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The Dynamics of Behavioural Economics and Its Influential Determinants

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Abstract

Relevance: Given the growing role of behavioural economics in shaping economic decisions under uncertainty, identifying factors that influence individuals' economic behaviour is important for forecasting consumer trends and optimising public economic policy. Aim: The article aims to analyse the theoretical aspects of behavioural economics and investigate the impact of macroeconomic factors on the financial behaviour of economic entities in an unstable environment. Methods: In the course of the study, several general scientific methods of cognition were used, including synthesis of literature sources, comparative analysis, methods of systematisation and generalisation, as well as analysis of statistical data to form the initial data for further correlation and regression analysis to identify the relationships between dependent and independent variables and to form behavioural aspects of economic decisions through the impact of macroeconomic factors on the financial activity of economic entities. Results: The correlation analysis revealed a moderate positive relationship between deposits and loans (r = 0.642), indicating that savings and capital raising decisions are interdependent; a significant negative relationship between the unemployment rate and deposits (r = -0.930) and loans (r = -0.628); and a weak correlation between inflation and deposits (r = 0.063) and loans (r = 0.188). In contrast, further regression modelling of deposit activity showed that adding the unemployment rate to the model significantly increases its explanatory power (R2 = 0.909), confirming its significant impact on deposit volumes. Similarly, in the regression model of lending, including average wages significantly improved the predictive power (R2 = 0.77), indicating its important role in shaping lending activity. Conclusion: Considering cognitive and emotional factors in financial models is becoming a key element for making more accurate forecasts of economic entities' financial activity, especially in conditions of instability; this opens up opportunities for improving strategies for the state regulation of economic entities' behaviour to ensure rationality in their economic decision-making.

Keyword: *behavioural economic theory, behavioural patterns, financial behaviour, economic actors, deposit activity, lending, economic instability, financial market, macroeconomic indicators, global economy, smart business, entrepreneurship and business culture, project analysis.*

Introduction

As an interdisciplinary field of research, behavioural economics aims to identify the influence of psychological, social and cognitive factors on the nature of economic agents' economic decisions. Unlike traditional economic theory, this concept is characterised by rejecting individuals' assumption of absolute rationality, which makes it expedient to systematically analyse decisions considering information asymmetry, emotional factors and social influence. It should also be noted that macroeconomic changes are key in shaping individuals' financial behaviour, directly affecting their consumer expectations, savings, and risk appetite. Therefore, consumer confidence is a key indicator of economic activity, as its results reflect the subjective perception of the economic situation and prospects among the population. In this context, the Consumer Confidence Index (CCI), the dynamics shown in Figure 1, is an analytical tool that

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allows studying the behavioural aspects of economic activity.

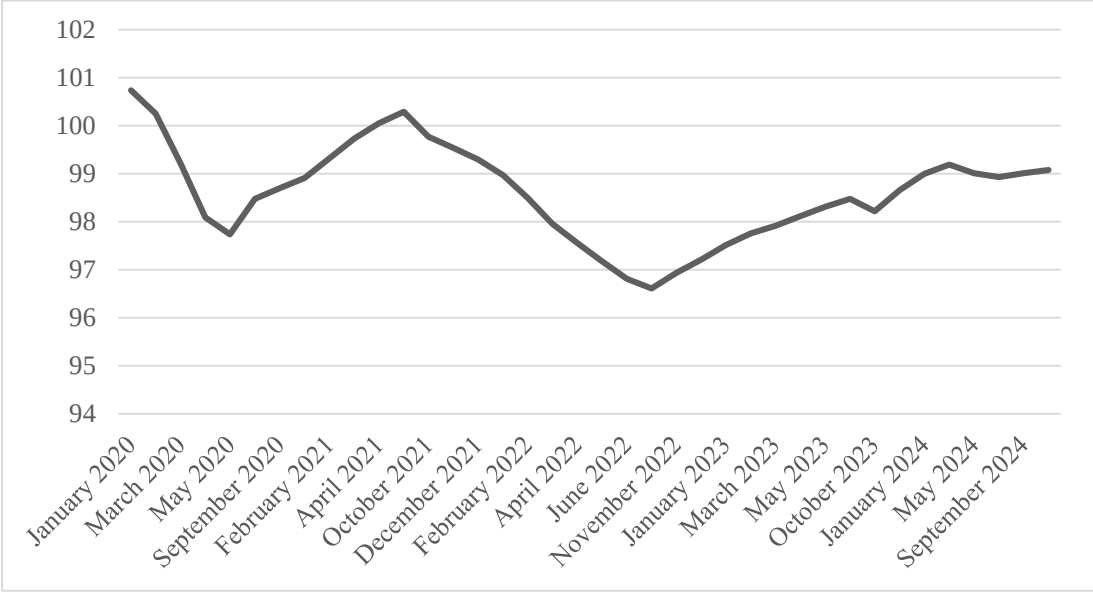


Figure 1. Dynamics of changes in the Consumer Confidence Index (CCI) in 2020–2024

Source: OECD (2024)

The dynamics of CCI changes over the past 5 years indicate significant fluctuations in consumer confidence due to the emergence of new challenges to the global economy. For example, the gradual decline in the index during 2020 (to 98.09 in April) was mainly due to the outbreak of the COVID-19 pandemic, which led to increased uncertainty, unemployment, and lower incomes of economic agents in most countries. Despite the attempts of economic systems to adapt to restore at least a satisfactory level of consumer confidence, consumer confidence declined again in early 2022, in particular after February 2022 (falling to 97.96), which directly indicates the impact of the beginning of Russia's full-scale invasion of Ukraine and related factors, including increased sanctions against Russia, disruption of supply chains, an increase in the number of refugees and aid spending, as well as geopolitical tensions and general socio-economic instability even among the world's leading countries. Thus, the analysis of the current level of consumer confidence in the global context allows us to trace the patterns of changes in the financial behaviour of households under the influence of global economic changes and, as a result, provokes discussions on the mechanisms of consumer adaptation to an unstable economic environment, the role of public policy in building confidence in the financial system and the effectiveness of regulatory instruments in stimulating economic activity.

This article aims to study the concept of behavioural economics and the factors that influence it. The study aims to identify patterns in the formation of financial behaviour of economic entities in times of crisis, in particular under the influence of the COVID-19 pandemic, Russia's full-scale invasion of Ukraine, and the accompanying socio-economic instability.

Literature Review

In the modern sense, behavioural economics is defined as a branch of economic science that

studies the influence of psychological and emotional factors on decision-making by economic actors (Umapathy, 2024), recognising deviations from rational behaviour due to cognitive biases, framing effects, heuristics and contextual features of decision-making (Liestyowati, 2024; Zik-Rullahi et al., 2023). It is opposed to traditional economic theory, as it considers the systemic nature of judgemental errors caused mainly by psychological blind spots and emotional reactions such as fear and greed, which can distort the rationality of choices (Liscow & Markovits, 2022). In addition, the development of behavioural economics allows us to reconsider traditional assumptions about the rationality of economic actors, focusing on cognitive biases. These emotional and social factors influence decision-making (Mondal, 2024). In this context, smart business, according to Puglisi et al. (2022), is one of the most effective mechanisms that integrates elements of psychology into economic decision-making, reducing the inertia of rational decisions, particularly in entrepreneurship and business culture. In particular, psychological factors such as motivation, risk perception, and self-confidence shape entrepreneurial intentions and behaviour (Yani, 2024); while cognitive biases such as confirmation bias and overconfidence significantly influence business decisions, leading to strategic mistakes and wastage of resources within entrepreneurship and business culture (Wang, 2024). Therefore, Zherlitsyn et al. (2019) emphasise using project analysis to accurately assess the potential of financial strategies and the formation of financial relationships arising from the movement of financial resources. In turn, Chauhan et al. (2024), in a study of Indian retail investors, identified a significant impact of anchoring bias, confirmation bias, accessibility, overconfidence, and representativeness on investment decision-making, indicating systematic deviations from rational decision-making models. Similar findings can be traced to Singh (2024) and Cui (2024), who emphasise the leading role of overconfidence, loss aversion and disposition effects in provoking suboptimal investment strategies and inefficient capital allocation. More specialised studies look at the factors shaping consumer behaviour through the prism of commercialisation of innovation (Mironova et al., 2022) and the increase in consumption of environmentally friendly goods, which is also associated with the development of environmental responsibility of individuals (Koval et al., 2023), which suggests the need for a comprehensive approach to studying economic behaviour in order to develop the most effective strategies for optimising investment and consumption practices.

Instead, research on the emotional aspects of financial behaviour confirms that fear, anxiety, and greed distort risk assessment, leading to impulsive economic decisions and significantly exacerbating financial system instability in crises (Jia, 2023). In the context of social influences, Lazaric et al. (2020) notes that group norms and cultural characteristics shape consumer behaviour, confirming the importance of the socio-economic environment in financial decisions. In addition, the relationship between economic instability and financial activity is more often observed in developing countries; for example, Kengne (2022) shows that in South Africa, low savings rates are negatively correlated with financial activity in the short run, but in the long run, they contribute to the growth of banking costs. Ali et al. (2022), studying economic agents in Somalia, showed the negative impact of high inflation and unemployment on financial activity, confirmed by statistically significant relationships between key macroeconomic indicators.

In the context of the financial behaviour of economic agents in Ukraine, Yudina et al. (2019) show that household lending played a key role in the formation of financial resources, but in times of war, the concentration of state-owned banks in the financial market serves as a stabilising factor that provides financing for the economy (Shpanel-Yukhta, 2022). Studies by

Korneev et al. (2024), Vozniak and Kaspshyshak (2024), Zomchak and Lapinkova (2022) confirm that an increase in unemployment leads to a reduction in the financial activity of economic entities and, as a result, a decrease in the deposit base of banks. A similar relationship is found in Matviichuk et al. (2024), who point to a direct correlation between the economic situation and deposit policy, in Vozniak and Kaspshyshak (2024), who note that a decline in household income limits the volume of deposits.

In order to reduce the impact of irrationality on the financial behaviour of economic agents, Cai (2020) suggests using nudge strategies to adjust the choice and provision of investment information and to encourage financial intermediaries to make more ethical decisions. In turn, Gomes (2023) emphasises that such strategies can influence behaviour in planned directions and that introducing behavioural incentives in various settings can promote desired financial behaviour. In general, nudging theory uses several strategies to create positive influences, drawing on well-established behavioural insights from the field of behavioural economics (Leal & Oliveira, 2024). However, Espinosa et al. (2022) are critical of nudge strategies, pointing to their paternalistic nature and limited ability to consider the fragmented knowledge held by economic actors. The authors emphasise that policy decisions based on the assumption that regulators are superior in understanding the goals and means of citizens may be flawed due to the cognitive biases of decision-makers. At the same time, the author prefers boosting strategies, as he is convinced of the need to develop the ability of economic actors to overcome cognitive biases on their own through education, entrepreneurship and the development of an institutional environment that ensures efficient use of resources. In this context, Hashinaga (2023) emphasises the need to develop and implement financial education programmes to promote sound financial behaviour and financial literacy among economic actors. Thus, the current scientific discussion generally confirms that the financial behaviour of entities is a synergy of rational and irrational factors that manifest themselves through cognitive biases, emotional reactions, and the socio-economic context. However, it is important to focus on the study of the impact of such factors on the behavioural aspects of decision-making in the financial sector, taking into account the specifics of crisis periods and changes in the structure of banking operations.

Methods

Qualitative Analysis

The following methods were used in the research:

The synthesis of literature sources was used to systematise scientific approaches to the interpretation of economic behaviour under conditions of uncertainty and risk and also allowed to summarise existing empirical studies of the impact of cognitive biases on the financial activities of economic entities in the global economy and the economic systems of developing countries;

Comparative analysis was used to assess the specifics of behavioural factors in different socio-economic contexts, including developed market economies and countries in crisis or economic instability;

The systematisation method was used to structure the results of empirical studies and generalise the impact of cognitive factors on financial processes;

The generalisation method was used to formulate conclusions about the role of behavioural aspects in modern economic science and their importance for macro- and microeconomic regulation.

QUANTITATIVE ANALYSIS

Based on the statistical data analysis results, a set of initial data was formed to analyse the impact of macroeconomic factors on the financial activity of economic entities in an unstable environment, as shown in Table 1. The data source for the study is official statistics from Ukrainian government agencies, mainly reports from the National Bank of Ukraine and the Ministry of Finance of Ukraine. The data covers the period from 2020 to 2024, which allows us to assess the factors influencing the dynamics of deposits and loans in the banking sector, which in turn shapes the financial behaviour of economic entities, specifically during the crisis period, which is characterised by challenges related to the COVID-19 pandemic, the beginning of Russia's full-scale invasion of Ukraine, and the accompanying political and socio-economic instability. The analysis methodology uses correlation and regression analysis to identify relationships between dependent and independent variables and shape the behavioural aspects of economic decisions through the impact of macroeconomic factors on the financial activity of economic entities.

Table 1. Initial data for analysing the impact of macroeconomic factors on the financial activity of economic entities

Period	Dependent variables		Independent variables		
	Deposits, UAH million	Loans, UAH million	Inflation index, %.	Unemployment rate, %.	Average salary, UAH
2020	1348130	948386	105	1,103053334	13321
2021	1503909	1044049	110	0,715878674	15701
2022	1893851	1007648	126,6	0,453029468	15116
2023	2395074	997877	105,1	0,236582588	16837
2024	2614517	1122172	112	0,234091407	118021

Source: The National Bank of Ukraine (2024a, 2024b), The Ministry of Finance of Ukraine (2025, 2024a, 2024b)

First, to ensure a comprehensive empirical analysis of the relationships between macroeconomic factors and the financial activity of economic entities, a correlation analysis was conducted using the Pearson Correlation function of the JASP statistical software. The purpose of the correlation analysis is to determine the degree of statistical dependence between the variables under study, which makes it possible to identify the direction and strength of the relationship between the volume of financial transactions and macroeconomic factors. In addition, the following variables were identified for further research based on a two-stage regression analysis:

1. This analysis's dependent variables (Y) are the volumes of deposit and credit operations, which are the basis for a two-stage modelling to identify the determinants of financial activity.

The research design provides for the formation of separate regression models for each dependent variable, which provides for analytical differentiation of the impact of macroeconomic factors on the analysis's independent variables (financial parameters).

2. The independent variables (X) include key macroeconomic indicators, such as inflation, unemployment, and average wages, which represent structural factors shaping economic dynamics. Using these variables provides for a comprehensive assessment of their impact on deposit and lending activity, allowing for the establishment of correlation and regression relationships between macroeconomic conditions and the transformation of the banking sector.

The main assumption to be confirmed or refuted in the quantitative research is that macroeconomic indicators, in particular selected data sets on inflation, unemployment, and average wages in Ukraine during the analysed period, affect the dynamics of deposits and loans in the banking sector, which in turn shapes the financial behaviour of economic entities.

Results and Discussion

Given the specificity of behavioural economic theory, which is mainly concerned with the psychological phenomena that influence human decision-making and should be taken into account in financial and economic models, the emphasis is shifting from classical rational models to approaches that take into account bounded rationality, heuristics and cognitive biases, and, as a result, influence the financial behaviour of economic agents. This theory emphasises psychological and emotional factors that influence decision-making, often leading to irrational behaviour that deviates from traditional economic theories. Its main difference from traditional economic theory, which emphasises human rationality, the theory of utility and the systematic updating of beliefs and opinions of subjects depending on the information acquired, is the consideration of the error of judgements of subjects due to psychological blind spots inherent in most individuals and their dependence on the context in which a decision is made. In scientific practice, within the framework of behavioural economic theory, it is also proposed that phenomena such as biases, framing effects, and heuristics be considered.

Emotional reactions, such as fear and greed, can distort rational decision-making, leading people to make impulsive financial choices. The systematic increase in the Fear & Greed Index (from 33 points in December 2024 to 46 points in February 2024) is mainly due to improved macroeconomic indicators, in particular the 5.2% increase in US GDP in the third quarter of 2023 (Bureau of Economic Analysis, 2023), as well as the growth of stock markets, such as the S&P 500, which reached 6040.53 points, and the Fed's easing monetary policy rhetoric, which has helped to increase the confidence and risk-taking of modern investors (CNN Business, 2024).

In developing countries, the financial behaviour of economic agents is primarily shaped by rational and irrational factors, including cognitive and emotional aspects of decision-making. Thus, the study by Chauhan et al. (2024) aims to identify the cognitive biases of 402 Indian retail investors representing most Indian states and union territories (UTs) when making investment decisions. The results of this analysis indicate that the Anchoring Bias (The everyday ANB impact is 100%) is the most important factor in investment decision-making, followed by Confirmation Bias (CB= 96%), Availability Bias (AVB= 83%), Overconfidence Bias (OC= 60%) and Representativeness Bias (RB= 59%). Another example is the study of the impact of using the mobile platform M-Pesa, which provides money transfer, payment and microfinance

services in Kenya, conducted by William and Suri (2014). The results indicate that M-Pesa has increased access to financial services by increasing the frequency of receiving remittances by 13%, which on average account for 6% to 10% of annual consumption.

At the same time, in Ukraine, which is experiencing prolonged armed aggression by Russia, economic instability and high levels of uncertainty are increasing the role of psychological factors in financial decisions. In July 2024, the Consumer Confidence Index of the Ukrainian population increased by 7.3 points to 70.1 points. In addition, other components of the indicator also showed an increase, in particular: the Current Situation Index (CSI) in 2024 equals 53.8 points, which is 2.9 points higher than the indicator in June of the same year; Index of Economic Expectations (IEE) in July 2024 showed an increase of 7.3 points and equals 80.9 points; in turn, the index of unemployment expectations increased by 0.7 points to 125.0 points; and the index of devaluation expectations increased by 2.8 points to 169.8 points; while the index of inflation expectations remained at the level of the previous month (Prasad, 2024). This trend is primarily due to cognitive biases significantly affecting investors' choices. Overconfidence, loss aversion, and the disposition effect often lead to suboptimal investment strategies and inefficient capital allocation (Singh, 2024; Cui, 2024). In addition, emotional factors, such as fear, increased anxiety, or greed, can distort rational risk assessment, leading to impulsive financial decisions and exacerbating financial system instability during economic turbulence (Jia, 2023).

Thus, within the behavioural economics framework, financial decisions (e.g., savings, investment, and lending) at both the individual and corporate levels are determined by logical calculations but also partially depend on cognitive distortions, social factors, and the level of trust in the economic environment. Given this, it is necessary to conduct a comprehensive study by analysing the behavioural aspects of economic decisions through the impact of macroeconomic factors on the financial activity of economic entities. The central assumption that should be confirmed or refuted in the course of the quantitative study is that macroeconomic indicators, in particular the data on inflation, unemployment, and the average wage in Ukraine in 2020–2024, affect the dynamics of deposits and loans in the banking sector, which in turn shapes the financial behaviour of economic agents. The correlation analysis results of macroeconomic factors' impact on business entities' financial activity are shown in Table 2.

Table 2. Correlation analysis of the impact of macroeconomic factors on the financial activity of business entities in Ukraine

Pearson's Correlations						
Variable		**Deposits**	**Loans**	**Inflation index**	**Unemployment rate**	**Average salary**
1. Deposits	Pearson's r	-				
	p-value	-				
2. Loans	Pearson's r	0.642	-			
	p-value	0.243	-			
3. Inflation index	Pearson's r	0.063	0.188	-		
	p-value	0.920	0.762	-		
4. Unemployment rate	Pearson's r	-0.930	-0.628	-0.266	-	

	p-value	0.022	0.256	0.666	-	
5. Average salary	Pearson's r	0.692	0.858	0.016	-0.500	-
	p-value	0.195	0.063	0.979	0.391	-

Note: *p < .05, **p < .01, ***p < .001

Source: calculated by the author

The correlation analysis of the impact of macroeconomic factors on the financial activity of business entities revealed a moderate positive relationship between deposits and loans ($r = 0.642$), confirming the interdependence between savings decisions and debt capital attraction. The example of another developing country, South Africa, shows that low savings rates have a long-term impact on banks' cost of capital and leverage, particularly in the short run, with negative correlations with financial activity; however, in the long run, this impact is positive and increases the cost of banking services and capital (Kengne, 2022). The unemployment rate decreased over the analysed period, following the A. W. Phillips pattern, where high inflation is accompanied by low unemployment, has a significant negative relationship with deposits ($r = -0.930$, $p < 0.05$) and loans ($r = -0.628$), which indicates a reduction in financial activity in times of economic instability. The study by Ali et al. (2022), which focuses on macroeconomic factors in Somalia, notes that economic instability, in particular high inflation and declining unemployment, is accompanied by a decline in financial activity, as evidenced by a significant negative relationship between unemployment and deposits and loans: The F-statistic for lnRGDP and lnUNEM is 1.283 at $p = 0.299$, and the F-statistic for lnUNEM and lnRGDP is 0.778 at $p = 0.472$. In particular, the authors point to a decrease in financial activity (F-statistic for lnRGDP and lnINF = 5.618 at $p = 0.012$) during economic instability, where unemployment hurts financial performance. Despite the marginal value of statistical significance, the positive correlation between average wages and lending to households ($r = 0.858$, $p = 0.063$), it is worth noting the increased willingness of banks to provide debt financing when business incomes grow. Moreover, while it was previously believed that lending in Ukraine played a leading role in the formation of financial resources of domestic households (Yudina et al., 2019), in the context of the war, the concentration of state-owned banks in the banking market is an additional stabilising factor and an instrument of direct government influence on financing and stimulating economic activity in the economy (Shpanel-Yukhta, 2022). Instead, the inflation rate weakly correlates with deposits ($r = 0.063$) and loans ($r = 0.188$). In particular, authors such as Korneev et al. (2024), Vozniak and Kaspshyshak (2024), Zomchak and Lapinkova (2022) point to a decline in financial activity during periods of economic instability, where unemployment hurts financial performance. Therefore, this trend indicates the adaptive behaviour of economic agents that integrate inflation expectations into their financial strategies. However, the identified relationships do not fully explain the impact of behavioural aspects of economic decisions due to the influence of macroeconomic factors on the financial activity of economic entities. Therefore, regression modelling was conducted separately for *deposit* and *lending* operations to analyse the determinants of economic activity's financial behaviour.

Regression Modelling of Deposit Operations

The regression modelling used in the study of behavioural patterns of deposit transactions by economic entities in Ukraine during the war and in the context of growing political and socio-economic instability is intended to assess the impact of various macroeconomic factors on

deposit activity, in particular, how changes in inflation and unemployment may affect the volume of household deposits. The results of the models for deposit operations, which are parameterised in Table 3, allowed the NBU to assess the structural relationships between deposit volumes and lending in the context of macroeconomic indicators such as inflation and unemployment.

Table 3. Parameterisation of regression models of deposit dynamics

Model Summary - Deposits								
Model	**R**	**R^2**	**Adjusted R^2**	**RMSE**	**R^2 Change**	**df1**	**df2**	**p**
M_0	0.642	0.413	0.217	485583.771	0.413	1	3	0.243
M_1	0.645	0.416	-0.168	592929.563	0.004	1	2	0.923
M_2	0.953	0.909	0.635	331531.027	0.493	1	1	0.259

Note: M_0 includes Loans

Note: M_1 includes Loans, Inflation index

Note: M_2 includes Loans, Inflation, Unemployment

Source: calculated by the author

In the baseline model M_0, where lending is the explanatory variable, the coefficient of determination ($R^{(2)}$) is 0.413, indicating a moderate level of explanation of deposit variation; and the inclusion of inflation in the model (M_1) does not improve its predictive power (R^2 = 0.416, p = 0.923), which is consistent with the previous results of the correlation analysis. However, including the unemployment rate in the M_2 model significantly increases the coefficient of determination (R^2= 0.909). Thus, the model confirms the significant impact of this macroeconomic factor on deposit activity. Such results are consistent with the general scientific discussion; in particular, Matviichuk et al. (2024) note that the economic situation, in particular the unemployment rate, directly affects the deposit policy of banks, and Vozniak and Kaspshyshak (2024) note that an increase in the unemployment rate can reduce household incomes, which in turn can affect the volume of deposits. Thus, the decision to include the unemployment rate in the model of deposit activity can significantly increase its explanatory power, confirming the importance of this macroeconomic factor. However, to fully understand the specifics of deposit operations by economic entities in Ukraine during the war, it is necessary to assess the significance of the regression coefficients in the previously formed models of deposit activity, the results of which are presented in Table 4.

Table 4. Estimation of significance of regression coefficients in deposit activity models

Coefficients								
							Collinearity Statistics	
Model		**Unstandardised**	**Standard Error**	**Standardised ( )β**	**t**	**p**	**Tolerance**	**VIF**
M_0	(Intercept)	$-3.632\times10^{+6}$	$3.853\times10^{+6}$		-0.943	0.415		
	Loans	5.452	3.757	0.642	1.45	0.24	1.000	1.00

					1	3		0
M_1	(Intercept)	$-3.313\times10^{+6}$	$5.532\times10^{+6}$		-0.599	0.610		
	Loans	5.549	4.671	0.654	1.188	0.357	0.965	1.037
	Inflation index	-3746.646	34100.837	-0.060	-0.110	0.923	0.965	1.037
M_2	(Intercept)	$3.207\times10^{+6}$	$4.177\times10^{+6}$		0.768	0.583		
	Loans	0.868	3.299	0.102	0.263	0.836	0.605	1.654
	Inflation index	-12452.634	19431.935	-0.201	-0.641	0.637	0.929	1.077
	Unemployment rate	$-1.372\times10^{+6}$	590637.744	-0.920	-2.323	0.259	0.583	1.716

Source: calculated by the author

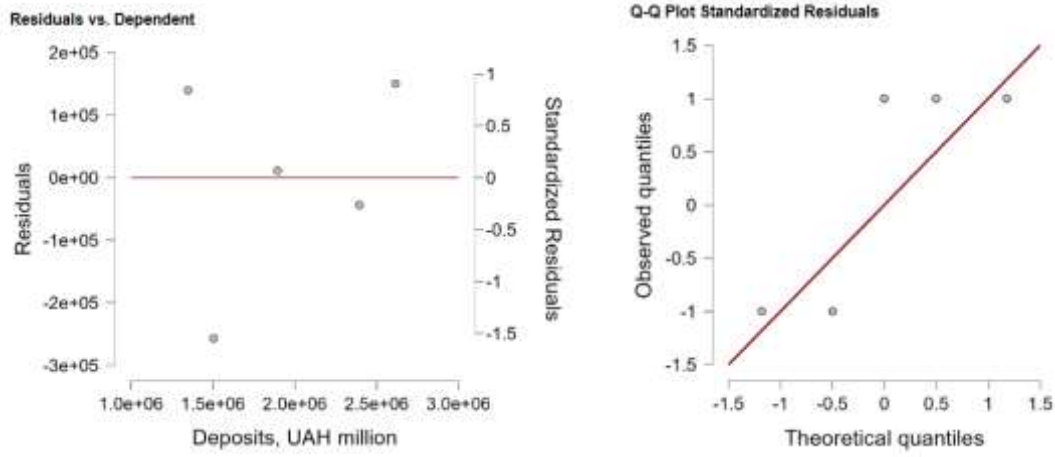
The analysis of regression coefficients in the deposit activity models shows that in the M_2 model, the unemployment rate has the most significant negative impact ($\beta = -0.920$, $p = 0.259$), which is consistent with the hypothesis that savings are reduced in times of economic uncertainty. In addition, given the high multicollinearity indicators (VIF < 2), which indicate no excessive dependence between the explanatory variables, a high level of accuracy and reliability is expected. However, Table 5 presents the results of multicollinearity diagnostics for the deposit behaviour models to confirm their stability. It is expected that the diagnostic results will confirm the low level of multicollinearity and, thus, the correctness of the models, allowing for a clear assessment of the impact of each variable on deposit activity.

Table 5. Diagnosing multicollinearity in models of deposit behaviour

Collinearity Diagnostics							
				Variance Proportions			
Model	**Dimension**	**Eigenvalue**	**Condition Index**	**(Intercept)**	**Loans**	**Inflation index**	**Unemployment rate**
M_0	1	1.998	1.000	0.001	0.001		
	2	0.002	35.459	0.999	0.999		
M_1	1	2.995	1.000	0.000	0.000	0.001	
	2	0.003	29.318	0.032	0.286	0.866	
	3	0.001	45.192	0.968	0.714	0.133	
M_2	1	3.772	1.000	0.000	0.000	0.000	0.009
	2	0.224	4.105	0.000	0.001	0.002	0.536
	3	0.003	32.956	0.023	0.165	0.855	0.001
	4	8.041×10^{-4}	68.488	0.977	0.834	0.143	0.454

Source: calculated by the author

The results of multicollinearity diagnostics in the models of deposit behaviour show that for the M_0 model, there is a strong dependence between the variables, as the bulk of the variation is explained by only two dimensions with very high values of the Condition Index (CI ≈ 35.5), indicating potential multicollinearity. It should also be noted that the highest values of the Condition Index are observed in models with a more significant number of predictors, particularly in the M_2 model (CI≈ 68.5), which indicates a high probability of multicollinearity between factors. At the same time, in the models with fewer predictors (e.g., M_0 and M_1), the conditional index does not exceed 35.459 and 45.192, respectively, which remains within the acceptable range. The identified patterns support the initial assumption that the number of predictors affects the level of multicollinearity. Given the identified trends, Cai (2020) suggests using nudge strategies to adjust the choice and provide information about investments, which can help reduce cognitive biases and irrational decisions that arise when making deposit transactions. In addition, Leal and Oliveira (2024) note that such strategies can help encourage economic actors to make more ethical decisions, which will help optimise their financial behaviour. Additionally, since the results of the multicollinearity diagnosis indicate that there is a possibility of dependencies between the variables, it is important to conduct additional analysis of the residuals (Figure 2) to check the correctness of the models and identify potential problems, such as autocorrelation or heteroscedasticity, that may distort the regression results.



a) Diagram of the dependence of balances on the dependent variable in deposit activity models

b) Q-Q plot of Standardised Residuals for deposit activity models

Figure 2. Estimation of residual characteristics in deposit activity models

Source: compiled by the author

The assessment of the residual characteristics in the deposit activity models showed that the residuals in the dependence plot (a) do not show a clear dependence on the values of the dependent variable (i.e. Deposits), given the chaotic distribution of the residuals and the absence of apparent patterns. In the case of the Q-Q plot (b) case, the residuals generally have a theoretically normal distribution as the observation point approaches a straight line, confirming the normality of the residuals. Also, despite minor deviations at the extremes of the plot, there

is no discrepancy between the empirical and theoretical quantiles. Thus, the estimation of the residual characteristics confirmed the adequacy of the residual distribution in the deposit activity models, given that the residuals do not exhibit significant systematic errors and their distribution is close to normal.

Regression Modelling of Credit Operations

Given that in the current conditions of war in Ukraine, economic entities face several challenges that affect their behaviour in financial transactions, it is necessary to conduct an additional analysis of behavioural patterns in credit transactions under conditions of financial uncertainty to determine the attitude of economic entities to deposit instruments and assess the factors that cause such changes. The additional analysis aims to develop regression models that assess the dynamics of lending activity and its dependence on certain economic factors. This leads to the study's primary hypothesis, which is that the behavioural patterns of economic entities with respect to credit operations in wartime are primarily determined by macroeconomic factors, such as inflation and average wages. The parameterisation of the regression models of lending dynamics is presented in Table 6.

Table 6. Parameterisation of regression models of lending dynamics

Model Summary - Loans								
Model	**R**	**R^2**	**Adjusted R^2**	**RMSE**	**R^2 Change**	**df1**	**df2**	**p**
M_0	0.642	0.413	0.217	57198.957	0.413	1	3	0.243
M_1	0.659	0.435	-0.131	68729.914	0.022	1	2	0.806
M_2	0.878	0.770	0.080	61986.196	0.336	1	1	0.440

Note: M_0 includes Deposits

Note: M_1 includes Deposits, Inflation index

Note: M_2 includes Deposits, Inflation, Average wage

Source: calculated by the author

Despite some relationship between the level of lending and deposit flows, the coefficient of determination of the model M_0 ($R^2 = 0.413$) leaves considerable room for other unaccounted-for factors, as only about 41% of the changes in lending dynamics can be explained by this variable. As in the case of the previous regression modelling, the inclusion of only one variable provides a limited explanation, necessitating additional variables to more accurately forecast lending activity. Taking into account the change in the inflation index in the M_1 model does not fundamentally change the situation ($R^2 = 0.435$), i.e. inflationary processes have a relatively minor impact on the dynamics of lending; however, when including the average wage in the M_2 model, significant progress in explaining lending activity was achieved ($R^2 = 0.77$), as 77% of the changes can be explained by the interaction of these macroeconomic variables. Similar trends were found by Ali et al. (2022) in their study of macroeconomic factors in Somalia in the context of instability; in particular, the authors noted a significant negative impact of the decline in financial activity on the financial performance of economic entities. In addition, such factors as the dynamics of unemployment and average wages are considered to be one of the most important factors in the decline in financial activity during periods of economic instability in the studies by Korneev et al. (2024), Matviichuk et al. (2024), Vozniak and Kaspshyshak (2024), Zomchak and Lapinkova (2022). Thus, although the hypothesis of low sensitivity of lending

behaviour to changes in macroeconomic conditions in crisis conditions is partially explained by the M_0 and M_1 models, the financial capacity of the population is a factor that increases the ability of the population to lend even in the face of increased instability. Given the possible effects of cognitive biases on decision-making, Gomes (2023) emphasises the importance of using behavioural incentives to adjust the decisions of economic agents in financial transactions. In addition, Espinosa et al. (2022) emphasise the importance of taking cognitive distortions into account when formulating policy decisions, which directly impact the efficiency of financial models and the accuracy of forecasts for credit transactions. However, in order to fully understand the specifics of lending operations by economic entities in Ukraine during the war, it is necessary to statistically assess the significance of the regression coefficients in the previously formed models of lending activity, the results of which are presented in Table 7.

Table 7. Estimation of significance of regression coefficients in lending activity models

Coefficients								
							Collinearity Statistics	
Model		**Unstandardised**	**Standard Error**	**Standardised ( )β**	**t**	**p**	**Tolerance**	**VIF**
M_0	(Intercept)	876414.801	104872.436		8.357	0.004		
	Deposits	0.076	0.052	0.642	1.451	0.243	1.000	1.000
M_1	(Intercept)	757310.550	445188.380		1.701	0.231		
	Deposits	0.075	0.063	0.633	1.188	0.357	0.996	1.004
	Inflation index	1085.038	3889.793	0.149	0.279	0.806	0.996	1.004
M_2	(Intercept)	827165.126	405650.907		2.039	0.290		
	Deposits	0.009	0.078	0.076	0.113	0.928	0.518	1.930
	Inflation index	1244.622	3510.617	0.170	0.355	0.783	0.995	1.005
	Average salary	1.129	0.935	0.803	1.208	0.440	0.520	1.923

Source: calculated by the author

The results of the analysis of the regression coefficients of the lending activity models indicate that in the M_2 model, average wages are the most significant factor influencing lending activity ($\beta = 0.803$, $p = 0.44$), confirming the assumption that an acceptable level of income is necessary to form an appropriate lending behaviour. The high value of the coefficient indicates a close relationship between the level of wages and the availability of borrowed funds, which is consistent with the theory of household creditworthiness as a determining factor in lending processes, as outlined in Vovchak and Antoniuk (2016). At the same time, given the positive regression coefficient ($\beta = 0.149$, $p = 0.806$) of the inflation index in the M_1 model, it can be

argued that economic agents are oriented towards other factors in a wartime economy, which is consistent with the empirical findings of Gilchrist et al. (2017) on the low sensitivity of the credit market to inflationary fluctuations in times of crisis. In addition, the Collinearity Statistics estimate in the regression models of credit activity indicates that there are no critical levels of dependence between the explanatory variables, which is confirmed by the values of multicollinearity indicators (VIF > 1), which remain below the generally accepted multicollinearity threshold; and, therefore, it can be argued that the models are correctly specified and there is no threat of multicollinearity, which increases the reliability of the obtained estimates of the regression coefficients. In addition, for a clearer understanding of the specifics of lending operations by economic entities in Ukraine during the war, it is important to assess the significance of the regression coefficients for the already established models of lending activity (Table 8).

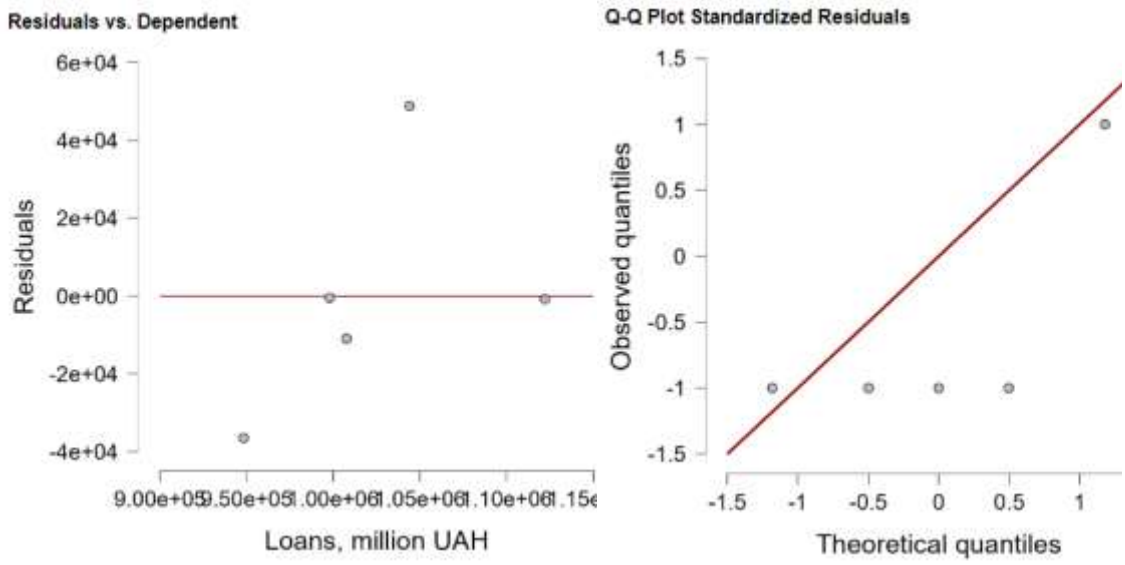
Table 8. Diagnosing multicollinearity in models of credit behaviour

Collinearity Diagnostics							
				Variance Proportions			
Model	**Dimension**	**Eigenvalue**	**Condition Index**	**(Intercept)**	**Deposits**	**Inflation index**	**Average salary**
M_0	1	1.970	1.000	0.015	0.015		
	2	0.030	8.076	0.985	0.985		
M_1	1	2.957	1.000	0.001	0.007	0.001	
	2	0.040	8.567	0.018	0.987	0.022	
	3	0.002	34.499	0.981	0.007	0.978	
M_2	1	3.526	1.000	0.000	0.002	0.000	0.015
	2	0.449	2.803	0.001	0.000	0.001	0.515
	3	0.022	12.560	0.022	0.986	0.032	0.466
	4	0.002	37.742	0.976	0.011	0.967	0.004

Source: calculated by the author

Given the diagnostic results, there are currently potential manifestations of multicollinearity between individual explanatory variables. The M_0 model has no significant multicollinearity problems, as evidenced by the relatively low Condition Index (CI≈ 8.08) and the uniform distribution of the Eigenvalue, i.e., the explanatory variables are entirely independent. However, in the M_1 model, there is a significant increase in the Condition Index (CI≈ 34.5) on the third dimension, which is accompanied by a significant share of variance for the Variance Proportions of the inflation index (VP = 0.978). This situation indicates a strong dependence between the variable and other predictors (Deposits and Average Wage), which may lead to instability in the estimates of regression coefficients and complicate the interpretation of the impact of inflation on the behaviour of economic entities in lending operations. In addition, given that the M_2 model has the highest values of the Condition Index (CI≈ 37.7), as well as the highest variance concentrations in the last dimension for the inflation index (VP = 0.967) and average wage (VP= 0.466), we argue that there is a significant interdependence between these variables and, as a result, a potential distortion of the estimates of the regression coefficients and a decrease in the predictive efficiency of the M_2 model. These results indicate certain limitations of the study. First, the diagnosis requires revision of the model specification, mainly by eliminating collinear variables, improving the estimates' accuracy and ensuring a correct interpretation of economic

dependencies. Estimating residual characteristics provides additional information on the adequacy of the built models, the results of which are presented in Figure 3.



a) Diagram of the dependence of balances on the dependent variable in lending activity models

b) Q-Q plot of Standardised Residuals for credit activity models

Figure 3. Estimation of residual characteristics in lending activity models

Source: compiled by the author

The assessment of the residual characteristics in the lending activity models revealed certain deviations from the normal distribution. The Residuals vs. Dependent plot (a) shows an uneven scattering of points, i.e., no systematic patterns could indicate heteroscedasticity. At the same time, Q-Q Plot (b) shows significant deviations of the empirical quantiles from the theoretical line, indicating the non-normality of the residual distribution, particularly the potential presence of extreme values or skewness. Therefore, to improve the quality of the models, future studies should eliminate the multicollinearity and consider other behavioural factors that may affect the lending activity of economic entities. In general, the diagnosis of multicollinearity and the analysis of residual characteristics indicate the need to improve the models' specification by enhancing the models' predictive ability by expanding the set of explanatory variables.

Conclusion

The modern development of behavioural economic theory strengthens interdisciplinary research that integrates economic, psychological and social aspects of decision-making. Given the results of the analysis of the behavioural aspects of economic decisions through the influence of macroeconomic factors on the financial activity of economic entities, the consideration of cognitive and emotional factors in financial models allows for improving existing government regulation strategies, mainly through behavioural tools. In particular, nudge strategies are the most effective solution for improving financial literacy and making more rational economic decisions, given the prospect of stimulating positive changes in the financial activity of

economic entities without direct interference or limiting their freedom of choice. The main areas of application of nudge strategies in the Ukrainian context are modelling the behaviour of depositors and creditors through psychological influences. Such strategies are aimed at encouraging the population to increase savings in a crisis environment where there is low deposit activity and, at the same time, reducing the negative impact of macroeconomic factors, which is reflected in the negative relationship between the unemployment rate and the volume of deposit and lending transactions. These strategies are mainly implemented through incentive mechanisms, such as automatic deposit opening or information on lending opportunities at lower unemployment rates. In addition, nudge strategies help support economic agents' financial behaviour by regulating the banking sector in the area of savings and lending in the face of unpredictable economic changes, especially given the weak relationship between inflation and deposits and loans. Currently, nudge strategies are most effective in the context of the need to adjust economic behaviour in the face of macroeconomic uncertainty and maintain financial market stability. However, the impact of information flows on financial decisions and the role of digital technologies in correcting behavioural distortions is an open question that needs to be considered in future research.

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