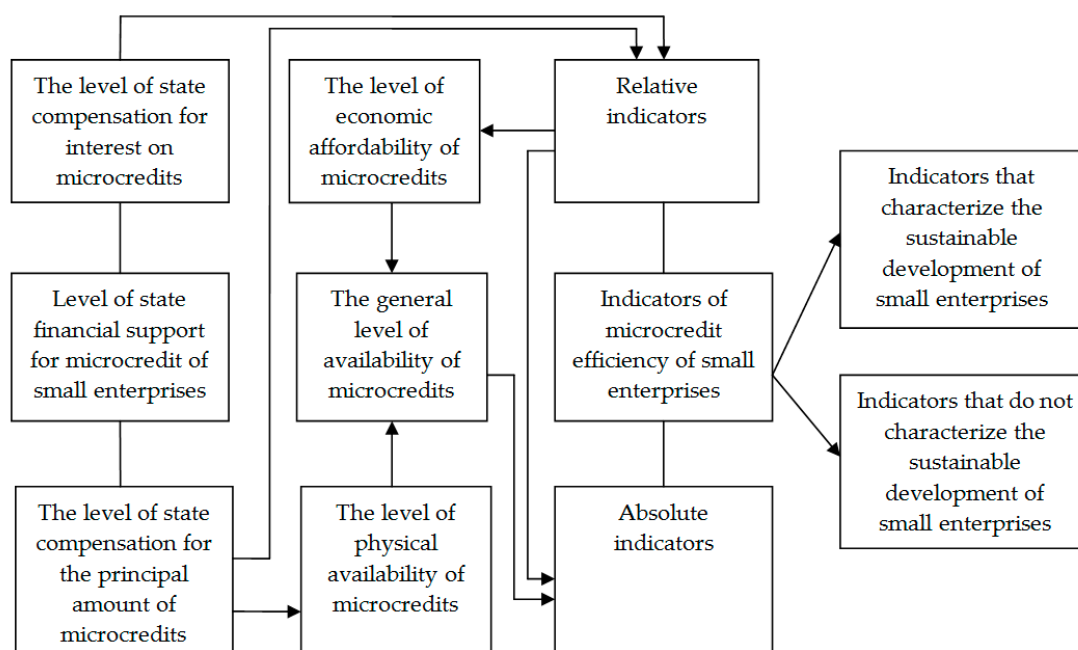

Figure 1. Relationship between efficiency, availability, and level of state support for microcredits in the context of ensuring sustainable development of small enterprises.

Thus, microcredit efficiency indicators can be grouped both by the people who are interested in information about these indicators and by the way the indicators are constructed. In the latter case, microcredit efficiency indicators will be divided into absolute and relative ones. The formulas for calculating them have the following general form:

$$I_{ac} = I_c - I_{nc} \tag{1}$$

$$I_{rc} = I_{fc} / I_{lc} \tag{2}$$

where I_{ac} is the absolute indicator of the efficiency of microcredit enterprises; I_c and I_{nc} are indicators of the impacts of microcredit accordingly, in the case of the implementation of microcredit and in case of its refusal; I_{rc} is a relative indicator of the efficiency of microcredit enterprises; and I_{lc} is the level's (amount) indicator of microcredit enterprises.

There are also other ways to group microcredit efficiency indicators. Their systematization is shown in Table 1.

At the same time, the efficiency indicators of microcredits for small enterprises which characterize their sustainable development should be divided into three groups (Table 2).

Note that the indicators listed in Table 2 can be calculated in both absolute and relative terms.

When evaluating the efficiency of microcredits, it is advisable to create a selection of microenterprises, which, in turn, may consist of separate groups of these enterprises.

At the same time, the evaluation of the microcredit's efficiency should ultimately include the development of proposals for improving the lending policy of microenterprises and government regulation in the field of microcredits.

Table 1. Grouping of microcredit efficiency indicators.

The Characteristics of Indicators' Grouping	Types of Indicators
1. Consumers of information about the level of microcredits' efficiency	1.1. Indicators which are relevant for owners of enterprises that draw to microcredits 1.2. Indicators which are relevant for institutions that give microcredits 1.3. Indicators that are relevant for public authorities 1.4. Indicators that are relevant to others
2. The method of constructing the indicators	2.1. Absolute 2.2. Relative
3. Results of assessing the consequences of microcredits	3.1. Quantitative 3.2. Qualitative
4. Objects of evaluation	4.1. Indicators that characterize an individual enterprise 4.2. Indicators that characterize the selection of enterprises 4.3. Indicators that characterize the entire set of enterprises
5. The consequences microcredits	5.1. Indicators describing the immediate impact of microcredits 5.2. Indicators describing the indirect impact of microcredits
6. The moment of microcredit implementation	6.1. Prognosis 6.2. Actual
7. The goal of the microcredit	7.1. Indicators of the efficiency of microcredits which are carried out to finance the establishment of microenterprises 7.2. Indicators of the microcredit efficiency which is carried out to finance the further development of microenterprises 7.3. Indicators of the efficiency of microcredits which are carried out to finance activities to ensure the survival of microenterprises
8. The ability of indicators to characterize the sustainable development of a small enterprise	8.1. Indicators that characterize the sustainable development of enterprises 8.2. Indicators that do not characterize the sustainable development of enterprises

Table 2. Grouping indicators of microcredit efficiency for small enterprises that characterize their sustainable development.

Groups of Indicators	Examples of Indicators
1. Indicators of microcredit efficiency for small enterprises which characterize the economic component of their sustainable development	Increase in profits and dividend payments; increase in the total amount of capital; increase in indicators that characterize the financial stability of enterprises; increase in production volumes; increase in return on capital
2. Indicators of microcredit efficiency for small enterprises which characterize the social component of their sustainable development	Increased need for workers; increase in the average wage per employee
3. Indicators of microcredit efficiency for small enterprises which characterize the energy and environmental components of their sustainable development	Increase in energy intensity of products manufactured by the enterprise; increase in the share of clean energy in the structure of energy sources consumed by the enterprise

The method of evaluating microcredit efficiency for small enterprises should provide for the implementation of a certain sequence of actions, which will eventually include the calculation of certain indicators that will characterize the efficiency of microcredits. It is advisable to highlight such a sequence of these actions:

Step 1. Defining the purpose of the microcredit.

Step 2. Selecting an indicator that will characterize the impact of microcredits and an indicator that will characterize the level of such lending. These indicators will depend, in particular, on the goal of the microcredit (Table 3).

In particular, among the indicators that characterize the consequences of microcredits, it is advisable to use the following:

(1) dividend yield. This indicator, in contrast to the rate of return on equity, takes into account the possible direction of part of the company's profits to repay the microcredit;

(2) the percentage increase in total enterprise capital. This indicator is relative, i.e., can be used when comparing enterprises with different amounts of initial capital; and

(3) coverage ratio of current liabilities. This indicator is one of the most important indicators of enterprise solvency.

Since all the proposed indicators that characterize the consequences of microcredit are relative, the corresponding indicators that characterize the level of microcredit should also be relative.

Step 3. Formation of a selection of microenterprises. However, this selection should also include businesses that did not attract microcredits during the accounting period.

Step 4. Dividing the possible values of the indicator that characterizes the level of microcredit into some equal intervals and the corresponding distribution of the selected microenterprises in these intervals.

Step 5. Calculations for each interval of the averaged values of absolute and relative indicators of microcredit efficiency according to the formulas shown above in Figure 2.
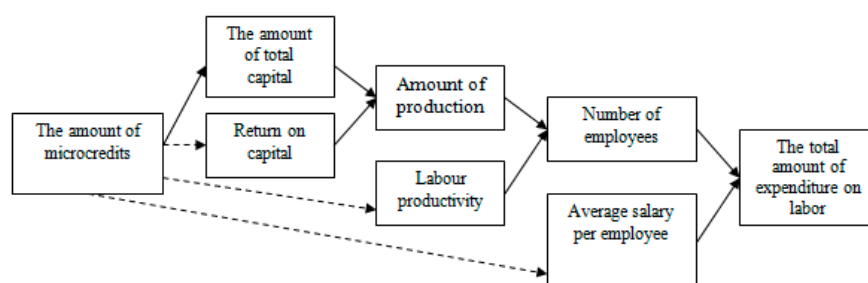

Figure 2. Model of the impact of microcredits on selected indicators of microenterprises' performance.

Step 6. Establishing a regression relationship between the indicator that will characterize the level of microcredit and the indicator that will characterize the consequences of microcredit.

Step 7. Based on the obtained regression relationship (provided that it is statistically significant), the determination of the relationship between the relative indicator of the efficiency of microcredit and the indicator that characterizes the level of microcredit.

Step 8. Drawing conclusions, in particular, conclusions on the microcredit impact for small enterprises on their sustainable development.

It should be noted that, if the selection of microenterprises is not large enough, one should perform the listed sequence of actions without allocating intervals for the corresponding indicator.

Building a regression relationship requires a preliminary choice of its general form. In particular, the relationship between indicators from the first pair of indicators in Table 2 is based on the effect of financial leverage. Consequently, the growth of the indicator that will characterize the consequences of microcredit, with the indicator's growth, in this case, may gradually slow down or even stop altogether. Therefore, we can assume that this regression dependence is quadratic.

Table 3. Proposed separate indicators that describe the impact of microcredits and the level of such lending.

The Goal of the Microcredit	Indicators that Describe the Impact of Microcredits	Indicators that Characterize the Level of Microcredits
Financing the establishment of a microenterprise	Dividend yield of the enterprise (V_1): $V_1 = V_2/V_3$, where V_2 is the average for a certain period (for example, the average for several years) the total amount of dividends and V_3 is the initial (at the beginning of the period) amount of equity of the enterprise	Share of microcredit in the structure of microenterprises' initial capital (V_4): $V_4 = 100V_5/V_6$, where V_5 is the amount of microcredit taken to finance the enterprise establishment and V_6 is the total amount of initial enterprise capital
Financing the further development of microenterprises	Percentage of growth in the total amount of the microenterprises capital (V_7): $V_7 = V_8/V_9$, where V_8 is the increase in assets of the enterprise during a certain period and V_9 is the total amount of enterprise capital at the period beginning	GenSeral indicator of microcredit intensity (V_{10}): $V_{10} = V_{11}/V_9$, where V_{11} is the amount of microcredit taken by the enterprise during a certain period
Financing activities aimed at the survival of microenterprises	Current liabilities coverage ratio (V_{12}): $V_{12} = V_{13}/V_{14}$, where V_{13} is the value of the current enterprise assets one year after microcredit reception and V_{14} is the amount of current liabilities of the enterprise one year after microcredit reception	General indicator of microcredit intensity (V_{15}): $V_{15} = V_{16}/V_{17}$, where V_{16} is the microcredit amount taken by the enterprise and V_{17} is the initial (at the time of microcredit obtaining) value of current enterprise assets

Regarding the relationship between the second pair of indicators presented in Table 2 above (the case of financing further development of the enterprise), it seems that, in this case, there is no reason to slow down the growth of the indicator of the microcredit's consequences. Therefore, we can assume that this regression dependence is linear.

It is worth mentioning that, in this case, it is possible to determine the indirect impact of the relative amount of microcredits on other indicators of microenterprises' performance, in particular, on the number of products sold by them and on the cost of paying the employees. For this purpose, we can present the model shown in Figure 2. Dotted arrows in this model indicate the possible existence of statistical dependencies between the corresponding indicators, and solid arrows are the determined dependencies.

At the same time, it should be noted that microcredits that are aimed at updating technologies are rarely used in Ukraine. Therefore, it can be assumed that the relative indicators shown in Figure 1 do not depend on microcredit intensity.

Eventually, regarding the third pair of indicators presented in Table 3, it can be assumed that the growth of the microcredit intensity to a certain extent will help companies out of the financial crisis. Therefore, we can assume that the relationship between these indicators is quadratic.

3.2. Identification and Modeling of Factors that Constrain the Microcredit of Small Enterprises

For those enterprises that did not attract microcredits during the accounting period, it is advisable to find out the reasons for this. Such clarification can take place based on a questionnaire survey of these enterprises' owners. At the same time, the factors that constrain microcredits can be placed in a certain sequence, as shown in Figure 3. Then, the level of each of these factors can be estimated as the share of microenterprises in which the owners indicated the presence of a certain factor in the total number of studied microenterprises that did not attract microcredits during the accounting period. Using the obtained results, it is possible to determine some indicators that characterize the studied sample of microenterprises, in particular, to assess the demand and microcredit accessibility. A distinction should be made between the physical availability of credits (i.e., the possibility of obtaining them) and the economic availability of loans (i.e., the attractiveness of loan conditions and other factors that determine the appropriate level of lending efficiency (e.g., low credit risk).

Among the factors that hinder the process of microcredits to small enterprises, special attention should be paid to the insufficient efficiency of microcredits from potential borrowers and insufficiently attractive repayment terms for granted loans. The selection of these factors is due to both their importance and the possibility of their modeling. At the same time, the terms of loans' repayment in the future will be deciphered as the terms set by the borrower for such repayment.

Modeling of these factors requires, in turn, modeling the processes of taking and repaying microcredits. At the same time, it is advisable to distinguish two ways of taking out loans (one-time and in parts) and two ways of accruing interest for using loans (accrual of complex and simple interest).

Let us first consider the case of a one-time loan and accruing compound interest on it. Taking a loan would be appropriate if the discounted stream of net profit as a result of taking loans increases:

$$\frac{P_0}{r} < \frac{P_1 \cdot (1 - \omega)}{r} \cdot \left(1 - \frac{1}{(1 + r)^{T_r}}\right) + \frac{P_1}{r \cdot (1 + r)^{T_r}}, \tag{3}$$

where P_0 and P_1 are the average values of the enterprise profit in accordance with the loan and after its taking and use ($P_1 > P_0$); r is the discount rate (capitalization) of the enterprise profit in shares of the unit; ω is the share of the company's profit, which goes to repaying the loan; and T_r is the full term of loan repayment.

Then, if the enterprise seeks to repay the loan as soon as possible, using all available profits (this desire may be due in particular to short loan terms), the criterion of the appropriateness of the loan can be presented as follows:
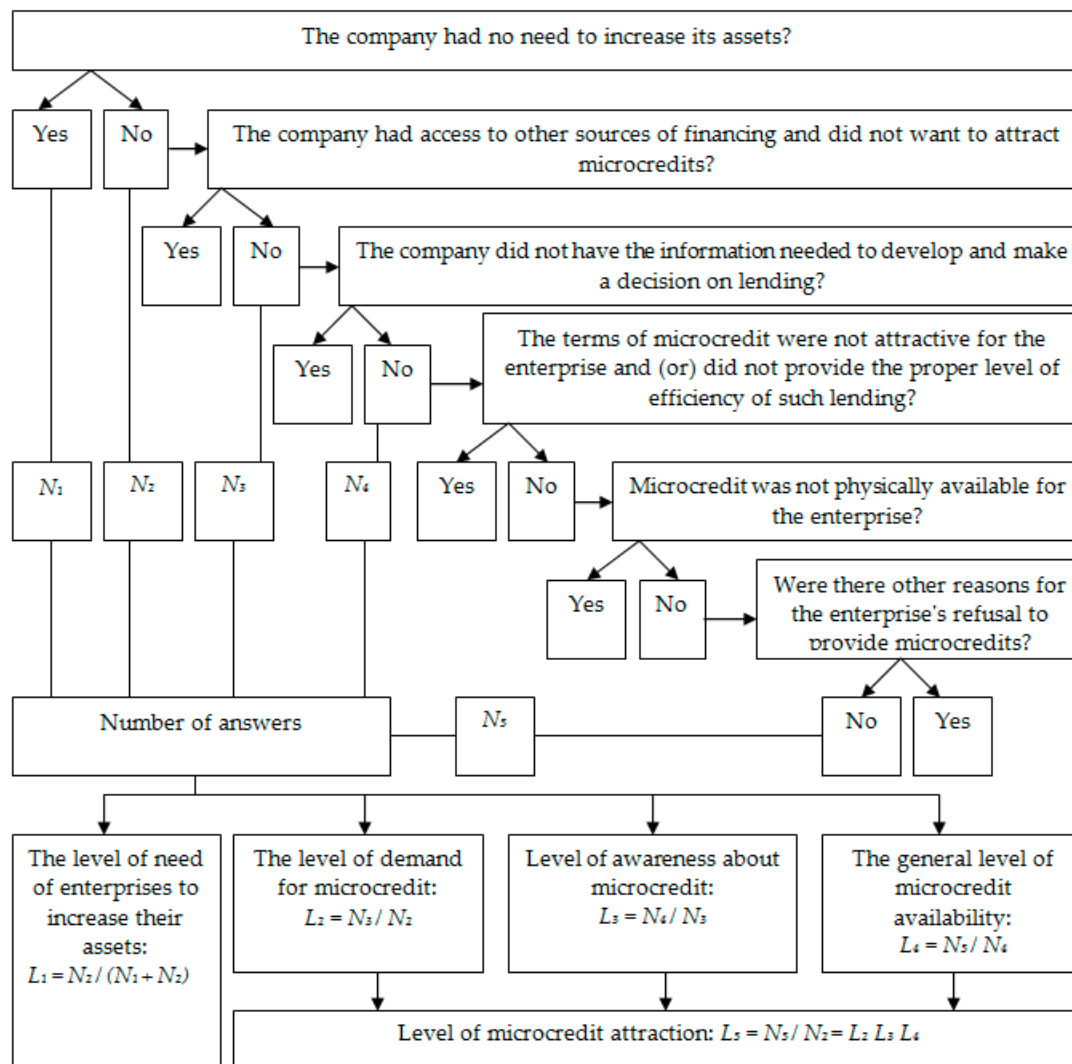
$$\frac{P_0}{r} < \frac{P_1}{r\cdot(1+r)^{T_r}} \tag{4}$$

Figure 3. The sequence of identification of factors that hinder the process of microcredit.

Note that, in this paper, indicators that have a time dimension will be measured in years. In particular, this applies to the maturity of the loan.

In turn, the full repayment period of the loan in case of its uniform return can be determined from the following equation:

$$\sum_{t=1}^{T_r} \frac{P_1}{(1+r_c)} = \frac{P_1}{r_c}\cdot\left(1 - \frac{1}{(1+r_c)^{T_r}}\right) = C, \tag{5}$$

where r_c is the loan interest rate in fractions of a unit and C is the amount of the taken loan.

From Equation (5), we obtain the following expression for determining the full repayment period of the loan T_r:

$$T_r = \log_{1+r_c}\left(\frac{P_1}{P_1 - C\cdot r_c}\right) \tag{6}$$

Thus, if a loan is taken out immediately and compound interest is accrued on it, the maximum loan repayment period set by the borrower will satisfy the loan recipient if this period exceeds the value of the indicator (6).

If simple interest is charged on the loan, the full repayment period of the loan will be determined from the following equation:

$$T_{cs1} \cdot P_1 = C + 0.5 \cdot C \cdot T_{cs1} \cdot r_c, \tag{7}$$

where T_{cs1} is the full repayment period of the loan, which is taken immediately and on which simple interest is accrued, and the value 0.5 C T_{cs1} r_c is the total amount of accrued interest on the loan.

From Equation (7), we obtain the following expression for determining the full repayment period of the T_{cs1} loan:

$$T_{cs1} \cdot = \frac{C}{P_1 - 0.5 \cdot C \cdot r_c} = \frac{1}{k - 0.5 \cdot r_c}, \tag{8}$$

where k is the ratio of profit P_1 to the loan amount C.

Therefore, if a loan is taken out immediately and simple interest is accrued on them, this loan will be attractive to a potential borrower if the following system of inequalities is met:

$$\begin{cases} P_0 \cdot (1+r)^{T_{cs1}} < P_1; \\ 1 \le T_{rm} \cdot (k - 0.5 \cdot r_c), \end{cases} \tag{9}$$

where T_{rm} is the maximum period for full repayment of the taken loan.

If the loan will accrue simple interest, but it is received over a certain period in equal parts, then the full repayment period of the loan will be determined from the following equation:

$$T_{cs2} \cdot P_1 = R_c \cdot T_{rc} + 0.5 \cdot R_c \cdot T_{rc}^2 \cdot r + 0.5 \cdot R_c \cdot T_{rc} \cdot T_{cs2} \cdot r_c, \tag{10}$$

where T_{cs2} is the full term of the loan repayment, which is obtained during a specified period in equal installments and charged with simple interest; R_c is value of each tranche of the loan ($R_c = C/T_{rc}$); and T_{rc} is the period during which the loan is being taken.

It is important that the right side of Equation (10) contains three addends, namely, the total amount of the loan, interest accrued during the period of receiving of tranches, and interest accrued during the repayment period of the taken loan. From Equation (10), we obtain the following expression for determining the full repayment period of the T_{cs2} loan:

$$T_{cs2} \cdot = \frac{R_c \cdot T_{rc} + 0.5 \cdot R_c \cdot T_{rc}^2 \cdot r_c}{P_1 - 0.5 \cdot R_c \cdot T_{rc} \cdot r_c} = \frac{1 + 0.5 \cdot T_{rc} \cdot r_c}{k - 0.5 \cdot r_c}, \tag{11}$$

Therefore, if the loan is taken out in equal parts over a certain period and simple interest is accrued on them, this loan will be attractive to the potential lender if the following system of inequalities is met:

$$\begin{cases} P_0 \cdot (1+r)^{T_{cs2}} < P_1; \\ 1 + 0.5 \cdot T_{rc} \cdot r_c \le T_{rm} \cdot (k - 0.5 \cdot r_c). \end{cases} \tag{12}$$

As it will be shown below, modeling factors that affect the attractiveness of lending can be useful in justifying government regulation of microcredits for small enterprises.

3.3. The Methodological Basis for Efficiency Evaluating of State Incentives for Microcredits for Small Enterprises

If the state or local authorities are interested in developing small businesses, they can make microcredits more attractive to potential borrowers. In particular, this can be done by partially or fully compensating interest on microcredits from the state or local budgets. It is also possible to compensate part of the principal amount of the microcredit. Later, we will consider the case of accrual of simple interest on a loan, since in Ukraine, this practice of accruing interest for microcredits prevails. Although, it should be noted that the case of accrual of compound interest does not fundamentally change the results obtained below (then, instead of expression (8), you need to use expression (6)). However, the resulting formulas are somewhat complicated. It should also be noted that, with small

(preferential) lending rates (and we will consider such rates in the empirical analysis), the results of calculations for simple and complex interest rates do not differ significantly.

Let us now define the general conditions under which microcredits become attractive. First, the system of inequalities (12) must be fulfilled for this purpose. It is worth mentioning that the inequality system (9) is a particular case (11) for $T_{rc} = 0$.

It should be noted that the first inequality of the system (12) can be represented as follows:

$$T_{cs2} \cdot = \frac{1 + 0.5 \cdot T_{rc} \cdot r_c}{k - 0.5 \cdot r_c} < \log_{1+r}\left(\frac{P_1}{P_0}\right), \tag{13}$$

or

$$r_c < r_{c1} = 2 \cdot \left(k \cdot \log_{1+r}\left(\frac{P_1}{P_0}\right) - 1\right) / \left(T_{rc} + \log_{1+r}\left(\frac{P_1}{P_0}\right)\right), \tag{14}$$

In turn, the second inequality of the system (11) can be represented as follows:

$$r_c \le r_{c2} = 2 \cdot (k \cdot T_{rm} - 1) / (T_{rc} + T_{rm}), \tag{15}$$

Therefore, the interest rate acceptable for a potential borrower of microcredit can be determined from this expression:

$$r_{ca} = \min\{r_{c1}, r_{c2}\}, \tag{16}$$

where r_{ca} is the maximum possible interest rate for a microcredit which is acceptable for a potential borrower, in fractions of a unit.

Then, having information about the r_{ca} rate averaged over the aggregate of microenterprises, government regulatory authorities can estimate the necessary amount of compensation by the state for interest on microcredits. However, there may be a situation where r_{ca} is negative. Then, there is a need for compensation from the state not only for the entire amount of interest for the microcredit but also for part of the principal amount of this loan. To determine this part, in the system of inequalities (12), take the zero value of r_{ca} and determine the value of *k*. This indicator, as noted above, is the ratio of profit P_1 to the amount of loan *C*. After the corresponding transformations, we get the following inequalities:

$$k > k_1 = 1 / \left(\log_{1+r}\left(\frac{P_1}{P_0}\right)\right), \tag{17}$$

$$k \ge k_2 = 1 / T_{rm}, \tag{18}$$

Accordingly, the minimum possible value of the indicator *k*, with $r_{ca} = 0$, obtaining an attractive microcredit will be determined from this expression:

$$k_a = \max\{k_1, k_2\}, \tag{19}$$

where k_a is the minimum possible value of the *k* indicator, with $r_{ca} = 0$, obtaining an attractive microcredit.

The practical application of the above models can be carried out during the evaluation of the state incentives' efficiency for microcredits to small businesses. For the purpose of this assessment, we can use the following formula:

$$E_s = \sum_{t=1}^{T_e} \frac{I \cdot \alpha_1}{(1 + r_s)^t} - I \cdot \alpha_2 = \frac{I \cdot \alpha_1}{r_s}\left(1 - \frac{1}{(1 + r_s)^{T_e}}\right) - I \cdot \alpha_2, \tag{20}$$

where E_s is a measure of the efficiency of budget spending on measures of the state incentives of microcredits for small enterprises; *I* is the total amount of investment in the development of microenterprises, at the expense of the microcredit; T_e is the average duration of operation of microenterprises; α_1 is the value of the tax payments and contributions for mandatory state social insurance that microenterprises shall pay, based on one monetary unit of investment in their

development; r_s is the discount rate for public investment, expressed as a unit fraction; and α_2 is the value of public expenditure on partial or full reimbursement of interests for microcredits and, if necessary, of their principal amount per currency unit of investment in the development of microenterprises.

In this case, the indicator α_1 should be calculated using the following formula:

$$\alpha_1 = \sum_{j=1}^{m} l_j \cdot v_j, \tag{21}$$

where m is the number of tax and other mandatory payments paid by microenterprises; l_j is the tax base of j payment per one monetary unit of investment in the development of microenterprises; and v_j is the rate of j payment.

When government expenditures on microcredit incentives are distributed over time for each microenterprise, these expenditures should be discounted. This circumstance can be taken into account by adjusting the value of the indicator α_2 in Formula (20).

4. Empirical Analysis

4.1. Dynamics Analysis of Microenterprises' Performance Indicators in Ukraine

Currently, the Ukrainian economy is undergoing certain structural changes; in particular, there is a growing demand for services and other economic activities that do not require large-scale enterprises. This circumstance allows us to draw a preliminary conclusion about the potential for the development of micro-entrepreneurship in Ukraine. However, this development has occurred in some years, as evidenced by the data presented in Table 4.

According to the data presented in Table 4, the nature of changes in the main performance indicators of microenterprises in Ukraine in the period from 2013 until 2018 differs for different indicators and different periods. In particular, the number of microenterprises had a general downward trend during 2013–2016, followed by an increase over the next two years. Along with it, the added value and investment in microenterprises in Ukraine have been mainly growing for years. The trends of changes in the microenterprises' main indicators in Ukraine for 2013–2018 are clearly shown in Figure 4. In particular, this figure shows that most index values are less than 1.00. This is due, in particular, to the fact that, because of the military-political conflict that began in 2014 in Ukraine, in 2014–2016, there was a significant decline in its economy.
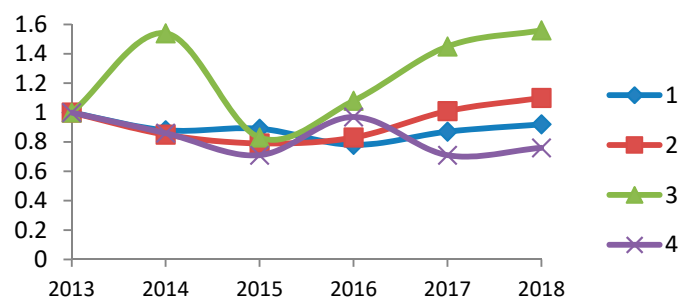

Figure 4. Indexes of individual indicators of microenterprises in Ukraine in 2013, where 1 is the number of microenterprises, 2 is the number of products sold, 3 is added value, and 4 is total assets [74,75].

Of particular interest is information about the value of microenterprises' performance indicators in Ukraine per employee at these enterprises. Taking into account the data presented in Table 5, most of these indicators increased during 2013–2018 (except for the indicator of total assets per employee). Consequently, during the period under study, there was an increase in the efficiency of human resource use of microenterprises in Ukraine. This increase was particularly significant in terms of added value (approximately 76%).

Table 4. Key performance indicators of microenterprises of Ukraine in 2013–2018 [1].

Names of Indicators and Their Units of Measurement	Value of Indicators by Year					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
1. The number of microenterprises, units	318,477	278,922	284,241	247,695	278,102	292,772
2. Number of employees, thousands	795.3	723.5	691.4	642.7	714.6	704.3
3. Number of products sold at comparable prices, mln. UAH [2]	216,111	184,731	171,777	179,835	217,620	238,750
4. Added value in comparable prices, mln. UAH	42,164	64,900	34,947	45,665	61,263	65,687
5. Capital investment at comparable prices, mln. UAH	9284	6951	5458	7962	9773	9322
6. Total assets in comparable prices, mln. UAH	917,381	785,165	649,631	889,461	649,370	694,485
7. Profit before tax in comparable prices, mln. UAH	15,030	14,970	18,497	18,871	18,524	20,682

[1] Sources of information: [74–76]; [2] UAH—Ukrainian hryvnia, the national currency of Ukraine.

Table 5. Key performance indicators of Ukrainian microenterprises from 2013 till 2018 per employee at these enterprises [1].

Names of Indicators and Their Units of Measurement	Value of Indicators by Year					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
1. The number of microenterprises, units	0.400	0.386	0.411	0.385	0.389	0.416
2. Number of products sold at comparable prices, mln. UAH [2]	0.272	0.255	0.248	0.280	0.305	0.339
3. Added value in comparable prices, mln. UAH	0.053	0.090	0.051	0.071	0.086	0.093
4. Capital investment at comparable prices, mln. UAH	0.012	0.010	0.008	0.012	0.014	0.013
5. Total assets in comparable prices, mln. UAH	1.154	1.085	0.940	1.384	0.909	0.986
6. Profit before tax in comparable prices, mln. UAH	0.019	0.021	0.027	0.029	0.026	0.029

[1] Sources of information: [74–76]; [2] UAH—Ukrainian hryvnia, the national currency of Ukraine.

It is also important to assess the impact of microenterprises on the economy of Ukraine as a whole and to analyze the dynamics of this impact. As follows from the data presented in Figure 5, this impact on the considered indicators during 2013–2018 did not exceed 12%.
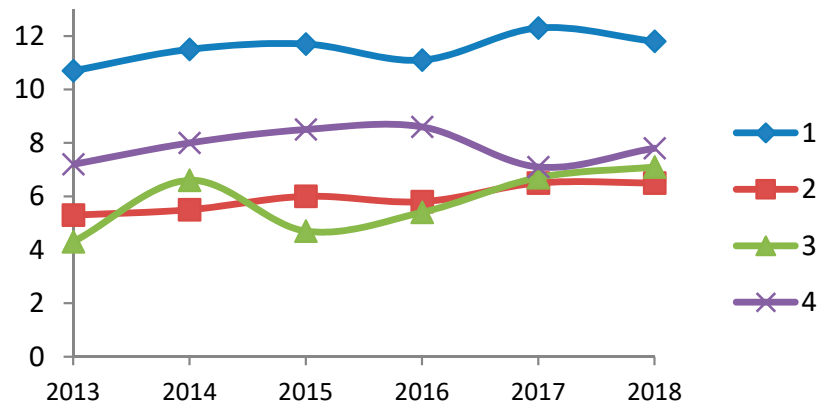

Figure 5. The share of microenterprises' contribution to the total value of individual indicators of the Ukrainian economy, %, where 1 is the number of employees, 2 is products sold, 3 is added value, and 4 is profit before tax [74].

However, as shown in Figure 4, there is a tendency to increase the influence of microenterprises on the Ukrainian economy. In particular, during 2013–2018, the share of added value which was created by microenterprises in the total value added increased from 4.3% to 7.1%.

4.2. Calculation of Microcredit Efficiency Indicators for Ukrainian Microenterprises

To assess the microcredit efficiency and availability in Ukraine, we surveyed the owners of Ukrainian microenterprises belonging to three industries, namely retail trade, construction, and catering. The following stages of input information collection were performed: (1) six regions of Ukraine were selected, which represent all its macro-regions-west (Lviv and Zakarpattia regions), center (Dnipropetrovsk region), north (Chernihiv region), east (Donetsk region), and south (Mykolaiv region); (2) two cities were randomly selected in each region; (3) 100 small enterprises were randomly selected in each city, and with the support of local authorities, they sent out questionnaires (a total of 1200 questionnaires); and (4) 604 completed questionnaires were received and processed.

It should be noted that, in Ukraine, the amount of microcredit for enterprises, as a rule, does not exceed 500 thousand UAH (approximately 20 thousand US dollars). At the same time, the interest rate on microcredits largely depends on the individual characteristics of the borrower (in particular, the risk of its activities), but on average, it is 1.5 times higher than on ordinary credits. There is also a government microcredit program, where interest rates are about twice lower than the average [6]. However, access to microenterprises of this program is still significantly limited, in particular, due to high borrowers' requirements.

As noted above, during the selection of indicators for evaluating the efficiency of microcredits for Ukrainian microenterprises, the purpose of such lending should be taken into account. In particular, the goal may be to finance the establishment of a microenterprise.

The survey showed that 106 microenterprises engaged in retail were formed during 2015. Meanwhile, 62 of these enterprises used microcredits to start their activities. Table 6 shows the average values of the dividend yield indicator (I_d), depending on the share of microcredits in the structure of microenterprises' initial capital (I_m).

From the data presented in Table 5, it is evident that, in 2016 and 2017, I_d grew to a certain I_m value and, then, that there was a drop in I_d values. At the same time, this was not happening in 2018 and 2019. This may be due to the fact that microenterprises with a high I_m value had large loan repayments during the period of 2016–2017 and, consequently, could not provide significant dividend payouts.

To test Hypothesis 1, we will consider a regression relationship of this type:

$$I_d = \beta_0 + \beta_1 \cdot I_m + \beta_2 \cdot I_m^2, \tag{22}$$

where β_0, β_1, and β_2 are the coefficients of the regression equation.

If Equation (22) is statistically significant, then according to Formula (2), the relative indicator for assessing the efficiency of microcredits, in this case, will be a linear function of *Im*:

$$I_{rc1} = \frac{I_d - \beta_0}{I_m} = \beta_1 + \beta_2 \cdot I_m, \tag{23}$$

where I_{rc1} is a relative indicator of assessing the efficiency of microcredit in the case of financing the establishment of enterprises.

As follows from the data in Table 7, the relation of the type (22) for all the years is statistically significant. Therefore, Hypothesis 1 is true. Accordingly, the relative indicator for assessing the efficiency of microcredits, in this case, is a linear function of I_m. The numerical values of this indicator, calculated using Formula (23), are shown in Table 8. As follows from Table 8, the I_{rc1} indicator in the period of 2016–2019 declined with increasing I_m.

Regarding the assessment of the efficiency of microcredits for the further development of microenterprises, among the studied trade microenterprises during 2018–2019, 79 microenterprises received microcredits to finance their development. The relationship between the general indicator of the microcredit intensity and the percentage of growth in the total amount of microenterprises' capital was established (Figure 6a). The results of the regression analysis of this relationship are presented in Table 9.
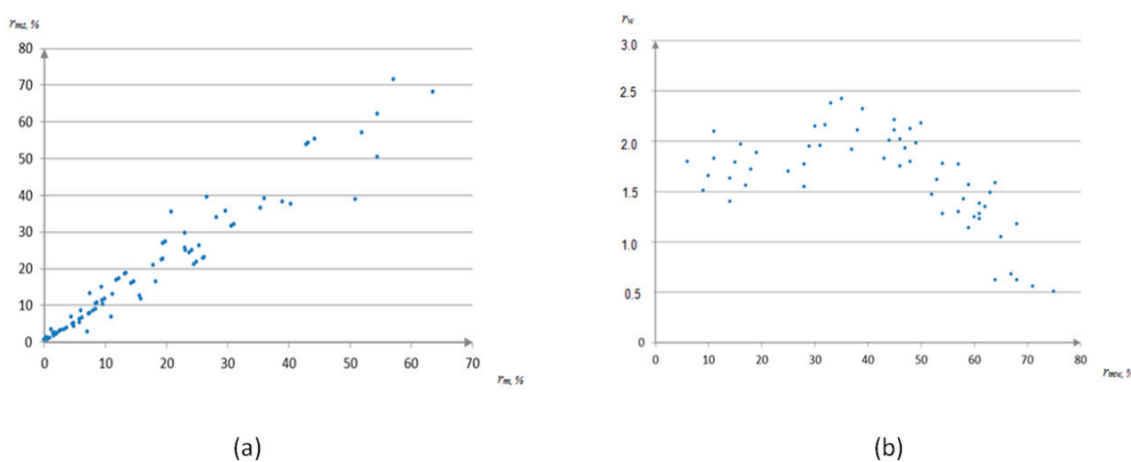

(a)   (b)

Figure 6. A graphical representation of the relationship between individual indicators of microenterprises: (**a**) between the general indicator of the microcredit intensity (r_m) and the percentage of growth in the total amount of capital of microenterprises (r_{ms}); (**b**) between the partial indicator of the microcredit intensity (r_{mw}) and the current liabilities coverage ratio a year after taking a microcredit (r_w).

Regarding the assessment of the efficiency of microcredits taken to overcome the financial crisis, for this purpose, among the studied trade microenterprises, 58 microenterprises during 2018 received microcredits to overcome the crisis of insolvency. A relationship was established between the partial indicator of the microcredit intensity and the current liabilities coverage ratio one year after taking the microcredit (Figure 6b). The results of the regression analysis of this relationship are presented in Table 9.

Table 6. The average value of the dividend yield indicator (I_d), depending on the share of microcredits in the structure of microenterprises' initial capital (I_m) [1].

Number of Years of Business Activity	Shares of Microcredit in the Structure of Microenterprises' Sources of Establishment, %										
	0	<10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	>90
1	0.077	0.082	0.084	0.080	0.092	0.086	0.075	0.068	0.049	0.034	0.022
2	0.098	0.112	0.118	0.127	0.122	0.124	0.120	0.115	0.117	0.109	0.085
3	0.078	0.085	0.086	0.108	0.126	0.136	0.142	0.146	0.151	0.146	0.147
4	0.099	0.111	0.115	0.129	0.128	0.133	0.138	0.148	0.150	0.152	0.157

[1] Sources of information: the results of the survey and [77].

Table 7. Results of the regression analysis of the relationship between dividend yield indicator (I_d) and the share of microcredits in the structure of microenterprises' initial capital (I_m).

Number of Years of Business Activity	Regression Coefficient			R^2	F-Value	t-Value			K-S [1]	White Test [2]	
	β_0	β_1	β_2			$t_{\beta\,0}$	$t_{\beta\,1}$	$t_{\beta\,2}$		R^2	F-Value
1	0.079	0.099	−0.172	0.642	31.517	22.167	3.992	4.815	0.128	0.058	0.708
2	0.097	0.127	−0.146	0.547	22.398	20.279	3.259	3.573	0.131	0.046	0.813
3	0.077	0.152	−0.078	0.714	48.405	18.358	4.764	2.257	0.120	0.049	1.017
4	0.096	0.102	−0.037	0.609	28.270	19.098	3.147	2.416	0.103	0.051	0.940

[1] K-S—Kolmogorov–Smirnov test (showed that, by all indicators, the set of values corresponds to the normal law of distribution). [2] Regression indicators between regression residual squares and independent variables.

Table 8. The value of the relative efficiency indicator of microcredits in the case of financing of the microenterprises' establishment depending on the share of microcredit in the structure of sources of initial capital.

Number of Years of Business Activity	Average Shares of Microcredit in the Structure of Microenterprises' Initial Capital, %									
	5	15	25	35	45	55	65	75	85	95
1	0.090	0.073	0.056	0.039	0.022	0.004	−0.013	−0.030	−0.047	−0.064
2	0.120	0.105	0.091	0.076	0.061	0.047	0.032	0.018	0.003	−0.012
3	0.148	0.140	0.133	0.125	0.117	0.109	0.101	0.094	0.086	0.078
4	0.100	0.096	0.093	0.089	0.085	0.082	0.078	0.074	0.071	0.067

Table 9. Results of a regression analysis of dependencies between individual performance indicators of microenterprises.

The Names of the Dependencies	Dependency Forms	Regression Coefficient			R^2	F-Value	t-Value			K-S [1]	White Test [2]	
		β_0	β_1	β_2			$t_{\beta 0}$	$t_{\beta 1}$	$t_{\beta 2}$		R^2	F-Value
General indicator of the microcredit intensity and the percentage of growth in the total amount of capital	Linear	0.472	1.130	-	0.815	217.625	0.412	18.508	-	0.139	0.116	1.273
Partial indicator of the microcredit intensity and current liabilities coverage ratio a year after taking a microcredit	Linear	2.051	−0.011	-	0.297	4.912	8.349	2.098	-	0.151	0.097	1.237
	Quadratic	0.879	0.064	−0.001	0.806	98.653	6.846	8.914	10.884	0.151	0.074	0.368

[1] K-S—Kolmogorov–Smirnov test (showed that, by all indicators, the set of values corresponds to the normal law of distribution). [2] Regression indicators between regression residual squares and independent variables.

As follows from the data in Table 8, the first of the considered dependencies is described fairly well by a linear function with a coefficient for a variable that is approximately equal to 1.13. According to expression (2), this coefficient simultaneously characterizes the value of the relative indicator of the microcredit efficiency for the further development of the studied enterprises. Meanwhile, for these enterprises, the average relationship of microcredits received during 2018–2019 to the total capital at the end of 2019 is 0.21. Consequently, the share of this capital formed as a result of microcredits received during 2018–2019 is equal to the product of 1.13 by 0.21, or 0.237. Thus, the above Hypothesis 2 proved to be true. Thus, microcredits, in general, have a positive impact on the sustainable development of considered small Ukrainian enterprises. The same applies to Hypothesis 3, as shown in Table 10.

Table 10. The results of regression analysis of dependencies between the percentage relationship of the number of microcredits in the initial total amount of capital and individual performance indicators of microenterprises.

Names of Dependent Variables	R^2	*F*-Value
Capital productivity	0.148	3.256
Energy intensity of products	0.169	2.986
The share of clean energy in the structure of energy sources	0.097	1.504
Labor productivity	0.125	1.915
Average salary per employee	0.108	1.740

According to Table 10, there is no linear relationship between the studied indicators. Therefore, the coefficient 0.237 that was calculated above, according to the model shown earlier in Figure 2, characterizes the impact of microcredits on all the absolute indicators considered in this model. This involves the volume of production, the number of employees, and the total cost of labor in the studied small enterprises.

From the data shown in Table 9, it also follows that Hypothesis 4 stated above is justified. In other words, there is a statistical relationship between the studied indicators, but it is not linear but rather quadratic. Consequently, attracting microcredits in relatively small amounts can be useful in overcoming the existing insolvency crisis in microenterprises.

4.3. Identification of the Main Factors Hindering the Process of Microcredit in Ukraine and Assessing of Their Demand and Availability

Among other things, in the process of a questionnaire, the questions presented in Figure 3 were answered. These responses were provided only by the owners of microenterprises that had not received microcredits in the past five years (307 microenterprises were found, which is 50.8% of the total number of microenterprises that submitted completed questionnaires). The received responses are summarized in Table 11.

According to the data presented in Table 11, the majority of microenterprises (from 62.07% to 72.55% depending on the sectors of the economy) named the insufficient attractiveness and low efficiency of microcredits as the main reasons for companies' refusal to obtain microcredit. At the same time, among other reasons for refusal, the high risk of microcredit was named.

Table 12 presents the results of assessing the demand and availability of microcredits in the sample of microenterprises. The formulas shown in Figure 3 were used for the calculations.

As follows from the data presented in Table 12, the level of microcredits' demand for the surveyed enterprises is extremely high. However, in the construction and catering industries, only 58% of enterprises that felt the need for microcredits eventually received them: in the field of trade of such enterprises, about 64%, which may be due to higher returns of capital in this sector of the Ukrainian economy.

Table 11. The summary of respondents' responses to the question about the reasons for refusing to receive microcredits.

Wording of Questions	Number of Positive Responses by Industry			Percentage of Positive Responses by Industry, %		
	Trade	Construction	Catering Service	Trade	Construction	Catering Service
The company did not need to increase its assets?	17	2	5	9.77	3.92	6.10
The company had access to other sources of financing and did not want to attract microcredits?	9	1	2	5.17	1.96	2.44
The company did not have the information needed to develop and make a decision on lending?	13	2	4	7.47	3.92	4.88
The terms of microcredit were not attractive for the enterprise and (or) did not provide the proper level of efficiency of such lending?	108	37	56	62.07	72.55	68.22
Microcredit was physically not available for the enterprise?	18	6	10	10.34	11.76	12.20
Were there other reasons for the enterprise's refusal to provide microcredits?	9	3	5	5.17	5.88	6.10

Table 12. Demand indicators and microcredit availability results according to the studied sample of microenterprises.

Indicators	Trade	Construction	Catering Service
The level of microcredit demand	0.966	0.951	0.925
The general level of microcredit availability	0.637	0.584	0.575

4.4. Justification of the Feasibility of State Incentives for Microcrediting of Ukrainian Enterprises and Assessment of the Role of such Incentives in Overcoming the Negative Socioeconomic Consequences of the COVID-19 Pandemic

As already mentioned above, state incentives for microcredits to small businesses may consist primarily of full or partial compensation of interests on microcredits from the state or local authorities. It is also possible to compensate part of the principal amount of the microcredit. In this case, two cases should be considered:

(1) when there are normal operating conditions for microenterprises and
(2) when there are quarantine restrictions on such functioning imposed by state and local authorities as a result of the COVID-19 pandemic.

Let us first consider the first case, provided that enterprises receive microcredits simultaneously and not in several tranches (respectively, the T_{rc} in Formulas (14) and (15) will then be zero).

It should be taken into account that, in Ukraine, the total amount of taxes and other mandatory payments paid by microenterprises are calculated using this general formula:

$$P_{to} = I_n \cdot t_1 + L_w \cdot t_2, \tag{24}$$

where P_{to} is the amount of taxes and other mandatory payments paid by microenterprises; I_n is the income of the microenterprise; t_1 and t_2 are the rates of corresponding payments; and L_w is the number of employees of the microenterprise.

Taking into account the data above, Table 13 presents the initial data and results of the assessment of the efficiency of measures for partial compensation of interests on microcredits to Ukrainian enterprises at the expense of state funds.

As follows from the data shown in Table 13, the value of the maximum microcredit rate acceptable for microenterprises is positive. Therefore, in this case, the state should only partially reimburse the interest for the microcredit and its principal amount should not be reimbursed. Meanwhile, the values of the budget efficiency indicators for such compensation are positive. This compensation is therefore appropriate. It should also be noted that the value of the relationship of the average efficiency of budget expenditures for reimbursement of interests for microcredits to the value of such expenditures exceeds 3. Therefore, this value is quite high. Therefore, improving the conditions of microcredits through budget financing can significantly increase its attractiveness for microenterprises without significantly reducing the budgetary efficiency of microcredits.

Let us now determine the role that partial compensation by the state for interest on microcredits or their principal amount will play in overcoming the negative economic consequences of the COVID-19 pandemic. First of all, we are referring to prevent mass closure of microenterprises. This can be achieved in particular through reduced microcredits for the costs that microenterprises are forced to bear in the conditions of temporary termination of their activities.

Let us assume that a certain microenterprise ceases to exist completely and then reopens after the end of the pandemic. Then, the company will require a certain period to start its activity again adequately. If this period was longer than the full repayment of the taken microcredit to reimburse the microenterprise's expenditure during the quarantine, it would be more profitable for the enterprise to continue to exist. The job positions would be preserved accordingly.

Certainly, these considerations do not take into account the additional costs of microenterprise owners associated with their closure and reestablishment. However, the presence of these costs only increases the attractiveness of microcredits for microenterprises' reimbursing expenditures during the quarantine.

Taking into account the data above, Table 14 shows the initial data and results of calculating the full repayment period of microcredits taken to reimburse microenterprises' expenditure during quarantine under various government support options.

Table 13. Input data and assessment results of the measuring efficiency for partial compensation of interest on microcredits for Ukrainian enterprises within the government financing.

The Names of the Indicators	Designation, Calculation Method, Formula Number	Value of Indicators by Activities		
		Trade	Construction	Catering Service
1. Average expected rate of profit growth	P_1/P_0	1.74	1.62	1.82
2. The relationship of the expected amount after repayment of the microcredit profit to the amount of this loan	k	0.35	0.40	0.34
3. The annual capitalization rate	r	0.20	0.20	0.20
4. The annual rate of interest for microcredits in fractions of a unit	r_c	0.22	0.22	0.22
5. The maximum time limit of full repayment of the microloan, in years	T_{rm}	3.00	3.00	3.00
6. The first boundary which was acceptable for microenterprise microcredit rates in fractions of a unit	r_{c1}, (14)	0.04	0.04	0.07
7. The second boundary which was acceptable for microenterprise microcredit rates in fractions of a unit	r_{c2}, (15)	0.10	0.40	0.04
8. The maximum limit of the microcredit rate acceptable for microenterprises in fractions of a unit	r_{ca}, (16)	0.04	0.04	0.04
9. The amount of tax and other obligatory payments paid by microenterprises, based on one monetary unit of investment in their development	α_1	0.63	0.70	0.61
10. The amount of public expenditure on partial reimbursement of interests for microcredits per one monetary unit of investment in the development of microenterprises at a reduced rate of microcredits, which is 3% per year	α_2	0.82	0.82	0.82
11. The expected average duration of microenterprises' functioning	T_e	10.00	10.00	10.00
12. The average efficiency of budget expenditures for partial reimbursement of interests for microcredits per microenterprise, in thousand UAH [1]	E_s, (20)	354.15	454.98	288.29
13. The average sum of reimbursement percent for microcredits per microenterprise, thousand UAH	$I\alpha_2$	105.50	121.30	92.40
14. The relationship of the average efficiency of budget expenditures for partial reimbursement of interests for microcredits to the size of such expenditures	$E_s/(I\alpha_2)$	3.34	3.82	3.20

[1] UAH—Ukrainian hryvnia, the national currency of Ukraine.

Table 14. Input data and results of calculation of the full maturity of microloans taken to reimburse the expenses of microenterprises during quarantine under different options of state support.

The Names of the Indicators	Designation, Calculation Method, Formula Number	Value of Indicators by Activities		
		Trade [1]	Construction	Catering Service
1. The expected period during which microenterprises will receive microcredits in parts for reimbursement of expenses during quarantine, in years	T_{rc}	0.20	0.20	0.20
2. the annual interest rate for microcredits, taking into account the partial reimbursement by the state of these percentages in fractions of unit	r_c	0.04	0.04	0.04
3. The relationship of the expected amount after repayment of the microcredit profit to the amount of this loan				
3.1. In case of full payment of the principal amount of the loan by the borrowers	k	1.94	1.91	1.92
3.2. In case of repayment of 50% from the principal amount of the loan at the expense of budget funds	$k/(1-0.5)$	3.88	3.82	3.84
4. The period of full repayment of the microcredit, in years:	T_{cs2}, (11)			
4.1. In case of reduced rates of microcredit without compensation of part of the principal amount of the loan		0.52	0.53	0.53
4.2. In case of reduced rates of microcredit with compensation of part of the principal amount of the loan		0.26	0.26	0.26
4.3. In case of the general rates of microcredits without compensation of part of the principal amount of the loan		0.56	0.57	0.57
4.4. In case of the general rates of microcredits with compensation of part of the principal amount of the loan		0.27	0.28	0.27

[1] Microenterprises that trade in those goods, the sale of which is prohibited during the quarantine in Ukraine.

As it is shown in Table 14, with the available basic data, the full repayment period for microcredits which was taken by enterprises for reimbursement of expenses during the quarantine period is about three months. This period does not exceed the one for enterprises to reestablish their activities adequately. Therefore, microcredits, in this case, are undoubtedly profitable. However, this conclusion is fair only if the state reimburses half of the principal amount of microcredit. In doing so, the state's reimbursement of interest on microcredits, in this case, does not have a significant impact on the repayment period of microcredits.

5. Discussion

The conducted research has shown that assessing the efficiency of microcredits for small businesses is a complex task which requires the use of a system of appropriate indicators. These indicators can be grouped by various criteria, in particular, by users of information about the level of efficiency of microcredit, by the method of constructing indicators, by the goals of microcredit, and so on. The indicator of the effects of microcredits and the indicator that measures the level (amount) of microcredit should be preselected. Taking into account these statements makes it possible to improve the existing methodological principles of evaluating the microcredit efficiency [27,37,38].

For those enterprises that do not attract microloans during the accounting period, it is advisable to find out the reasons for the rejection. Such clarification can take place based on a questionnaire survey of these enterprises' owners. At the same time, the factors that constrain microcredits can be placed in a certain sequence and the magnitude of the impact of each of these factors on the refusal of enterprises from microcredit can be estimated. These results represent a further development of the ideas presented in [52–54] and have practical significance.

Among the factors that hinder the process of microcrediting to small enterprises, special attention should be paid to the insufficient efficiency of microcrediting from potential borrowers and insufficiently attractive repayment terms for granted loans. This factor is reflected in the insufficient growth of the enterprise's profit due to microcredit. The second factor is reflected in particular in the too-short terms for which the microcredit is provided.

The choice of indicators that will characterize the consequences and level of microcredit primarily depends on the purpose of the microcredit. In particular, it is appropriate to identify three main goals: financing the establishment of a microenterprise, financing the further development of a microenterprise, and financing activities aimed at the survival of a microenterprise. Note that, in the works devoted to the evaluation of the microcredit efficiency [20,21], the definition of the objectives of microcredit is not always a priority.

The conducted study showed a significant impact of microcredits on the financial and economic performance of microenterprises in Ukraine. In particular, the existence of a quadratic relationship between the share of microcredits in the structure of microenterprises' sources of establishment and their dividend yield is established. At the same time, those Ukrainian microenterprises that have a larger share of microcredits in the structure of microenterprises' sources of the establishment have higher dividend yields since the third year of its operation. Thus, the effect of financial leverage has an exceptionally positive effect, starting from the third year of microenterprise activity. Note that this result is slightly different from the results of the studies described in [41,42].

We also found a linear growing relationship between the general microcredit intensity and the percentage of growth in the total amount of microenterprises' capital. This indicates that microcredits in general ensure the sustainable development of microenterprises. Thus, our results confirm the conclusions presented in [30–32] but contradict the results presented in [33].

Consequently, those enterprises that attract larger relative amounts of microcredit grow faster on average than those microenterprises that attract smaller amounts of microcredit. Meanwhile, the level of microcredit does not have a statistically significant impact on the indicators of capital productivity, labor productivity, and average wages of employees of enterprises. This may happen since Ukrainian enterprises do not use microcredits as a source of financing for technological changes.

Besides, a quadratic dependence between the partial indicator of the microcredit intensity and current liability coverage ratio year after taking a microcredit was established for the investigated selection of Ukrainian microenterprises. Thus, attracting microcredits in relatively small amounts can be useful in overcoming the existing insolvency crisis in microenterprises. This pattern is beyond the work of other researchers who have studied microcredit efficiency [22,23].

In general, a conducted study showed that the microcredit impact on the sustainable development of Ukrainian small enterprises is ambiguous. In particular, according to some indicators, this influence is present and, according to others, it is absent. The indicators that recorded the microcredit impact on the sustainable development of the surveyed enterprises include the total amount of capital of enterprises, the volume of manufactured products, and the number of employees. With the increase in the volume of microcredit, there is an increase in these indicators. However, microcredits do not affect the average wage of employees. There was also no impact of microcredits on the energy intensity of products of small Ukrainian enterprises and the share of net energy in the structure of energy consumption of these enterprises. Therefore, the government of Ukraine should consider the possibility of extending the practice of preferential microcredit to households implementing energy-saving measures [18,19] in the case of small enterprises.

The survey showed that the majority of studied Ukrainian microenterprises (62.07–72.55%, depending on the economy sectors) singled out the lack of attractiveness and efficiency of microcredits as the main reason for refusing to receive microcredits. The study has shown the feasibility of partial compensation by the state for interests on microcredits for small businesses. Therefore, improving the conditions of microcredits through budget financing can significantly increase its attractiveness for microenterprises without significantly reducing the budgetary efficiency of microcredits. Also, the use of well-founded reduced mechanisms for microcredits can provide significant support to Ukrainian microenterprises in the context of the COVID-19 pandemic.

6. Conclusions

In this work, we assessed the microcredit efficiency and availability to small Ukrainian enterprises and justified the need to strengthen government regulation of this lending. The obtained results allowed us to deepen our understanding of the complex patterns that occur in the process of microcredits to small businesses. The methodological basis for assessing the efficiency of microcredits has been improved, in particular, the method of such assessment based on the selection of indicators of performance and the level of microcredits, followed by their comparison and establishment of dependencies between them. The practical use of the proposed method has shown that microcredits in Ukraine mainly have a positive impact on the development of small businesses and, thus, contribute to the sustainable development of the Ukrainian economy. However, this impact could be enhanced by state incentives for microcredits, which is particularly relevant in the context of the COVID-19 pandemic.

7. Limitations and Prospects for Further Research

The assessment of the efficiency of microcredits of enterprises performed in this work was carried out mainly from the point of view of the owners of these enterprises as well as the state (regarding the payment of taxes by enterprises). At the same time, it is possible to assess the efficiency of microcredits from the side of institutions that provide microcredits and other interested parties. Besides, alternative ways of financing the development of microenterprises, in particular, the accumulation and use of their profits, remained out of consideration. Also, when assessing government support for microcredits, a partial case was considered when the enterprise repays the credit as soon as possible, which meets criterion (4). In the future, it is also advisable to consider a more general case, which meets criterion (3). Eventually, the study involved only relatively successful microenterprises that did not go bankrupt as a result of borrowing. Concerning bankrupt microenterprises, the formation of an array of information about them is complicated by the fact that these enterprises are no longer working

and that it is not possible to conduct a survey. Therefore, the question of the risk of microcrediting to small businesses requires further research.

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