# “The relationship between bank lending and economic factors in the regions of Kazakhstan”


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| **AUTHORS** | Assel Bekbossinova<br>Laszlo Vasa<br>Elvira Nurekenova |



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**Assel Bekbossinova** (Kazakhstan), **Laszlo Vasa** (Hungary), **Elvira Nurekenova** (Kazakhstan)

# THE RELATIONSHIP BETWEEN BANK LENDING AND ECONOMIC FACTORS IN THE REGIONS OF KAZAKHSTAN

## Abstract

Understanding the impact of economic factors on bank lending is crucial in Kazakhstan's modern economy, characterized by volatile inflation and fluctuations in real wages. This paper aims to investigate the link between bank lending and economic factors such as inflation, real wages, and consumer expenditure in a regional context. Data from the Bureau of National Statistics and the National Bank, covering the period from 2012 to 2022, were used to uncover how economic factors influence bank lending. For the analysis, various economic indicators were integrated through normalization and averaging. Analysis reveals significant regional disparities in real wages and consumer expenditures, which impact the demand for bank credit. The results of the correlation matrix showed that both real wages (P-value < 0.001) and inflation (P-value < 0.001) significantly impact bank lending, with an $R^2$ value of 0.998, indicating that the model explains 99.8% of the variation in bank lending. The regression analysis highlights that regions with higher real wages, such as Astana, Almaty, and Atyrau, provide the most favorable conditions for banking sector growth, demonstrated by a strong relationship between wages and bank lending. In contrast, regions with lower wage levels, such as Turkestan and Zhambyl, show a significantly weaker connection (around 0.65), reflecting their lower attractiveness for banking investment and emphasizing the need for policies to address social inequality. The Durbin-Watson test confirmed no autocorrelation in residuals (DW = 1.89), although heteroscedasticity was detected, suggesting the need for further model adjustments. The study emphasizes the importance of developing economic policies that can balance regional development and improve financial stability.

**Keywords** bank, bank lending, financial stability, financial inclusion, banking sector, social inequality, economic indicators, Kazakhstan

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Assel Bekbossinova, Ph.D. Candidate, Department of Finance and Accounting, University of International Business named after K. Sagadiyev, Kazakhstan.

Laszlo Vasa, Ph.D., Professor, Faculty of Economics and Social Sciences, Széchenyi István University, Hungary. (Corresponding author)

Elvira Nurekenova, Ph.D. in Economics, Associate Professor, D. Serikbayev East Kazakhstan Technical University, Kazakhstan.



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## INTRODUCTION

Understanding the relationship between bank lending and economic factors like inflation, real wages, and consumer expenditure is essential for grasping broader economic dynamics, especially in rapidly developing economies like Kazakhstan. Bank lending drives economic development by supporting investment and providing capital access. However, its effectiveness is closely linked to social conditions influencing borrowing behavior and economic stability.

Inflation influences borrowing costs by reducing purchasing power, often prompting banks to raise interest rates. As a result, loans become more expensive and less accessible to consumers. Real wages, adjusted for inflation, reflect purchasing power and influence borrowing capacity. Rising wages typically increase loan demand, whereas stagnant or declining wages tend to limit it. Consumer expenditure patterns also impact credit demand, with economic uncertainties or high inflation potentially reducing spending and credit needs.

Bank lending is becoming a source of financial support and an indicator of the country's economic health in conditions of economic instability. Particular attention is given to analyzing economic factors such as inflation, real wages, and consumer spending. Understanding the relationship between these variables and the banking sector makes it possible to assess current economic conditions better and develop effective measures to stimulate economic growth. This article aims to comprehensively analyze the impact of economic factors on bank lending in Kazakhstan from 2012 to 2022, identify key trends, and explore areas for further development.

## 1. LITERATURE REVIEW

Bank lending is a pivotal component of economic development, facilitating finance access for businesses and households. It promotes economic growth, employment, and improved living standards. By providing funds under specific repayment and interest conditions, bank lending allows businesses to invest in production capacity, technology, and innovation, thus contributing to productivity and GDP growth. Moreover, it enables companies to expand, create new jobs, reduce unemployment, and increase incomes. On the other hand, consumer loans enhance purchasing power, stimulating demand for goods and services and further contributing to economic growth.

Numerous studies underscore the positive relationship between bank lending and economic growth. For instance, research by King and Levin (1993) and Levin and Zervos (1998) highlighted that a well-developed banking system fosters economic growth. Kaminsky and Reinhart (1999) analyzed the risks associated with bank lending and the impact of financial crises on economic stability. Additionally, the role of bank lending in supporting small and medium-sized enterprises (SMEs) is well-documented, emphasizing how access to credit is crucial for the growth and sustainability of SMEs. Loans enable businesses to invest in new technologies and innovative projects, boosting their competitiveness and contributing to overall economic development. Nurgaliyeva et al. (2024) further elaborate on the relationship between banking infrastructure, innovation, and economic growth in Kazakhstan, underscoring the crucial role that a robust banking system plays in facilitating economic expansion.

The impact of bank lending extends to both income and expenses of businesses and households. For businesses, loans can increase revenues by expanding production and improving efficiency. However, interest payments on loans represent a significant cost, potentially affecting financial stability. Bank lending also influences inflation rates, as increased borrowing can raise the money supply in the economy. According to the quantitative money supply theory (Friedman, 2010), an increase in the money supply can lead to higher demand for goods and services, thereby raising prices. Increased loan investment may initially cause inflation by driving up demand for resources and labor. However, enhanced production capacity can stabilize prices (Carpenter & Demiralp, 2012; McLeay et al., 2014).

Inflation plays a critical role in shaping bank lending conditions, particularly concerning household financial stability. Low-income households are especially vulnerable to inflation, as a significant portion of their budget is spent on essential goods, which often experience the highest price increases (Matin et al., 2002). When inflation outpaces wage growth, households are compelled to borrow more to maintain their standard of living, thereby exacerbating financial strain and increasing economic inequality (Jaravel, 2021; Dilanchiev & Taktakishvili, 2021). Cardoso et al. (2022) further discuss how inflation redistributes wealth from creditors to borrowers, diminishing the actual value of nominal incomes. This reduction in real income, coupled with rising expenses, often leads households to take on more debt, thereby impacting their financial stability.

Inflation impacts household behavior by reducing the actual value of wages and increasing expenses. Cardoso et al. (2022) discuss how inflation redistributes wealth from creditors to borrowers and diminishes the actual value of nominal incomes. As real incomes fall and expenses rise, households often take on more debt to sustain their consumption, impacting their financial stability (Jaravel, 2021). Regional studies indicate that inflation and rising consumer expenditures significantly affect household budgets,


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leading to increased borrowing (Gibson et al., 2016; Arundel & Ronald, 2021). Additionally, rising housing prices, driven by asset inflation, place a further financial burden on households, intensifying economic inequality (Adkins et al., 2021; Le Goix et al., 2021). Thus, research indicates that inflation and pricing policies significantly affect social and economic inequality and consumer expenditures. Asset ownership, particularly in real estate, becomes crucial in determining wealth, necessitating reevaluating approaches to assessing inequality and living standards under inflationary conditions.

Real wages, adjusted for inflation, play a crucial role in determining the purchasing power of households. Increases in real wages lead to higher disposable income, which can boost demand for loans as individuals are better positioned to service debt (Sehrawat et al., 2021). However, under high inflation conditions, the growth of real wages often lags behind the increase in household expenditures, disproportionately affecting lower-income households (Kaplan & Schulhofer-Wohl, 2017). Studies by Fuller et al. (2020) and Ali and Asfaw (2023) emphasized that asset inflation, particularly in housing, exacerbates inequality by causing housing costs to rise faster than wages, thereby reducing real purchasing power and deepening economic divides. This situation can lead to higher default rates on bank lending as households struggle to keep up with rising costs, impacting the banking sector's stability.

Consumer expenditures are a critical determinant of the demand for bank credit, as fluctuations in household spending, influenced by changes in income and inflation, directly affect borrowing behavior (Dumitrescu et al., 2022). During periods of high inflation, household expenditures often increase, particularly on necessities, which can reduce disposable income for other spending and limit the need for additional credit. However, wage growth frequently lags behind increases in household expenditures, particularly under high inflation conditions, disproportionately affecting lower-income households (Kaplan & Schulhofer-Wohl, 2017; Alazzawi & Hlasny, 2019). Studies by Fuller et al. (2020) and Ali and Asfaw (2023) highlighted how asset inflation, especially in housing, intensifies inequality by driving housing costs up faster than wages, thereby reducing real purchasing power and deepening economic divides.

As household budgets become more constrained, the ability to repay loans diminishes, potentially leading to higher default rates on bank lending. This strain on households can also prompt banks to tighten lending standards, making credit less accessible to those who need it most, further limiting economic opportunities for lower-income families. Moreover, rising housing prices, driven by asset inflation, impose additional financial burdens on households, exacerbating economic inequality (Adkins et al., 2021; Le Goix et al., 2021). The cycle of constrained spending, increased financial strain, and restricted access to credit underscores the significant role consumer expenditures play in influencing bank lending behavior.

Social and economic inequality remains a critical issue affecting developed and developing countries (Kuznets, 2019). One significant factor exacerbating inequality is inflation and pricing policies. Inflation directly impacts the population's purchasing power, influencing income distribution and the welfare of different social strata. In particular, it increases costs for the poor and reduces the accessibility of essential goods and services (Bond & Malikane, 2019). Furthermore, the unequal impact of inflation across various income groups can widen the gap between the rich and the poor, making it harder for low-income households to maintain their standard of living. This disparity is often exacerbated by regressive pricing policies that disproportionately affect vulnerable populations, further entrenching socioeconomic divides (Iammarino et al., 2019). As inflation disproportionately burdens lower-income households, it intensifies social inequality by eroding their purchasing power and increasing economic vulnerability. Consequently, the deepening of these divides undermines social cohesion and creates long-term challenges for achieving equitable economic growth and stability (Kenzhegulova et al., 2023; Shah et al., 2023).

Although extensive research exists on the relationship between bank lending and economic inequality, a significant gap remains in understanding the role of economic factors, especially in rapidly developing economies like Kazakhstan. Previous studies have highlighted the importance of bank lending for economic growth, the risks associated with lending, and the impact of inflation on financial stability and social inequality. However,

there is a need for a comprehensive analysis that addresses explicitly how these economic factors collectively influence bank lending.

Inflation disproportionately impacts lower-income households, exacerbating financial strain and deepening economic divides. Furthermore, real wages often fail to keep pace with rising living costs, particularly during periods of high inflation, leading to increased borrowing and heightened financial vulnerability. Given these dynamics, this study seeks to address the research gap by investigating the relationship between bank lending and critical economic factors within the regional context, including inflation, real wages, and consumer expenditure. Thus, based on the literature review and identified research gaps, the following hypotheses were developed:

*H1: The inflation rate has a significant impact on bank lending in Kazakhstan.*

*H2: Real wages have a significant impact on bank lending in Kazakhstan.*

*H3: Consumer expenditures have a significant impact on bank lending in Kazakhstan.*

# 2. METHODS

Analyzing economic factors is essential for understanding population lifestyle and regional development processes. The data for this study were obtained from official statistical sources, including the National Bank and the Bureau of National Statistics of the Republic of Kazakhstan, covering the period from 2012 to 2022. Thus, the research methodology includes a multi-stage analytical process aimed at a comprehensive understanding of social dynamics in Kazakhstan, which includes the following important stages.

## 2.1. Stage 1: Key variables identification

In the first stage, critical variables for the analysis of economic factors dynamics were identified. In particular, the following vital variables were selected: the inflation rate (measured using three categories of price indices: non-food products, food products, and goods and services); real wages (representing actual wage values without taking inflation into account); consumer expenditures (representing average household cash expenditures and income used for consumption).

## 2.2. Stage 2: Analysis of time-trends

In the second stage, time trends in inflation rates, real wages, and consumer spending were analyzed. Time series analysis allowed us to identify significant patterns and anomalies and to understand how these indicators changed during the period under study. In addition, regional differences in these variables were examined to identify spatial economic differences and their implications for regional development policies. The analysis results were visualized using graphs and charts, allowing us to present the data clearly and identify critical trends and issues.

## 2.3. Stage 3: Regression analysis

To fully understand the impact of the above economic factors on bank lending and test the proposed hypotheses, it was necessary to supplement this analysis with regression analysis. A correlation analysis was conducted at the initial stage to identify linear relationships between the variables. Correlation coefficients measured the degree of linear relationship, where values from –1 to 1 showed the direction and strength of the relationship. This analysis included the construction of a correlation matrix, the results of which will show which variables are significant. The following variables were used: the volume of bank lending (BL) as a dependent variable, real wages (RW), inflation (INFL), and average consumer expenditure (ACE) as independent variables.

## 2.4. Stage 4: Model validity check

To check model validity, the Durbin-Watson autocorrelation test was performed, the results of which confirmed the absence of autocorrelation of the residuals. Additionally, the Q-Q plot was used to check the normality of the residual distribution. Suppose the points on the plot lie close to the line. In that case, this indicates a normal distribution of the residuals, which is an essential condition for the correct application of regression analysis. Finally, a


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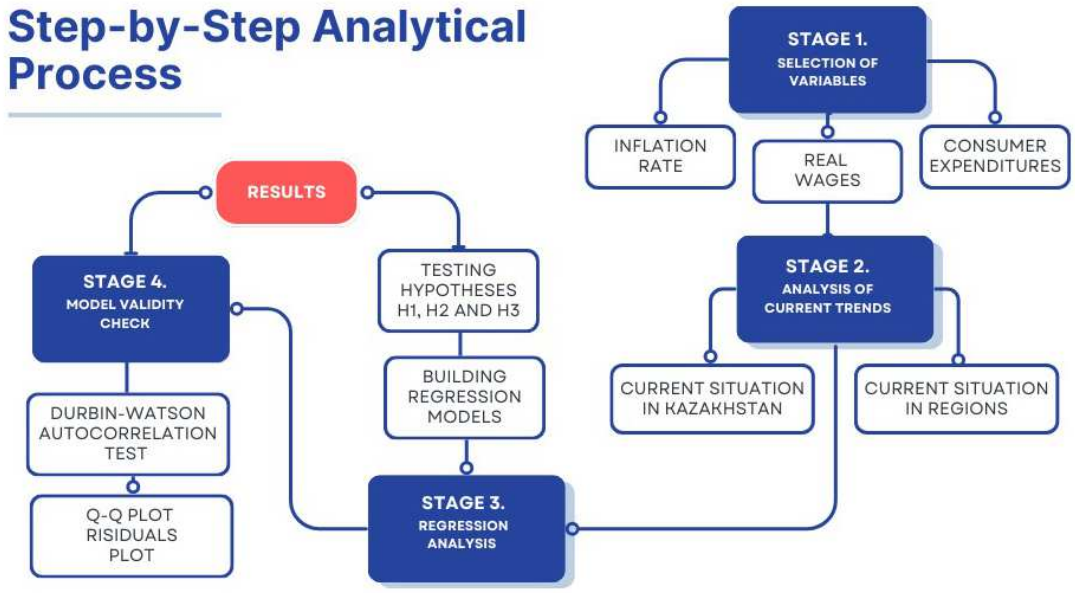


**Figure 1.** Stages of research

plot of residuals against predicted values was used to identify heteroscedasticity. Heteroscedasticity indicates a change in the dispersion of residuals depending on the level of predicted values, which can reduce the accuracy of model estimates.

This step-by-step analytical process provided a comprehensive analysis of the economic factors influencing bank lending in Kazakhstan. Figure 1 presents the stages of the study in visual form.

This methodology provided a comprehensive analysis of economic factors influencing bank lending in Kazakhstan. This approach allowed identifying critical variables and trends and assessing their impact on regional development and the banking system, which is important for the formation of effective economic policy.

## 3. TRENDS IN THE DYNAMICS OF ECONOMIC FACTORS OF KAZAKHSTAN FOR 2012–2022

### 3.1. Dynamics of the inflation rate

Analyzing inflation rates in regions is important because inflation plays a crucial role in shaping economic conditions, influencing purchasing power and the overall standard of living, especially in low-income regions. Regional differences in inflation are essential for developing effective economic strategies and policies to stabilize prices. In addition, inflation and bank lending are closely interrelated, as high inflation can lead to higher interest rates, which reduces the availability of loans for the population and businesses.

The average inflation rate results, based on data from three price index categories: non-food products, food products, and goods and services, display the change in Kazakhstan from 2012 to 2022 (Figure 2).

From 2012 to 2022, Kazakhstan's inflation rate experienced significant fluctuations, with notable declines and sharp increases. The decade began with deflation in 2012 and 2013, with rates at –1.07%, reflecting a period of economic contraction or stability. However, inflation rose 2014 to 3.8%, indicating emerging economic pressures, likely tied to global events such as the drop in oil prices. The most dramatic change occurred in 2015 when inflation surged to 7.4% following the devaluation of the tenge, which sharply increased import costs and reduced purchasing power. By 2016, inflation had swung back to –5.42%, marking a return to deflation as the economy stabilized. The situation remained relatively stable until 2022, when inflation spiked to 11.68%, the highest point

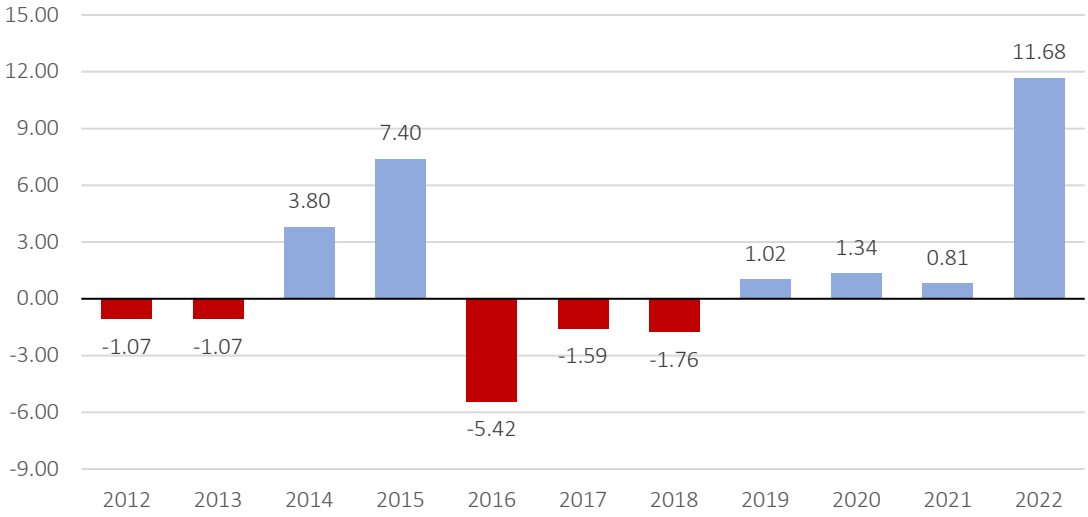


**Figure 2.** Average inflation rate for 2012–2022

of the decade. This stark contrast from the deflationary start to the decade reflects the significant impact of global supply chain disruptions and geopolitical tensions, marking a challenging period for Kazakhstan's economy.

Next, Figure 3 shows inflation rates across various regions in Kazakhstan from 2012 to 2022.

The findings illustrate that inflation rates varied significantly across regions. Astana city consistently shows the highest inflation rates, likely due to rapid urbanization and economic activities driving up prices. Regions like Mangystau and Kyzylorda also exhibit high inflation rates, potentially due to economic volatility and fluctuating oil prices. In contrast, regions such as Karaganda and Almaty show relatively lower inflation rates, indicating more stable economic conditions. Significant regional variations in inflation highlight the importance of customized economic policies to address the specific needs of regions like Astana, Mangystau, and Karaganda.

## 3.2. Dynamics of real wages

For wage analysis, it is crucial to determine the real wage, considering the effect of inflation on the population's purchasing power. Real wages provide a more accurate representation of how effectively individuals can purchase goods and services based on income. Therefore, the price indices for various categories were analyzed, and nominal wages were subsequently adjusted for inflation.

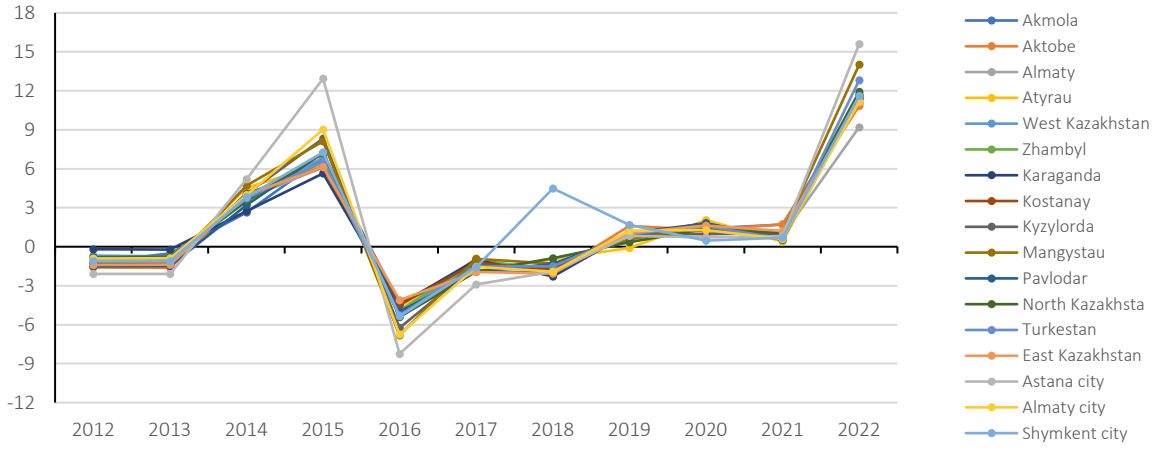


**Figure 3.** Inflation by region 2012–2022


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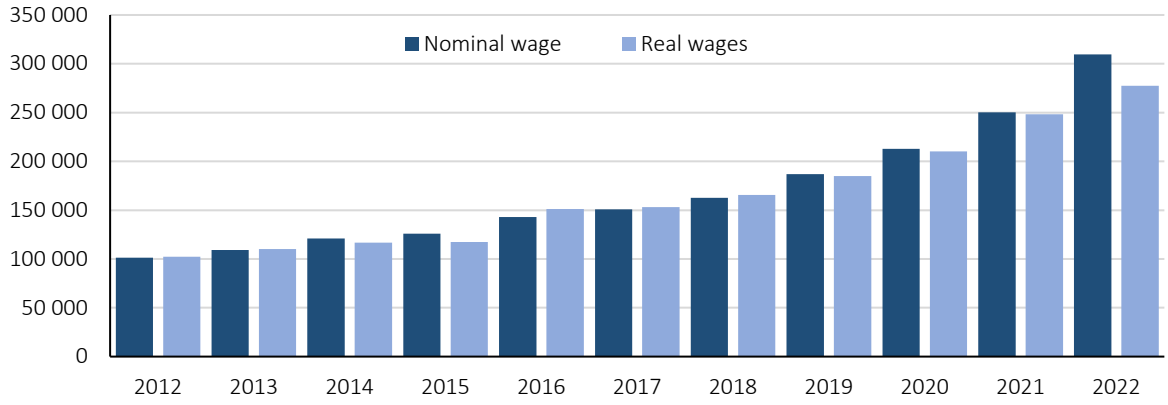


**Figure 4.** Nominal and real wages for 2012–2022

Figure 4 presents two indicators: nominal and real wages in Kazakhstan from 2012 to 2022. Nominal wages display the actual wage values without considering inflation, while real wages are adjusted for inflation and reflect the purchasing power of wages.

Between 2012 and 2022, Kazakhstan experienced a steady increase in nominal and real wages. However, this growth exhibited distinct characteristics, reflecting the domestic and global economic and social processes. Over the decade, nominal wages nearly tripled, which, at first glance, suggests a significant improvement in the standard of living for the population. Nevertheless, when examining the dynamics of real wages adjusted for inflation, the situation appears less straightforward: the growth in real income was only 2.7 times, indicating the influence of inflationary processes and a reduction in purchasing power. For instance, in 2012, real wages were higher than nominal wages, which can be interpreted as a favorable economic condition. However, starting from 2015, when inflation peaked at 7.4%, real wages began to lag significantly behind nominal wages, leading to a decline in purchasing power and, consequently, a deterioration in the social welfare of a significant portion of the population. In subsequent years, despite the stabilization of inflationary processes and even some periods of deflation, the gap between nominal and real wages remained substantial. For example, in 2022, nominal wages reached 309,697 tenge, while real wages amounted to 277,307 tenge, indicating a decrease in purchasing power by 10.4% relative to nominal wages.

These changes are inevitably linked to various external and internal factors that have impacted Kazakhstan's economy. In particular, global crises, driven by falling oil prices and the COVID-19 pandemic, intensified economic pressure on the country, which was reflected in wage dynamics. Additionally, internal socio-economic processes, such as labor market reforms and changes in tax and social policies, may have contributed to the widening disparity between nominal and real income. Thus, despite the apparent growth in nominal wages, the improvement in the population's welfare has been uneven and often offset by inflationary processes and external economic shocks.

Next, Figure 5 depicts real wages adjusted for the price index and reveals notable regional disparities in Kazakhstan from 2012 to 2022.

The graph reveals significant regional disparities in real wages over the analyzed period. Atyrau consistently shows the highest real wages, indicating strong economic activity, likely due to the oil industry's presence. Astana and Almaty cities also exhibit high real wages, reflecting their roles as economic and administrative centers. On the other hand, regions like North Kazakhstan and Zhambyl regions display lower real wages, which may indicate slower economic growth or less economic diversification. Revealed disparities highlight the economic differences between regions, influenced by various factors such as industrial presence, economic policies, and regional development programs, and underscore the necessity of regional wage management to address these imbalances.

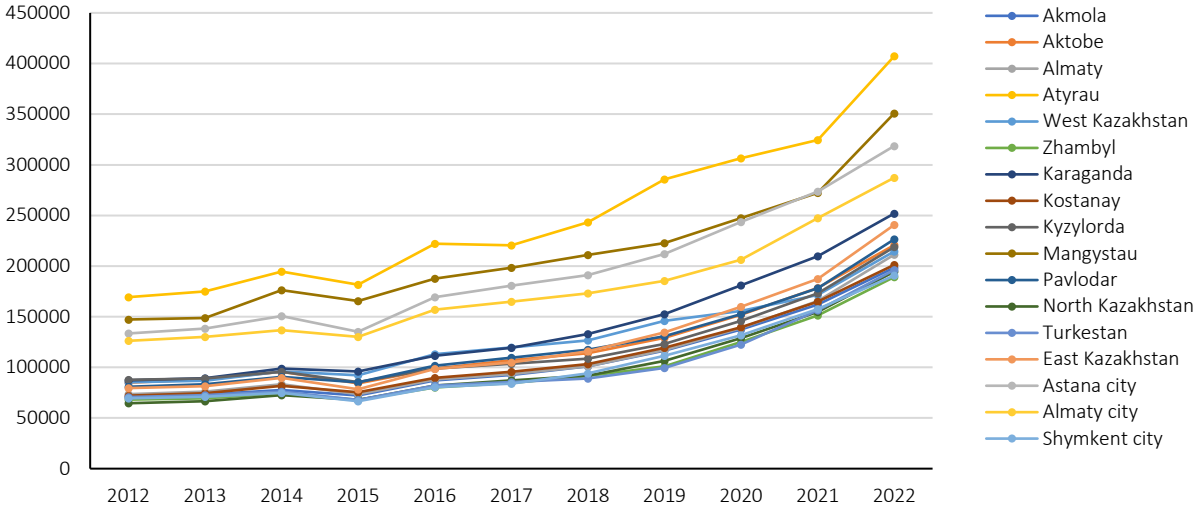


**Figure 5.** Real wages by region for 2012–2022

## 3.3. Dynamics of consumer expenditures

To analyze regional economic disparities in Kazakhstan, it was necessary to evaluate the average household monetary expenditures and incomes used for consumption by the population. Combining these data points into a single overall index achieved a more holistic understanding of economic well-being and consumer behavior across different regions. The index provided valuable insights into regional economic health, highlighting areas of strength and identifying regions that may require targeted economic interventions. The comprehensive approach allowed for identifying economic trends, disparities, and opportunities for development across Kazakhstan's diverse regions.

Next, Figure 6 depicts the combined index of consumer expenditures and incomes used for consumption across various regions in Kazakhstan.

Between 2012 and 2022, average consumer expenditures in Kazakhstan more than doubled, indicating a significant increase in spending. At the start of the period, in 2012, expenditures were about a third of what they were in 2022, highlighting the substantial growth in consumer spending. For example, in 2012, expenditures were 58% lower than in 2022, reflecting a significant shift in spending behavior.

Real wages increased by approximately 2.7 times, significantly less than the growth in nominal wages. Thus, the population's purchasing power increased more slowly than nominal incomes. During years of high inflation, such as 2015 and

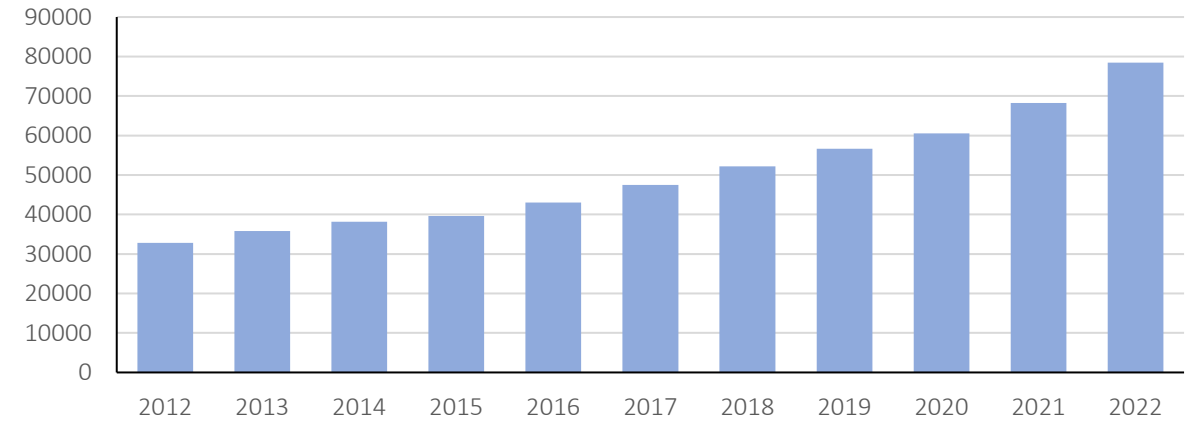


**Figure 6.** Average consumer expenditures used for consumption for 2012–2022


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2022, the rise in consumer expenditures was partly driven by higher prices for goods and services rather than an actual increase in the volume of goods and services consumed. This indicates that people were forced to spend more to maintain their previous standard of living. For instance, in 2022, expenditures increased by 14.9% compared to 2021, mainly due to inflation, which reached 11.68%. Similarly, in 2015, when inflation was 7.4%, expenditures grew by 3.7% compared to the previous year, again highlighting the impact of inflation on consumer spending.

The relationship between income and expenditure shows that the increase in consumer spending is primarily tied to inflationary processes and changes in market conditions. Despite the growth in nominal incomes, real opportunities for consumption increased more slowly, indicating a possible slowdown in improving the population's well-being. Thus, while average consumer expenditures increased, this growth does not necessarily reflect a real improvement in economic conditions but instead demonstrates an adaptation to changing economic realities, including inflation and market fluctuations.

Next, Figure 7 reveals distinct economic patterns and consumer behaviors across Kazakhstan regarding average incomes used for consumption by region.

The analysis of average consumer expenditures across Kazakhstan's regions from 2012 to 2022 reveals significant disparities driven by various economic factors. In most regions, household expenditures more than doubled during this period. For instance, in Almaty, expenditures increased nearly 2.5 times, reflecting income growth and inflationary pressures, reaching 11.2% in 2022. Similarly, in Astana, household expenditures also more than doubled, influenced by a 15.6% inflation rate in 2022, substantially impacting consumer spending. In regions with high inflation and slower real wage growth, such as Zhambyl and Kyzylorda, household expenditure increases were only sometimes aligned with income growth. For example, in Zhambyl, real wages grew by about 2.8 times, while household expenditures increased by over 2.6 times. This indicates that the 11.7% inflation rate in 2022 significantly eroded purchasing power, forcing households to spend more without corresponding real income growth.

In economically stronger regions like Almaty and Astana, the growth in household expenditures was more closely aligned with income growth. In Almaty, real wages increased by 2.9 times, enabling residents to maintain their consumption levels despite inflation. In Astana, real wages grew more than 2.3 times, reflecting sufficient income growth to support consumer spending despite high inflation. Conversely, in less developed regions like Zhambyl and Kyzylorda, the rise in household expenditures was driven more by rising prices than by actual improvements in well-being. For instance, in Kyzylorda, where inflation reached 11.5% in 2022, household expenditures increased by about 2.6 times, while real wages only grew by 2.5 times.

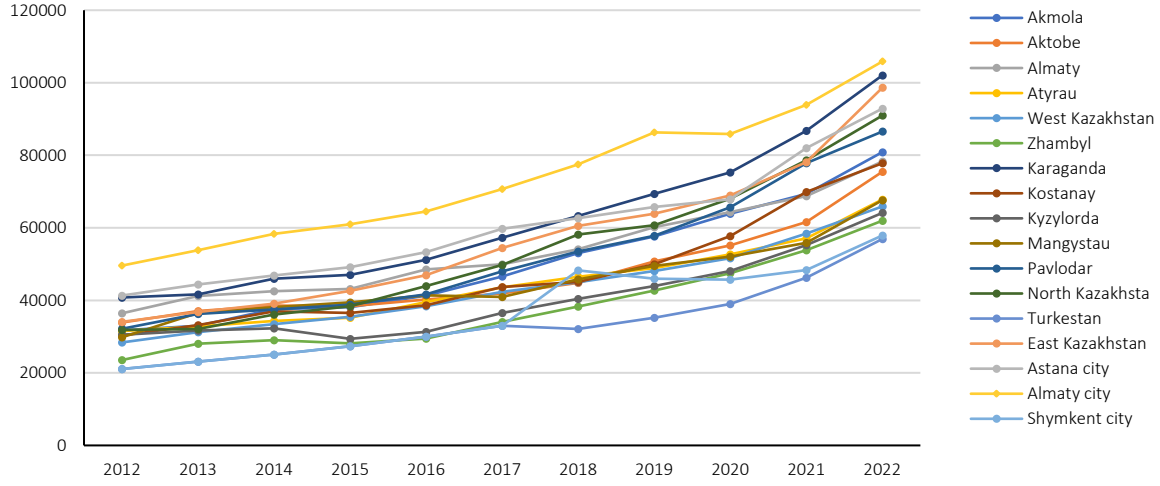


**Figure 7.** Average consumer expenditures used for consumption by region for 2012–2022

The results of the analysis also identified social inequality, which was reflected in notable expenditure spikes in certain regions, such as Shymkent, in 2018. With high consumer expenditures, cities like Astana and Almaty likely benefit from robust economic activity, higher wages, and better employment opportunities, attracting more banking services due to higher disposable incomes and greater demand for financial products. In contrast, regions like Turkestan and Shymkent face economic challenges, with lower expenditures suggesting lower incomes and possibly higher relative costs of living. These regions may struggle with financial stability, highlighting the need for targeted economic interventions to reduce regional disparities and promote balanced economic growth. The consistent rise in consumer expenditures across all regions underscores the impact of inflation and the necessity for policies that support income growth and financial resilience.

# 4. RESULTS OF REGRESSION ANALYSIS

## 4.1. Correlation matrix

The relationship between bank lending and various economic factors is crucial for understanding financial dynamics within Kazakhstan. Analyzing these correlations helps identify the degree of interdependence among the variables, which is essential to building a reliable regression model. The regression analysis involved using a multiple linear regression model to understand the relationship between average bank lending (BL) (the dependent variable) and three independent variables: real wages (RW), average consumer expenditures (ACE), and inflation (INFL). This section presents the results of the correlation analysis and discusses the implications for the regression model used to predict bank lending in Kazakhstan.

The results of the correlation analysis are displayed in Table 1.

Correlation coefficients measure the degree of linear relationship between variables, where a value of 1 indicates a perfect positive correlation, 0 means no correlation, and –1 indicates a perfect negative correlation. From the matrix, it is evident that there is a very high positive correlation between RW and ACE (0.99), indicating a strong interdependence. Similarly, a high positive correlation between RW and BL (0.99) suggests a significant interdependence between these variables. INFL, on the other hand, has comparatively lower correlations with the different variables, especially with RW (0.37) and BL (0.49).

The ACE variable was removed from the model due to high multicollinearity. The high correlation between ACE and RW (0.99) and between ACE and BL (0.99) indicates that these variables are strongly interrelated. Multicollinearity reduces the accuracy of regression coefficient estimates and complicates the model's interpretation. Removing ACE improved the model's reliability and made the results more interpretable.

The model includes two significant predictors: real wages (RW) and inflation (INFL). These variables were found to be statistically significant predictors of bank lending. Therefore, changes in these variables significantly impact the volume of bank loans, highlighting their importance in economic dynamics.

Table 2 shows the results for the model coefficients.

The model results show an $R^2$ value of 0.998, meaning that the predictors included in the model explain 99.8% of the variation in bank

**Table 1.** Correlation matrix

| Const | BL | ACE | RW | INFL |
|---|---|---|---|---|
| BL | 1.000 | 0.990*** | 0.990*** | 0.493 |
| ACE | 0.990*** | 1.000 | 0.992*** | 0.429 |
| RW | 0.990*** | 0.992*** | 1.000 | 0.371 |
| INFL | 0.493 | 0.429 | 0.371 | 1.000 |
| Degrees of freedom (df) | 8 | 8 | 8 | 8 |
| P-value | <.001 | <.001 | <.001 | 0.148 |

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


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**Table 2.** Model coefficients

| Predictor | Coefficient | SE | T | P | VIF | Tolerance |
|---|---|---|---|---|---|---|
| Intercept | –7,961.91 | 3,492.51 | –2.28 | 0.057 | – | – |
| INFL | 1,890.64 | 230.76 | 8.19 | <.001 | 1.16 | 0.862 |
| RW | 1.05 | 0.020 | 52.55 | <.001 | 1.16 | 0.862 |

lending. High $R^2$ value indicates that the model describes the observed data well. The model coefficients are as follows: Intercept: –7,961.91 ($p = 0.057$), INFL: 1,890.64 ($p < 0.001$), and RW: 1.05 ($p < 0.001$). These results indicate that real wages (RW) and inflation (INFL) are significant predictors of bank lending. An increase in real wages by one unit leads to a rise in bank lending by 1.05 units, highlighting the significant impact of wages on loan volumes. In contrast, inflation has a more substantial effect; an increase in inflation by one unit leads to a rise in bank lending by 1890.64 units. To validate the model, the following tests were conducted: The multicollinearity test showed VIF values of 1.16 for both INFL and RW (Tolerance = 0.862), indicating no multicollinearity issues between the predictors, which confirms the model's reliability after removing ACE.

## 4.2. Autocorrelation test

The autocorrelation test evaluates whether residuals from the regression analysis exhibit patterns that could violate the assumption of independent errors. This section presents the results of the Durbin-Watson test for autocorrelation and the residual plots to assess the validity and reliability of the regression model.

Table 3 presents the results of the autocorrelation test.

**Table 3.** Durbin-Watson test for autocorrelation

| Test | Value | Statistic | p-value |
|---|---|---|---|
| Durbin-Watson Test for Autocorrelation | 0.166 | 1.89 | 0.546 |

The Durbin-Watson test for autocorrelation produced a DW statistic of 1.89 ($p = 0.546$), which is close to 2. This indicates no autocorrelation of residuals, thus confirming that the model meets the regression analysis requirements. Generally, a DW value between 1.5 and 2.5 is acceptable, further affirming the model's robustness.

The Q-Q plot of residuals compares the quantile values of the residuals with the theoretical quantiles of a normal distribution, showing normal distribution and validating the model (Figure 8).

The normal distribution of residuals supports the reliability of the predictions for bank lending based on wages and inflation. The residuals versus predicted values plot shows the distribution of residuals concerning the expected values. Deviations of the residuals from random distribution around the zero axis suggest heteroscedasticity. This means that the variance of the residuals is not constant across the range of predicted values. Heteroscedasticity can reduce the accuracy of predictions, necessitating further analysis or model modification to improve reliability.

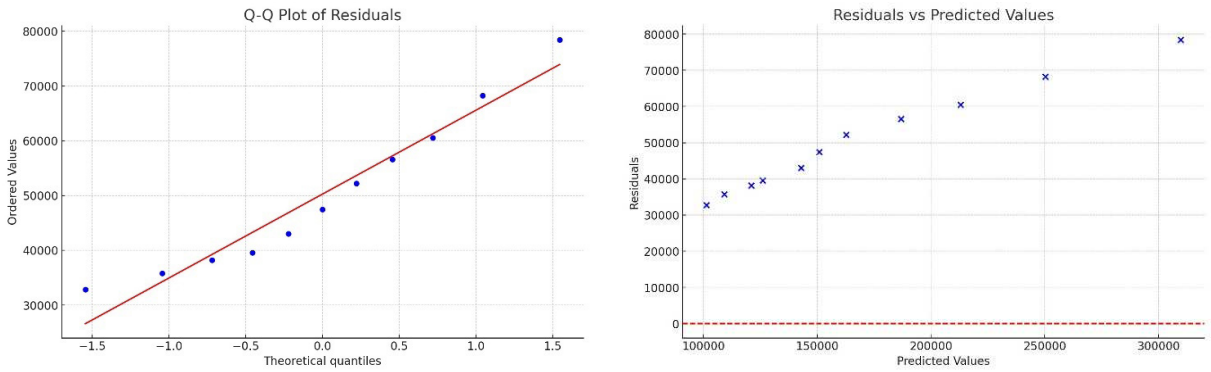


**Figure 8.** Residuals

Overall, the analysis of the residual plots indicates that the model generally satisfies the normality assumption but reveals heteroscedasticity. In an economic context, the predictions for bank lending based on real wages and inflation are valid but require attention to identified anomalies to enhance their accuracy and reliability.

The regression model analysis demonstrated that real wages and inflation are key factors influencing bank lending in Kazakhstan. Comparing these regression results with regional analyses reveals valuable insights into the potential for banking sector development across various regions. Astana stands out as a particularly favorable region for banking growth due to its consistently high average nominal monthly wages, which are nearly double those in less prosperous regions. The strong correlation between wages and loans (0.99) underscores Astana's significance as a critical area for banking expansion. Similarly, with high wage levels – approximately 85% of Astana's – Almaty supports strong economic development, making it a prime candidate for further growth in the banking sector. In Atyrau, driven by its vital oil and gas industry, wages are the highest in the country, showing a considerable lead over other regions. This financial strength and growing banking activity highlight Atyrau as another favorable region for expansion.

Conversely, some regions need help solving social inequality, particularly with lower wage levels, which may impact their attractiveness for developing the banking sector. In Turkestan, historically associated with lower wages, average salaries are nearly half of those in Astana, resulting in slower growth in banking activities. Despite some improvements, Turkestan remains less favorable for banking expansion than other regions. The Zhambyl region exhibits similarly low wages, among the lowest in the country, leading to less dynamic growth in bank lending and making it less attractive for banking sector investment.

The correlation between wages and consumer expenditures highlights significant regional disparities. Cities like Astana, Almaty, and Atyrau region benefit from high wages and relatively lower household expenditure burdens. For instance, consumer expenditures in Astana are around one-fourth of the average monthly wage, while in Almaty, expenditures are slightly higher but still manageable. Atyrau stands out with consumer expenditures constituting an even smaller fraction of income, allowing more disposable income to be directed toward savings and investments, further supporting growth in the banking sector. In contrast, regions like Turkestan and Zhambyl face a different scenario, where consumer expenditures consume a more significant proportion of already lower wages. In these areas, expenditures approach nearly half the average monthly income, severely limiting disposable income and savings, exacerbating economic inequality, and reducing these regions' attractiveness for the development of the banking sector.

The analysis identifies Astana and Almaty cities, and Atyrau region as favorable for banking sector growth due to their high wages and substantial loan activities. In contrast, regions like Turkestan and Zhambyl face challenges due to lower wages and higher consumer expenditures. Addressing these disparities through targeted economic interventions could help alleviate regional inequalities and support balanced economic growth across Kazakhstan. The strong correlation between wages and bank lending underscores the importance of economic policies promoting wage growth to enhance the overall development of the banking sector.

Overall, the results of the hypothesis testing are as follows:

$H_1$: *The inflation rate has a significant impact on bank lending in Kazakhstan* – accepted.

$H_2$: *Real wages have a significant impact on bank lending in Kazakhstan* – accepted.

$H_3$: *Consumer expenditures have a significant impact on bank lending in Kazakhstan* – rejected.

## 5. DISCUSSION

The results revealed significant disparities in inflation trends across different regions of Kazakhstan. The concentration of economic activity in the spe-


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cific areas, as discussed by Krugman and Venables (1995), provides a relevant framework. They showed that economic activity tends to cluster in regions with advantages such as market access and reduced transportation costs (Martin et al., 2012). This concentration can lead to higher inflation in those regions due to increased demand for goods and services. The most substantial price increase was observed in Shymkent city, indicating high inflation rates likely due to high economic activity and demand for goods and services. These findings align with Petrakos et al. (2003), who demonstrated that short-term economic growth increases regional inequality while long-term growth contributes to its reduction. Furthermore, research by Iammarino et al. (2019) confirmed that inflation impacts various social groups unevenly, exacerbating the gap between the rich and the poor.

Adjusting real wages for inflation showed significant disparities in real incomes across regions. The theory by Krugman and Venables (1995) on economic concentration explains these findings, suggesting that regions with concentrated industrial activity, like Mangystau and Atyrau, benefit from economies of scale and increased productivity, leading to higher real wages. The growth in real wages is likely due to the presence of major industrial enterprises, particularly in the oil and gas sector. In contrast, regions such as Kyzylorda and Kostanay showed slower growth, which may indicate insufficient economic diversification and poor inflation management. These results are supported by the study of Jaravel (2021), who found that inflation redistributes wealth from creditors to borrowers and reduces the real value of nominal incomes. Fuller et al. (2020) also highlighted that asset inflation, particularly in housing, can significantly outpace wage growth, reducing real purchasing power and exacerbating inequality. The impact of real wages on bank lending is particularly notable, as regions with higher real wage growth, such as Mangystau and Atyrau, demonstrate more significant potential for banking sector expansion due to increased consumer spending power.

The results revealed that regions such as North Kazakhstan and East Kazakhstan exhibit high consumer expenditures, indicating robust economic activities and consumer confidence. In contrast, regions like Kyzylorda and Kostanay showed low expenditure levels, suggesting economic stagnation or higher savings rates due to uncertainty. These findings are consistent with several works. Bond and Malikane (2019) also emphasized that inflation increases costs for low-income people, reducing the accessibility of essential goods and services and widening socio-economic divides. Dilanchiev and Taktakishvili (2021) noted that inflation significantly affects household purchasing power, especially in regions with high expenditure levels. The correlation between consumer expenditures and bank lending underscores the importance of consumer confidence and economic activity in driving the growth of the banking sector.

Thus, in regions with high real wage growth, there is an increased potential for the development of the banking sector due to an increase in consumer purchasing power, such regions can demonstrate active credit growth, which stimulates further economic development. At the same time, regions with slower real income growth and low spending levels face difficulties in expanding lending due to low consumer activity and lack of confidence in the economy.

## CONCLUSION

This study examined the influence of economic factors, specifically inflation, real wages, and consumer expenditures, on bank lending in the regions of Kazakhstan. The findings confirmed that real wages and inflation significantly affect bank lending, supporting the hypotheses that inflation (*H1*) and real wages (*H2*) are important determinants. Conversely, the theory regarding the influence of consumer expenditures (*H3*) was rejected due to its limited impact on lending behavior.

The results revealed that while inflation plays a role in influencing credit demand, its effect is less substantial compared to the impact of rising real wages. Inflation drives households and businesses to seek

loans as prices increase, but the growth in real incomes fosters banking sector expansion. Regions with higher real wages, such as Astana, Almaty, and Atyrau, exhibit sustained demand for banking services and more favorable conditions for lending. Thus, policies to increase real incomes in regions with lower wage levels could stimulate the development of the banking sector and strengthen economic stability.

Contrary to initial expectations, consumer expenditures were found to have a limited effect on bank lending. Although high expenditures typically reflect economic activity, they did not translate into increased demand for loans across Kazakhstan's regions. In areas characterized by high expenditures but lower real wages, demand for banking services remained weak, suggesting that consumer spending alone is insufficient to drive significant growth in the banking sector.

## AUTHOR CONTRIBUTIONS

Conceptualization: Assel Bekbossinova, Laszlo Vasa.
Data curation: Laszlo Vasa, Elvira Nurekenova.
Formal analysis: Assel Bekbossinova, Laszlo Vasa.
Funding acquisition: Laszlo Vasa, Elvira Nurekenova.
Investigation: Assel Bekbossinova, Laszlo Vasa.
Methodology: Assel Bekbossinova, Laszlo Vasa, Elvira Nurekenova.
Project administration: Assel Bekbossinova, Laszlo Vasa.
Resources: Assel Bekbossinova.
Software: Laszlo Vasa, Elvira Nurekenova.
Supervision: Laszlo Vasa, Elvira Nurekenova.
Validation: Assel Bekbossinova, Elvira Nurekenova.
Visualization: Assel Bekbossinova, Laszlo Vasa.
Writing – original draft: Assel Bekbossinova, Laszlo Vasa, Elvira Nurekenova.
Writing – reviewing & editing: Assel Bekbossinova, Laszlo Vasa, Elvira Nurekenova.

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