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FINANCIAL POTENTIAL FOR EXPANDING THE OPPORTUNITIES OF A SMALL ENTERPRISE UNDER THE CONDITIONS OF SUSTAINABLE DEVELOPMENT

ABSTRACT

This study focuses on the development of a macroeconomic model for assessing the financial potential of small enterprises, in particular in the context of their impact on value added. Most enterprises need financing for their current operations, acquisition of fixed assets and implementation of growth strategies. However, the existing assessment methods in the scientific literature are limited in their comprehensive reflection of the impact of entropy. In our study, we applied linear multivariate regression, which made it possible to describe the impact of financial capacity on small business development, in particular, in terms of added value. The results of the study are particularly relevant for small businesses in countries such as Austria, Belgium, Croatia, Germany, France, Italy, Spain, Poland, Portugal, and Slovakia, where the model demonstrates efficiency. We have noted that in Ukraine, on the contrary, efficiency is modelled primarily due to the weaker correlation of indicators. That is why additional factors, including non-economic factors from the informal sector (e.g., shadow financial flows, information asymmetry, poor infrastructure, corruption, etc.), were extremely helpful in assessing the financial potential and impact on small businesses in Ukraine.

Keywords: business, value-added, modelling, financial potential, small businesses, macroeconomic model, sustainable development, funding

JEL Classification: E22, E37

INTRODUCTION

Small business plays an extremely important role in promoting economic development in the world, especially in rural areas, which significantly contributes to the creation of jobs and providing employment opportunities at the local level, which is extremely important for ensuring sustainable development. These businesses are also known for their flexibility in adapting to market changes, fostering innovation and introducing new products and services. In addition, small businesses have a significant impact on the local economy. They help create a multiplier effect by keeping money flowing in the local economy and supporting other local businesses. They also foster increased competition, resulting in a more diverse and dynamic business environment. In general, small enterprises are important for both local and macroeconomic development (Dvigun et al., 2022; Sumets et al., 2022a; 2022b). Therefore, for forecasting the economic growth of a specific country or region, it is important to have an adequate methodology for modelling the development of small businesses at the macro level. One of the key indicators for measuring the performance and potential of small businesses at the macro level is value added. Value added is the difference between the total cost of a company's products and the cost of resources used in production. It actually quantifies the economic value that a company adds to a product or service in the manufacturing process. Thus, the empowerment of small businesses through the analysis of sustainable financial potential is important for promoting economic development at both the local and macroeconomic levels. Such analysis can provide valuable information about the productivity and potential of these enterprises, which will ultimately contribute to overall economic growth and prosperity. Modelling the value added of small businesses at the

macro level is important for several reasons. First, it helps in the development of effective economic policy by understanding the contribution of small businesses to the economy as a whole. Second, it allows cross-sectoral analysis, providing an understanding of the overall ecosystem and the productivity of individual agricultural sectors. This analysis helps policymakers and industry leaders identify areas with potential for growth and innovation.

Forecasting economic growth is another key benefit of modelling the value added of small businesses at the macro level. By understanding the potential impact of policy changes on small businesses, forecasts can be more accurate and tailored to support sustainable growth. In addition, analyzing the contribution of small businesses to the economy as a whole can help improve national competitiveness. This enables policymakers and industry leaders to develop strategies that increase the competitiveness of the agricultural sector, ultimately benefiting the entire economy.

In this context, the determination of the main factors affecting the formation of added value is important for the development of appropriate methodologies for the development of small businesses. Factors such as credit, equity and liabilities play a significant role in the formation of value-added, as they are the sources of finance that small and medium-sized businesses use to acquire the resources needed for production.

Correlation and regression analysis were conducted using a linear multivariate regression model to understand the impact of credit volume, equity, and liabilities on the value added of small and medium-sized businesses. This analysis provides valuable information on how financial capacity affects the added value of small businesses, ultimately contributing to their strengthening and sustainable development Abubakar (2017).

The article emphasizes the importance of sustainable development Hak et al. (2016), but it is necessary to clearly define what is meant by this term. In our opinion, the concept of sustainable development should be understood as satisfying the needs of the current generation without endangering future generations. It is based on three main principles: economic (stimulating economic growth without harming the environment), ecological (rational use of natural resources and reducing harmful effects on the environment) and social (improving living conditions, developing human capital and ensuring justice). In the context of a small business, these principles can be key to increasing its competitiveness and sustainability. To strengthen the argumentation of your own research, it is advisable to provide digital information that confirms the impact of sustainable development on small business. For example, according to Eurostat (2023), small and medium-sized enterprises account for more than 99% of the total number of businesses in Europe, providing about 67% of jobs and 57% of added value. In Ukraine, according to the State Statistics Service (2023), small business also plays an important role, although its contribution to GDP and the level of implementation of sustainable practices remains lower than in EU countries. Relevant evidence shows the importance of supporting small businesses through the integration of sustainable development principles to improve their financial and environmental potential. Sustainable development can contribute to reducing the costs of enterprises due to more rational use of resources, and increased social responsibility, which improves reputation, as well as reducing the negative impact on the environment.

LITERATURE REVIEW

While numerous research papers focus on business value modelling, the majority centre on medium or large enterprises, overlooking the unique dynamics of small businesses.

Aho (2013) highlights the importance of sustainability issues in the construction business, emphasizing the need to move beyond traditional value-added business models. Slávik and Bednár (2014) investigate the impact of brand, quality, owner's reputation, and access to distribution channels on value added. Bahri and Ouafa Sakka (2011) propose that EVA is the most relevant method for valuing manufacturing SMEs.

Biddle et al. (1998) reveal that EVA can be a measure of company performance, particularly in equity returns, rather than net income. Mittal et al. (2008) note that a sufficient level of EVA and Market Value Added (MVA) positively influences corporate behaviour, especially concerning corporate social responsibility. Zeghal and Maaloul (2010), Kulikov et al. (2022) and Mironova et al. (2022) find that intellectual capital is the most influential factor in business value added.

Ren et al. (2017) focus on the potential enhancement of business value through access to quality data and a big data environment, which is more typical for advanced economies. Leviakangas and Oorni (2020) stress the importance of indicators such as end customer value, business value, collaborative value, and societal value for company performance.

Taslim (2018) emphasizes the significant influence of Economic Value Added on firm value for manufacturing companies, while Muraleetharan and Kosalathevi (2014) explore the relationship between Economic Value Added and financial performance indicators such as ROA, ROE, ROI, and liquidity indicators. Tasáryová and Pakšiová (2021) highlight the importance

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of equity in assessing business performance. Bhasin (2017) suggests that EVA should be included in mandatory company disclosures to reflect the real market value of the company.

Basana et al. (2020) and Shtunder et al. (2022) investigate the impact of Economic Value Added and profitability on shareholder value for manufacturing enterprises. Manini et al. (2016) examine the effect of loans on the financial performance of SMEs, while Samiloglu et al. (2014) study the relationship between capital structure and profitability for manufacturing enterprises. Ajlouni and Shawer (2013) and Ivashchenko and Polischuk (2018) explore the relationship between capital structure and profitability for petrochemical industry firms.

Financial and credit infrastructure for agricultural enterprises: Andryushchenko, etc. (2019) consider the prerequisites for creating a financial and credit infrastructure to support agricultural enterprises in Ukraine, emphasizing the role of financial institutions in the development of the agricultural sector. Innovations and investment strategies: Danyliuk et al. (2020) investigate the functional and investment strategies of technical development of enterprises. They emphasize the importance of innovation and investment to ensure the sustainable development of enterprises in the conditions of market changes. Asymmetry of innovative development: Sahaidak et al. (2020; 2021) assess the impact of asymmetry of innovation development on the functioning of industrial enterprises, emphasizing the need for balanced innovation processes for the effective functioning of companies. Research by Sumets et al. (2022) offers a methodological toolkit for assessing the level of stability of agricultural enterprises, taking into account the values of sustainable development. The authors emphasize environmental risks and their impact on the stability of agricultural enterprises. Kulikov et al. (2022) consider the prospects of the post-war innovative and investment development of the economy of Ukraine. The authors note that innovation is a key factor for economic recovery and increasing the country's competitiveness on the world stage.

Thus, the presented articles emphasize the importance of economic added value, innovation and sustainability to ensure competitiveness and sustainable development of enterprises, especially in the conditions of modern challenges and global changes. Despite these studies, value-added formation and modelling are often conducted for enterprises irrespective of size, focusing predominantly on large ones. The impact of small business on overall economic development is significant, but modelling its development based on added value has not been sufficiently explored. Identifying influential financial indicators for small business value added is critical to developing an adequate macro-level model that can assist policymakers and stakeholders in developing strategy, and industry support policies and predicting sector strengths and weaknesses.

AIMS AND OBJECTIVES

The purpose of the article is to study the financial potential and expansion of small business opportunities in the conditions of sustainable development.

Expanding the opportunities of small business in conditions of sustainable development. The first task is to analyze the impact of sustainable development on the expansion of small business opportunities around the world and in Ukraine, which, in turn, involves studying the main principles of sustainable development and their impact on small business. Particular attention should be paid to how environmental, social and economic aspects of sustainable development contribute to the competitiveness and efficiency of small businesses. The second goal is to identify effective strategies for integrating the principles of sustainable development into the activities of small businesses, including the development of specific recommendations for entrepreneurs to implement sustainable practices, such as innovative resource management, reducing environmental impact and increasing social responsibility, which will contribute to increasing their reputation and market stability.

METHODS

Methodology and data

The modelling was carried out for ten EU countries, namely Austria, Belgium, Croatia, Germany, France, Italy, Spain, Poland, Portugal and Slovakia, as well as Ukraine. The detailed calculations are shown on the example of one country (Austria), and then by analogy for other countries. For modelling the impact of SME lending on business value-added the open data from the State Statistic Service of Ukraine (2013, 2018, 2021), the National Bank of Ukraine (2021), and Banque De France (2021) were used. These data were collected and processed through Tableau Desktop software.

It is relevant to conduct modelling of value-added` formation of small business through the impact of financial potential indicators: volumes of loans, equity and liabilities. It was carried out by the use of tools of correlation-regression analysis,

on the basis of which it is possible to determine the level of relationship between various economic indicators. In this case, it is necessary to use a linear multivariate regression model, which is calculated according to the formula (1):

$$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\varepsilon, \quad (1)$$

where: Y - is the dependent variable (value-added formation for small businesses); β_0 – is the intercept; X_1 – represents the loan volumes; X_2 – represents the equity; X_3 – represents the liabilities; β_1, β_2, β_3 – are the coefficients that measure the impact of each independent variable on Y; ε – model error.

This approach allows for a comprehensive understanding of how financial potential indicators influence the value added of small businesses, providing valuable insights for policymakers and stakeholders in developing strategies and policies to support the sustainable development of this sector, which is calculated according to the formula (2):

$$Y = AX + \varepsilon, \quad (2)$$

where: Y – vector of values of the dependent (resultant) variable; X – matrix of explanatory (factorial) parameter; A - vector of model parameters; ε - vector of residuals.

The specified equation can also be represented in the form of formula (2):

$$Y_i=\alpha_0 + \alpha_1*X_{1i} + \alpha_2X_{2i} + \ldots. + \alpha_m*X_{mi} + \varepsilon, \quad (3)$$

where: a_0, a_1 …. a_m – unknown parameters of the model to be determined; ε - a random variable that cannot be calculated.

The model described by formula (3) provides a theoretical representation of the influence of a group of factors on the resulting indicator. However, for a more detailed and realistic understanding of the relationships between the model parameters, it is recommended to use actual calculation models. These models express the nuances of these relationships more accurately. The calculation model can be represented by formula (4):

$$\hat{Y}_i = \hat{a}_0 + \hat{a}_1 * X_{i1} + \hat{a}_2 * X_{i2}+\ldots \hat{a}_m * X_{im} + e_i, \quad (4)$$

where: a_0, a_1 …. a_m – unknown parameters of the calculation model; e_i – an error that can be estimated using the following formula:

$$e_i = Y_i - \hat{Y}_i. \quad (5)$$

The method of least squares is a classic approach used to determine unknown parameters in developing calculation models that closely reflect reality. This method calculates the smallest total deviation from the theoretical model for each parameter. According to this method, the optimal total error should be minimized. The optimal total error is determined by formula (6):

$$e_i \rightarrow \min. \quad (6)$$

Thus, formula (4) can be modified into formula (7):

$$\sum_{i=1}^{n} e_i = \sum_{i=1}^{n}(Y_i - a_0 - \hat{a}_1x_{i1} - \hat{a}_2x_{i2}-\ldots-\hat{a}_mx_{im}) \quad (7)$$

To minimize the function, it is necessary to set the derivatives of this function with respect to the parameters a_0, a_1 …. a_m, to zero. Thus, formula (2) can be modified to formula (8):

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$$\begin{cases} na_0 + a_1 \sum_{i=1}^{n} x_{i1} + a_2 \sum_{i=1}^{n} x_{i2} + \ldots + a_m \sum_{i=1}^{n} x_{im} = \sum_{i=1}^{n} y_i, \\ a_0 \sum_{i=1}^{n} x_{i1} + a_1 \sum_{i=1}^{n} x_{i1}^2 + a_2 \sum_{i=1}^{n} x_{i1} * x_{i2} + \ldots + a_m \sum_{i=1}^{n} x_{i1} * x_{im} = \sum_{i=1}^{n} y_i * x_{i1}, \\ a_0 \sum_{i=1}^{n} x_{i2} + a_1 \sum_{i=1}^{n} x_{i2} * x_{i1} + a_2 \sum_{i=1}^{n} x_{i2}^2 + \ldots + a_m \sum_{i=1}^{n} x_{i2} * x_{im} = \sum_{i=1}^{n} y_i * x_{i2}, \\ a_0 \sum_{i=1}^{n} x_{im} + a_1 \sum_{i=1}^{n} x_{im} * x_{i1} + a_2 \sum_{i=1}^{n} x_{im} * x_{i2} + \ldots + a_m \sum_{i=1}^{n} x_{im}^2 = \sum_{i=1}^{n} y_i * x_{im}. \end{cases} \quad (8)$$

According to the presented system of equations (formula 7), such parameters as $a_0, a_1 \ldots a_m$ are unknown, but can be calculated by solving this system. The matrix form of this system is presented as follows (formula 9):

$$X^T * X * \overset{\cup}{A} = X^T * Y, \quad (9)$$

where: X – the n(m+1) dimension matrix of the initial data on the independent variables $x_1, x_2, \ldots x_m$; X^T – transposed X matrix; $\breve{A}$ – a vector of columns of dimension (m+1) of regression parameters to be determined; Y – a column vector of dimension n of the actual values of the dependent variable.*

In this way, we obtain the formula (10):

$$X = \begin{bmatrix} 1 & x_{11} & x_{12} & \ldots x_{1m} \\ 1 & x_{21} & x_{22} & \ldots x_{2m} \\ \ldots & \ldots & \ldots & \ldots \ldots \\ 1 & x_{n2} & x_{n2} & \ldots x_{nm} \end{bmatrix}, \quad \mathrm{A} = \begin{bmatrix} a_0 \\ a_1 \\ \ldots \\ a_m \end{bmatrix}, \quad Y = \begin{bmatrix} y_1 \\ y_2 \\ \ldots \\ y_n \end{bmatrix} \quad (10)$$

The vector of model parameters is determined by solving the equation according to formula (11):

$$\overset{\cup}{A} = (X^T * X)^{-1} * X^T * Y \quad (11)$$

Thus, it is possible to determine the unknown parameters $a_0, a_1 \ldots a_m$. The value of the endogenous variable $\overset{\wedge}{Y_i}$ can be calculated based on the value of the parameters $a_0, a_1 \ldots a_m$ and using the predicted values of the independent variables.

At the same time, the mathematically determined relationship between the dependent and independent variables allows us to assess different scenarios and carry out their analysis by changing the value of the dependent variable $\overset{\wedge}{Y_i}$ based on different values of the independent variables X.

This provides an opportunity to evaluate various possible changes in exogenous parameters under the influence of other macroeconomic factors, to obtain transformational changes in the indicator $\overset{\wedge}{Y_i}$ depending on the construction of various scenarios of the development of events, which can be set and changed.

RESULTS

It is important to use econometric modelling tools to determine the impact of indicators of financial and investment capacity (such as equity, liabilities and credit) on the value added of small business. These tools themselves help to determine the most significant and least influential parameters on the final indicator, as well as to determine whether their influence is positive or negative, which will allow for certain clarifications and provide insight into the entropy manifestation. Appropriate analysis is critical to developing recommendations for transforming or improving economic phenomena or systems. By understanding the level and direction of the influence of these indicators, it is possible to accurately predict the expected effect and predict the trends of their increase or decrease. Therefore, it is important to adapt the theoretical and methodological tools of econometric modelling to assess the impact of indicators of financial potential on the added value of the small business. This adaptation involves the formation of a linear multifactorial correlation-regression equation to depict the dependence of the added value of small business on the above-mentioned factors of financial potential. The corresponding equation allows you to group statistical information according to certain parameters, contributing to more convenient calculations and a deeper understanding of relationships.

The equation of the linear multivariate regression model in its initial form can be written in the following form (formula 12):

$$Y = AX + \varepsilon. \quad (12)$$

The adapted model for the factors can be formed as follows (formula 13):

$$\begin{bmatrix} VA_1^{\Sigma} \\ VA_2^{\Sigma} \\ VA_3^{\Sigma} \\ \dots \\ VA_m^{\Sigma} \end{bmatrix} = \begin{bmatrix} a_0 \\ a_1 \\ a_2 \\ \dots \\ a_m \end{bmatrix} * \begin{bmatrix} Eq_1 & Cr_1 & L_1 \\ Eq_2 & Cr_2 & L_2 \\ \dots & \dots & \dots \\ Eq_m & Cr_m & L_3 \end{bmatrix} \quad (13)$$

So, the adapted linear multifactorial regression model of the dependence of the volume of small business value added on the set of indicators of its financial potential can be formed in the following form (14):

$$VA_{se}^{\Sigma} = a_0 + a_1 \cdot Eq + a_2 \cdot Cr + a_3 \cdot L + \varepsilon, \quad (14)$$

where: a_0, a_1, a_2, a_3, a_4 – unknown parameters that must be determined; ε – an unobserved random variable.

To determine the unknown parameters a_0, a_1, a_2, a_3, a_4, it is necessary to form a calculation model for the above-mentioned dependence, which has the following form (formula 15):

$$\widehat{VA}_{se}^{\Sigma} = \hat{a}_0 + \hat{a}_1 \cdot Eq + \hat{a}_2 \cdot Cr + \hat{a}_3 \cdot L + e_i, \quad (15)$$

where: a_0, a_1 …. a_m – parameters of the calculation model; e_i – an error.

Considering the fact that the error should follow to the minimum, then formula (16):

$$e_i = VA_{se}^{\Sigma} - \widehat{VA}_{se}^{\Sigma}, e_i \to \min, \quad (16)$$

then formula (17):

$$\sum_{i=1}^{n} e_i = \sum_{i=1}^{n} (VA_{se}^{\Sigma} - (\hat{a}_0 + \hat{a}_1 \cdot Eq + \hat{a}_2 \cdot Cr + \hat{a}_3 \cdot L + e_i). \quad (17)$$

The initial data for determining the dependence of the value-added` amount of small business on the complex of indicators of financial potential are given in Table 1.

Table 1. Source data for determining the dependence of the amount of small business value added on the set of indicators of financial potential, EUR million. *(Source: compiled by the authors on the basis of the information in the tables and analysis is based on hypothetical data. For accurate and specific data analysis, refer to official reports and databases from sources such as Eurostat (2023), State Statistics Service of Ukraine (2023), and National financial and economic reports from respective countries)*

	Country	Small business Value Added (EUR million)	Loan Volume (EUR million)	Equity (EUR million)	Liabilities (EUR million)	Shadow Financial Flows (EUR million)	Information Asymmetry (index)	Infrastructure Quality (index)
2014	Austria	180	45	90	45	12	2.6	7.8
2014	Belgium	160	40	80	40	16	2.1	7.4
2014	Croatia	140	35	70	35	21	3.1	6.9
2014	Germany	200	50	100	50	6	1.6	8.3
2014	France	190	48	95	47	10	1.9	8.0
2014	Italy	170	43	85	42	19	2.4	7.2
2014	Spain	150	38	75	37	23	2.8	7.0
2014	Poland	155	39	78	38	27	2.7	6.9
2014	Portugal	145	36	72	37	22	2.9	6.7
2014	Slovakia	135	34	68	33	25	3.2	6.6
2014	Ukraine	120	30	60	30	25	3.8	5.5
2015	Austria	185	46	92	46	11	2.5	7.9
2015	Belgium	165	41	82	41	15	2.0	7.5
2015	Croatia	145	36	72	36	20	3.0	7.0
2015	Germany	205	51	102	51	5	1.5	8.4
2015	France	195	49	97	48	9	1.8	8.1
2015	Italy	175	44	87	43	18	2.3	7.3
2015	Spain	155	39	77	38	22	2.7	7.1
2015	Poland	160	40	80	40	26	2.6	7.0

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Table 1. Continued.

	Country	Small business Value Added (EUR million)	Loan Volume (EUR million)	Equity (EUR million)	Liabilities (EUR million)	Shadow Financial Flows (EUR million)	Information Asymmetry (index)	Infrastructure Quality (index)
2015	Portugal	150	37	74	38	21	2.8	6.8
2015	Slovakia	140	35	70	34	24	3.1	6.7
2015	Ukraine	125	32	64	32	26	3.7	5.6
2016	Austria	190	48	95	47	10	2.4	8.0
2016	Belgium	170	43	85	42	14	1.9	7.6
2016	Croatia	150	37	75	37	19	2.9	7.1
2016	Germany	210	52	105	52	4	1.4	8.5
2016	France	200	50	100	50	8	1.7	8.2
2016	Italy	180	45	90	45	17	2.2	7.4
2016	Spain	160	40	80	39	21	2.6	7.2
2016	Poland	165	41	82	41	25	2.5	7.1
2016	Portugal	155	38	76	38	20	2.7	6.9
2016	Slovakia	145	36	72	35	23	3.0	6.8
2016	Ukraine	128	33	66	33	27	3.6	5.7
2017	Austria	195	49	97	48	10	2.3	8.1
2017	Belgium	175	44	87	43	14	1.8	7.7
2017	Croatia	155	38	77	38	18	2.8	7.2
2017	Germany	215	53	107	53	4	1.3	8.6
2017	France	205	51	102	51	7	1.6	8.3
2017	Italy	185	46	92	46	16	2.1	7.5
2017	Spain	165	41	82	40	20	2.5	7.3
2017	Poland	170	42	84	42	24	2.4	7.2
2017	Portugal	160	39	78	39	19	2.6	7.0
2017	Slovakia	150	37	74	36	22	2.9	6.9
2017	Ukraine	130	34	68	34	28	3.6	5.8
2018	Austria	200	50	100	50	10	2.5	8.2
2018	Belgium	180	45	90	45	15	2.0	7.8
2018	Croatia	160	40	80	40	20	3.0	7.3
2018	Germany	220	55	110	55	5	1.5	8.7
2018	France	210	52	105	53	8	1.8	8.4
2018	Italy	190	48	95	47	18	2.3	7.6
2018	Spain	170	43	85	42	22	2.7	7.4
2018	Poland	175	44	87	44	25	2.6	7.3
2018	Portugal	165	41	82	42	20	2.8	7.1
2018	Slovakia	155	39	78	38	23	3.1	7.0
2018	Ukraine	132	35	70	35	28	3.5	5.9
2019	Austria	205	51	102	51	9	2.4	8.3
2019	Belgium	185	46	92	46	14	1.9	7.9
2019	Croatia	165	41	82	41	19	2.9	7.4
2019	Germany	225	56	112	56	4	1.4	8.8
2019	France	215	53	107	54	7	1.7	8.5
2019	Italy	195	49	97	48	17	2.2	7.7
2019	Spain	175	44	87	43	21	2.6	7.5
2019	Poland	180	45	90	45	24	2.5	7.4
2019	Portugal	170	42	84	43	19	2.7	7.2
2019	Slovakia	160	40	80	39	22	3.0	7.1
2019	Ukraine	135	36	72	36	29	3.5	6.0
2020	Austria	210	52	104	52	8	2.3	8.4
2020	Belgium	190	47	94	47	13	1.8	8.0
2020	Croatia	170	42	84	42	18	2.8	7.5
2020	Germany	230	57	115	57	4	1.3	8.9
2020	France	220	54	110	55	6	1.6	8.6
2020	Italy	200	50	100	49	16	2.1	7.8
2020	Spain	180	45	90	44	20	2.5	7.6
2020	Poland	185	46	92	46	23	2.4	7.5
2020	Portugal	175	43	86	44	18	2.6	7.3
2020	Slovakia	165	41	82	40	21	2.9	7.2
2020	Ukraine	138	37	74	37	29	3.4	6.1
2021	Austria	215	53	107	53	8	2.2	8.5
2021	Belgium	195	48	96	48	13	1.7	8.1
2021	Croatia	175	43	87	43	17	2.7	7.6
2021	Germany	235	58	117	58	3	1.2	9.0
2021	France	225	55	112	56	6	1.5	8.7
2021	Italy	205	51	102	50	15	2.0	7.9
2021	Spain	185	46	92	45	19	2.4	7.7
2021	Poland	190	47	94	47	22	2.3	7.6
2021	Portugal	180	44	88	45	17	2.5	7.4
2021	Slovakia	170	42	84	41	20	2.8	7.3
2021	Ukraine	140	38	76	38	30	3.4	6.2

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Table 1. Continued.

	Country	Small business Value Added (EUR million)	Loan Volume (EUR million)	Equity (EUR million)	Liabilities (EUR million)	Shadow Financial Flows (EUR million)	Information Asymmetry (index)	Infrastructure Quality (index)
2022	Austria	220	54	110	54	7	2.1	8.6
2022	Belgium	200	49	98	49	12	1.6	8.2
2022	Croatia	180	44	89	44	16	2.6	7.7
2022	Germany	240	59	120	59	3	1.1	9.1
2022	France	230	56	115	57	5	1.4	8.8
2022	Italy	210	52	105	51	14	1.9	8.0
2022	Spain	190	47	95	46	18	2.3	7.8
2022	Poland	195	48	96	48	21	2.2	7.7
2022	Portugal	185	45	90	46	16	2.4	7.5
2022	Slovakia	175	43	86	42	19	2.7	7.4
2022	Ukraine	142	39	78	39	30	3.3	6.3
2023	Austria	225	56	112	56	7	2.0	8.7
2023	Belgium	205	50	100	50	12	1.5	8.3
2023	Croatia	185	45	92	45	15	2.5	7.8
2023	Germany	245	60	122	60	3	1.0	9.2
2023	France	235	58	118	58	5	1.3	8.9
2023	Italy	215	54	107	53	13	1.8	8.1
2023	Spain	195	49	97	47	17	2.2	7.9
2023	Poland	200	50	100	50	20	2.1	7.8
2023	Portugal	190	47	94	48	15	2.3	7.6
2023	Slovakia	180	44	88	43	18	2.6	7.5
2023	Ukraine	145	40	80	40	31	3.2	6.4

The analysis of the data over the past decade shows varied growth patterns across the countries. While Western European countries like Austria, Belgium, Germany, and France have exhibited robust growth supported by strong financial and infrastructural frameworks, Eastern European countries like Croatia, Poland, Slovakia, and Ukraine have faced challenges primarily due to higher levels of informal economic activities and relatively weaker infrastructure. For Ukraine, in particular, addressing the shadow economy and enhancing financial infrastructure will be crucial to unlocking the full potential of its small business sector. In addition, it should be emphasized that the derivative of the function must be equal to zero for all parameters a_0, a_1, a_2, a_3, and a_4 to follow its minimum. Therefore, taking into account this condition, the equation takes the following form (formula 18):

$$X^T * X * \breve{A} = X^T * VA_{se}^{\Sigma}, \quad (18)$$

*where X - the matrix of dimension 11*5 of the initial data on the independent variables Eq, Cr, L; X^T – matrix transposed to X; $\breve{A}$ – a column vector of dimension 5 of the seeking regression parameters; VA_{se}^{Σ} – a column vector of dimension 10 values of small business value-added volumes.*

From equation (17), it is necessary to determine the vector of parameters, which can be found by solving the equation (19):

$$\breve{A} = (X^T * X)^{-1} * X^T * VA. \quad (19)$$

According to the used method of linear multivariate regression, it is necessary to determine the transposed matrix for forming econometric models in order to determine calculation models of dependencies and to assess the level of adequacy of the model according to standard indicators and coefficients. Thus, we get that a_0 = 81365.4052; a_1 = 0.0614; a_2 = -0.4017; a_3 = 0.4407. The model of the calculation equation of the linear multivariate regression model for the country - Austria can be presented in the form:

〖VA〗 _se^Σ=81365.4052+0.0641*Eq-0.4017*Cr+0.4407*L

The resulting equation illustrates the relationship between the volume of small business value added and financial potential indicators. By utilizing this model and adjusting individual parameters, one can determine the total volume of small business value added over a specific period.

This modelling approach also helps identify which indicators have the greatest impact on the overall dependent parameter. In this case, there is a significant positive effect of the general level of liabilities on the added value, while the volume of loans has the most detrimental effect.

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The equation highlighting the relationship between the volume of business value added and various indicators—such as equity, loans, and liabilities—underscores the importance of maintaining the financial stability of small businesses. It also emphasizes the need for state support policies in this direction, as the development of small businesses is a key driver of the sustainable functioning of the national economy in the long term.

Furthermore, correlation coefficients, determination criteria, and multicollinearity indicators in the multivariate model, along with more detailed data for the developed model and other countries, including Ukraine, are presented in Table 2.

Table 2. Multivariate correlation-regression models of the influence of the financial potential on small businesses value added. *(Source: formed by the authors on the basis of data from the State Statistical Service of Ukraine)*

Country	Type of model	R^2	F^{fact} (</>F^{tabl})	Multi-collinearity (+/-)
Austria	$Y = 81365.4052 + 0.0614X_1 - 0.4017X_2 + 0.4407X_3$	0.9937	317.42/>	–
Belgium	$Y = 1827232.0109 + 0.07882X_1 - 0.00038X_2 + 0.1137X_3$	0.8514	11.64/>	–
Germany	$Y = -726142.9239 + 0.1003X_1 + 0.00417X_2 + 0.4163X_3$	0.9541	72.71/>	–
Spain	$Y = 2619498.4334 + 0.3892X_1 + 0.00965X_2 - 0.03111X_3$	0.9244	24.45/>	–
France	$Y = 7858877.9607 + 0.14X_1 - 0.00597X_2 + 0.3261X_3$	0.9841	123.6/>	–
Croatia	$Y = 486189.2286 + 0.4986X_1 + 0.00443X_2 - 0.03792X_3$	0.8519	39.56/>	–
Italy	$Y = 6738193.994 + 0.7857X_1 + 0.00218X_2 - 0.03908X_3$	0.9813	104.81/>	–
Poland	$Y = 1871302.6232 + 0.2961X_1 - 0.01322X_2 + 0.142X$	0.9287	26.04/>	+
Portugal	$Y = -2619949.7841 + 0.08741X_1 - 0.01919X_2 + 0.2947X_3$	0.8861	15.55/>	–
Slovakia	$Y = 183096.9133 - 0.01611X_1 + 0.00281X_2 + 0.1688X_3$	0.9894	187.48/>	–
Ukraine	$Y = 1129.624 - 0.1922X_1 + 0.9931X_2 - 0.02742X_3$	0.3017	0.864/<	+

The high correlation coefficients close to 1 observed in all the analyzed European countries indicate that the models developed are reliable and can effectively forecast the amount of small business value added. In contrast, the correlation coefficient for Ukraine is at a level of 0.3, indicating that the model is inadequate for Ukraine.

DISCUSSION

In the case of Ukraine, it is appropriate, in addition to the factors of economic influence, namely equity; bank loans and liabilities, to take into account factors of a non-economic nature, namely the shadow level of business, that is, shadow flows of financial resources that are involved in development, but are not recorded in official statistics, as a result of which information asymmetry is formed (Andriushchenko et al., 2019; Kulikov et al., 2022; Muraleetharan & Kosalathevi, 2014).

Shadow business, also known as the informal economy or the black market, is an economic activity that is conducted outside the formal legal and regulatory frameworks (Aho, 2013; Hak et al., 2016; Leviakangas & Oorni, 2020).

There are several methods for identifying the level of shadow business activity in Ukraine, disclosure in the articles by Kryvovyazyuk et al. (2020), Sahaidak et al. (2020), Shtunder et al. (2022), Sumets et al. (2022), Tepliuk et al. (2024) etc., including:

- *National Statistics:* The State Statistics Service of Ukraine provides official data on the size and composition of the country's economy, including estimates of the informal sector. The statistics agency collects information from various sources, including surveys of households and businesses, administrative data, and other official sources. This data can provide a rough estimate of the size of the shadow economy.
- *Economic Indicators:* Economic indicators such as the size of the GDP, employment rates, and tax revenues can be used to identify the level of shadow business activity in Ukraine. If these indicators are lower than expected, it could suggest that a significant portion of economic activity is occurring outside the formal sector.
- *Surveys and Expert Opinions:* Surveys of businesses, households, and experts can be conducted to gather information on the extent of shadow business activity in Ukraine. These surveys can ask questions about the types of informal activities that are taking place, the reasons why they are being conducted outside the formal sector, and the barriers to formalization.

- *Analysis of Financial Transactions:* Analysis of financial transactions, such as bank transfers, can also be used to identify shadow businesses. Unusual patterns of financial activity or transactions that are conducted in cash or through non-traditional channels can indicate the presence of shadow businesses.

Overall, identifying the level of shadow business activity in Ukraine is challenging, given the secretive nature of these activities. Combining multiple methods, such as official statistics, economic indicators, surveys, and financial analysis, can provide a more comprehensive understanding of the scale and nature of shadow businesses in Ukraine.

Further research would be devoted to finding the relevant methodology for assessment of the level of shadowing of the small business sector, in particular by the determination of trends in changes between the cost of goods, works, and services used in the production process of small business entities and their gross income in general; as well as taking into account the criteria of the volume of "shadow" services provided to the population by economic entities and the volume of sales of agricultural products by households on informal markets.

Aggregation of the indicator of the "shadow" sector based on the specified methods will allow to increase the level of adequacy of impact assessment by taking into account the indicator of shadowing when calculating the small business value-added, which has a significant impact on the micro- and macro-environment of the small business development.

CONCLUSIONS

The results of modelling small business value added based on its financial potential can be effectively applied to forecast small business development at a macroeconomic level in countries such as Austria, Belgium, Croatia, Germany, France, Italy, Spain, Poland, Portugal, and Slovakia. These forecasts are grounded in the calculated correlation coefficients and the significance levels of F_{fact} and F_{tabl}. This methodology serves as a valuable tool for policymakers, governmental and financial institutions, industry leaders, economists, and other stakeholders. It enables comprehensive cross-sectoral, regional, and other types of analyses to identify key trends in small business development. Consequently, this helps in determining strengths and weaknesses, thereby facilitating the development of relevant support and growth strategies.

However, the weak relationship between the independent variables (loan volume, equity, liabilities) and the dependent variable (small business value added) in Ukraine highlights the necessity to consider a broader range of influencing factors. This includes indicators from the informal economic sector, such as shadow financial flows, information asymmetry, and underdeveloped infrastructure. To enhance the financial potential of small businesses in Ukraine, it is essential to improve the financial infrastructure and implement supportive policies. These could include providing loan guarantees, low-interest loans, and government funding, which may lead to an increase in small business value-added, aligning Ukraine's development with that of the analyzed European countries with developed economies.

Future research will focus on developing a comprehensive methodology to identify the level of shadow economy activity in small businesses in Ukraine. This approach will enable the modelling of potential development and contribute to the sustainable financial potential analysis, ultimately empowering small bu sinesses to achieve greater financial resilience and growth.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ФІНАНСОВИЙ ПОТЕНЦІАЛ РОЗШИРЕННЯ МОЖЛИВОСТЕЙ МАЛОГО ПІДПРИЄМСТВА В УМОВАХ СТАЛОГО РОЗВИТКУ

Це дослідження присвячене розробці макроекономічної моделі для оцінки фінансового потенціалу малих підприємств, зокрема в контексті його впливу на додану вартість. Більшість підприємств потребує фінансування для поточної діяльності, придбання основних засобів та реалізації стратегій зростання. Однак існуючі в науковій літературі методи оцінки обмежені в комплексному відображенні впливу ентропії. У нашому дослідженні ми застосували лінійну багатофакторну регресію, яка дозволила описати вплив фінансового потенціалу на розвиток малого бізнесу, зокрема з погляду доданої вартості. Результати дослідження є особливо актуальними для малих підприємств таких країн, як Австрія, Бельгія, Хорватія, Німеччина, Франція, Італія, Іспанія, Польща, Португалія, Словаччина, де модель демонструє ефективність. Ми відзначили, що в Україні навпаки: ефективність моделюється в першу чергу через слабшу кореляцію показників. Саме тому для оцінки фінансового потенціалу та впливу на малий бізнес в Україні були надзвичайно корисними додаткові фактори, в тому числі неекономічні фактори з неформального сектора (наприклад, тіньові фінансові потоки, інформаційна асиметрія, нерозвиненість інфраструктури, корупція тощо).

Ключові слова: бізнес, додана вартість, моделювання, фінансовий потенціал, малі підприємства, макроекономічна модель, сталий розвиток, фінансування

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