NATIONAL BANK OF KAZAKHSTAN

An Empirical Assessment of Consumer Demand Heterogeneity to Household Income by Regions of Kazakhstan

Monetary Policy Department
Economic Study No.2024-4

Samat M.

Economic studies and research notes of the National Bank of the Republic of Kazakhstan ("the NBK") are meant to disseminate the outcomes of the NBRK's studies as well as of other academic research works of the NBK's staff. Economic studies are disseminated in order to encourage discussions. The opinions expressed in the paper reflect the personal standing of the author and may not coincide with the official standpoint of the NBK.

An Empirical Assessment of Consumer Demand Heterogeneity to Household Income by Regions of Kazakhstan

NBRK - WP - 2024 - 4

Abstract

Samat M.[1]

Due to differences in socio-economic status, established attitudes and habits of households, consumer behavior may differ not only across countries, but also within the same economy. This paper analyzes the presence of such heterogeneous response of consumer demand to several shocks across the regions of Kazakhstan. The results of the constructed structural vector autoregression models indicate the presence of different responses of consumer demand from region to region to income and credit shocks.

Key Words: consumer demand, structural vector autoregression model, demand heterogeneity by regions, impulse responses.

JEL-Classification: C51, E21, E2.

[1] Samat M.N. – Chief Specialist-Analyst, Macroeconomic Research and Forecasting Division, Monetary Policy Department
E-mail: Moldir.Samat@nationalbank.kz

CONTENTS

Preamble

Studying consumer demand is one of the main and complex tasks of the central bank, along with inflation, since the transmission of monetary policy (MP) to consumer prices occurs precisely through the consumption channel. Given the difference in the level of socio-economic development in the regions of the country, there is a possibility of heterogeneity in the response of consumer demand to various shocks. Understanding the degree of regional heterogeneity can be useful for better understanding consumption and building macroeconomic models at the National Bank.

This paper tests the presence of heterogeneity of demand across regions and assesses the heterogeneity of the response of consumer demand to several types of shocks at a regional level based on the technique of structural vector autoregressions (SVAR).

The paper consists of several sections. The initial chapters are devoted to a review of the literature on the study of consumer demand, then, based on the review of literature studied, an evaluation technique is selected and a description of the analysis methodology is provided. The third chapter describes the choice of variables. As an indicator of regional demand, the author calculated the demand indicator based on the output of economic sectors that secure household consumer spending. As explanatory factors of demand, the factor of population well-being in the form of real cash income of the population, as well as the volume of consumer loans, is used. The fourth chapter of the study summarizes the main patterns of consumer demand in Kazakhstan. Next comes a description of the immediate results of the empirical assessment and, in conclusion, the main findings of the study and recommendations for future research of consumer demand.

According to the results of the analysis, 30% of the regions did not show statistically significant responses to all shocks; in the rest of regions, the presence of a heterogeneous response of consumer spending to shocks of income and consumer lending was confirmed. The main reason for heterogeneity of consumption is the socio-economic situation in the regions, which affects the consumption structure of the population.

1.1. Literature Review

One of the first theories devoted to consumer demand is the absolute income hypothesis by J.M. Keynes, where under consumer behavior is determined by a functional dependence on the level of current income, and capital and interest rates are constant. Subsequent fundamental theories were founded by J. Hicks, who considered consumption not only as a function of income but also of the interest rate (IS-LM model); M. Friedman, who prioritized constant income rather than current income, as well as F. Modigliani, who introduced the life cycle theory.

Numerical empirical evaluation of existing fundamental theories became possible with the development of econometrics. Methods for assessing consumer behavior as econometric techniques developed changed from the simplest random walk models to more complex structural models.

The study by (James E. H. Davidson, David F. Hendry, Frank Srba, Stephen Yeo, 1978) is one of the earliest works on empirical assessment of consumption where consumption in the UK is estimated from disposable income using vector autoregression models, as well as the work of an American economist (E.Hall, 1978) who came to the conclusion that consumption in the US is more inertial and its forecasting is possible using random walk processes rather than future income. Next, the study by (Flavin, 1981) on the contrary, shows that consumption is "overly sensitive" to income, a finding widely interpreted as evidence that liquidity constraints are important for estimating consumer spending (Dornbusch, 1987).

In general, there are many studies examining household consumption as a function of the population's welfare, and also with the addition of factors of household access to credit, interest rates on loans, inflation, etc.

Many works devoted to the study of consumer demand are based on microdata in the form of household balance sheets. One recent such paper (Crawley, E., Kuchler, A., 2020) examines the microfoundations of consumption patterns and quantifies the macroeconomic consequences of consumption heterogeneity. The paper proposes a new empirical method for estimating the consumption response to permanent and temporary income shocks for different groups of households. The results show that households that stand to lose from rising interest rates respond more strongly to income shocks than those that are less sensitive to interest rates.

A number of studies describe a long-term interrelationship between income and consumption based on VECM models. For example, in the study by (Singh, 2004), consumption on the island of Fiji in the long run is determined by the income and welfare of the population. Moreover, in the short run, consumption is determined mainly by the real interest rate and net private transfers.

In Kazakhstan, there are also research works aimed at studying consumer demand. For example, a long-term relationship between consumer demand and a number of macroeconomic indicators is found in the study by (Жузбаев А., Сейдахметова Б., 2019) (Zhuzbaev A., Seidakhmetova B., 2019). In addition, based on vector autoregression models, impulse response functions of consumer demand to shocks of these macrovariables were constructed. The results showed that the largest consumption response is observed from shocks to changes in the number of hired workers and the population size.

The work by (Carlino G., 1998), which examines the heterogeneity of the influence of monetary policy across the US states is also of interest. One of the conclusions in the work is the relevance of using the structural vector autoregression approach to identify regional differentiation in the response of income to monetary policy instruments. This approach was used by the Russian researcher (Закирзянов, 2021) (Zakirzyanov, 2021), who conducted an assessment of the factors that differentiate demand by region based on the above-mentioned SVAR methodology. According to the analysis, real wages serve as the main driver of consumer demand in Russian regions.

1.2. Data Used

The economic agents in the study are households (HHs) presented on a regional basis. In order to collect the maximum available time series, the divisions of large regions into smaller ones that occurred in the historical dynamics were skipped and used in their original form (Attachment A).

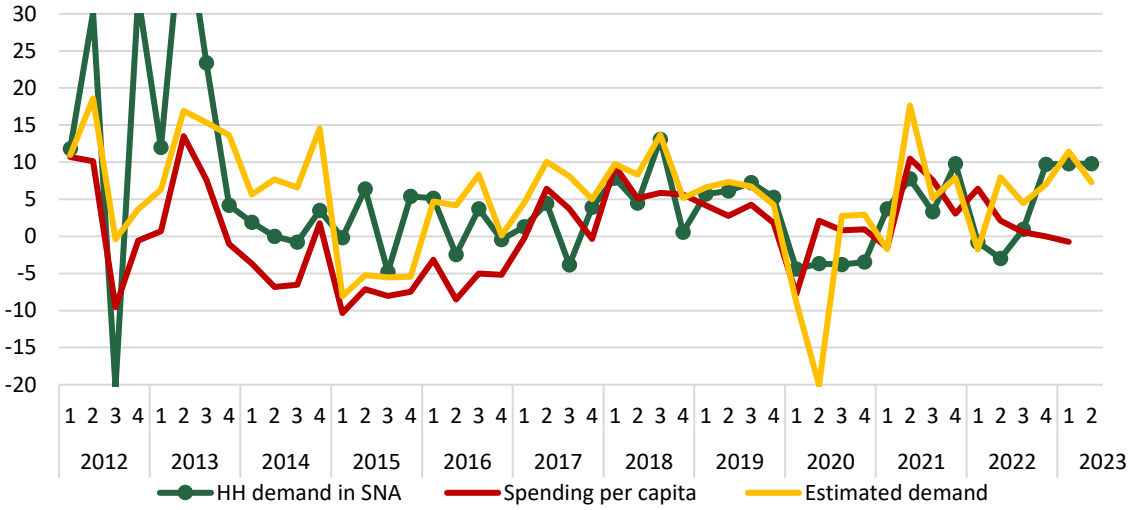
In the absence of statistics of national accounts (SNA) on regional consumption, the question was which variable to use as an indicator of demand on a regional basis. For this purpose, a comparison was made of the dynamics of household consumption with consumer expenditures per capita and the calculated indicator. The calculated indicator is a set of production volumes of industries that meet household demand, including retail trade turnover, public catering, hotel services, passenger turnover and other personal services (hairdressers, beauty salons, etc.). The total volume of these industries, according to calculations, took on average 36% of demand in the SNA over the time range under consideration[2].

In general, the demand dynamics themselves are volatile in certain periods, which is a consequence of the quality of the SNA statistics, due to the existing export lag, which affects not only the balance of payments statistics[3] but also the National Accounts indicators. At the same time, due to the lack of alternative statistics on demand in Kazakhstan, the demand variable calculated by the author will be used in this study. Both in terms of dynamics and statistical characteristics (Attachment B), of the two variables, the calculated indicator is closest to the dynamics of demand in the SNA. Per capita consumer spending demonstrated a more dramatic decline between 2014 and 2016 and has also recently shown a significant divergence from aggregate consumer demand (Graph 1).

[2] This low share is due to the methodology for collecting monthly and quarterly statistics used in the work. For example, in retail trade, to collect monthly statistics, data from 10% of small enterprises is taken into account, while maintaining the representativeness of the sample.

[3] There is a lag of up to 90 days when submitting export declarations, which directly affects the dynamics of the trade balance. The BNS ASPR in the calculation of GDP using the end-use method employs trade balance statistics, and the lag also fits the GDP dynamics. Thus, a certain difference arises between GDP on the production side, which displays actual oil production in the reporting period, and GDP on the demand side, where the reported oil exports are the oil sales volumes of the previous period. The difference becomes significant during the periods of high growth or decline in exports, which distorts the figures for domestic demand and makes its dynamics more volatile.

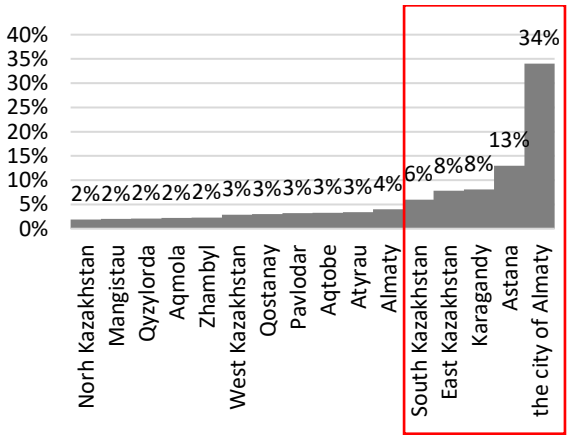
Graph 1. Dynamics of Household Demand in the SNA, Consumer Spending per Capita and the Estimate of Demand (calculated using the household demand deflator)



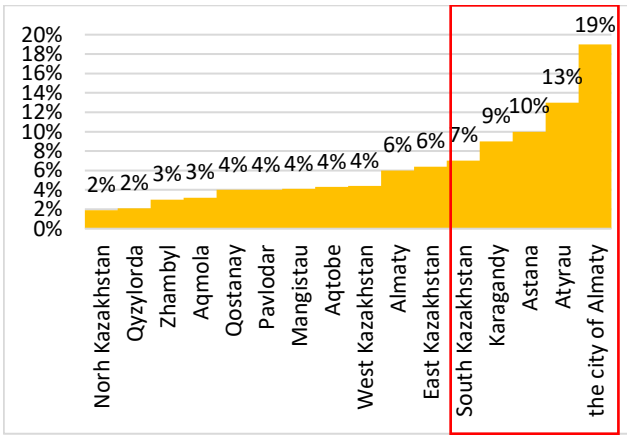
Source: BNS ASPR, the author's computations

In addition, to check the relevance of the choice in the calculated indicator as a proxy variable of demand in a regional context, the distribution of regions by the share of consumption in the total volume of estimated demand was compared with the distribution by the share of GRP in GDP. Considering that demand accounts for the largest share of GDP, it is logical to assume that the regions will be distributed equally in terms of both demand and GRP. In general, the hypothesis is confirmed, with the exception of the Atyrau region, which has the second largest GRP (supply side), given the high contribution of the oil sector in the region (Graphs 2, 3).

Graph 2. Regional Distribution by Shares in Total Demand.



Graph 3. Regional Distribution by Shares in Total GDP.

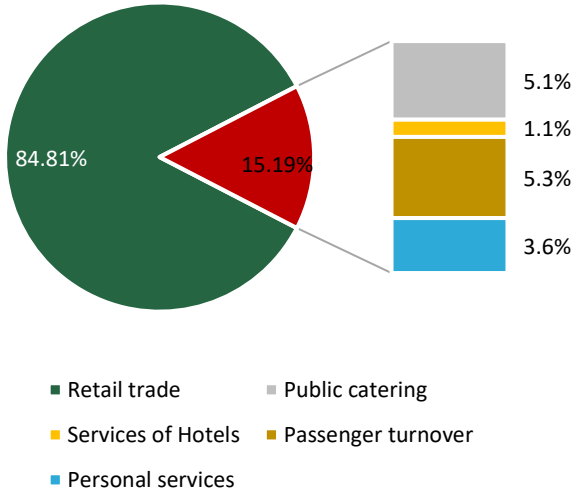


Source: the author's computations based on the data from BNS ASPR

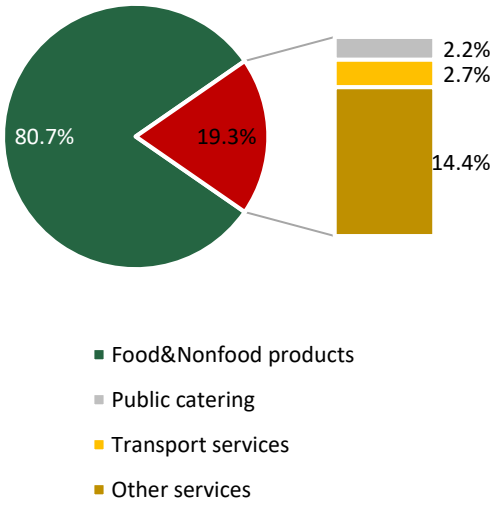
The structure of expenditures for paid services in consumer spending reported by the BNS and the estimated indicator are slightly different. It must be borne in mind that the estimated indicator does not take into account the population's expenditures

on health care, education, and utilities. The share of these services in paid services is about 40%, and when their volumes are included in the estimated variable, the share of services and retail turnover generally corresponds to the structure of consumer spending per capita. Thus, we can conclude that the estimated demand generally follows the general consumption patterns of the population.

Graph 4. Structure of Estimated Demand (Q2 2023)



Graph 5. Structure of Consumer Spending per Capita (Q2 2023)



Source: BNS ASPR, The author's computations

Real money income per capita, as well as the volume of consumer loans originated by region, were selected as explanatory factors of demand. According to the study by (Midori Wakabayashi; Charles Yuji Horioka, 2005), conducted based on the Japanese microdata, limitations on borrowings have an important impact on household consumption behavior, and the consumption of those without access to credit is more affected by changes in income. Also, according to the study, the short-term nominal interest rate on loans to individuals (from 3 months to 1 year), characterizing the deterioration or improvement of lending conditions, is taken into account as an endogenous factor.

To check the robustness of obtained estimates, the dynamics of the tenge exchange rate is used as an exogenous factor. Dummy variables have been added that cover the period of a significant drop in demand during the imposition of lockdowns during the pandemic, as well as the first quarter of 2022, corresponding to the January events. These dummy variables can explain the behavior not only of demand, but also of income and crdits during crisis periods.

The time series covers the maximum available quarterly statistics by region from 2011 until present. All indicators are given at constant prices based on the 2010 base. Deseasonalization of the rows was performed using the X12 method. Seasonally adjusted figures in real terms are presented as a quarterly index (as percentage, on a QoQ basis, SA).

1.3. Methodology of Analysis

The assessment technique will be based on the work by (Закирзянов, 2021), (Zakirzyanov, 2021), which, in turn, rests upon the study of (Carlino G., 1998), which assesses the heterogeneity of response across the US states to the Fed's monetary policy based on structural vector autoregression. SVAR is a model from the class of vector autoregressions and is represented mathematically in the following form:

$$A\,Y_t = A_1^S\,Y_{t-1} + \cdots + A_p^s\,Y_{t-p} + \ C^sX_t + Bu_t, \text{ (1)}$$

where Y_t- is the vector of endogenous variables (n × 1);

X_t is the vector of exogenous variables;

A, A_i^s, C^s, B – is the matrix of unidentifiable parameters;

u_t, – is the vector of structural shocks, representing white noise with a diagonal covariance matrix $\sum \epsilon$, where one or more elements have an economic interpretation supported by a particular theory. Typical shocks identified within the SVAR include shocks to aggregate supply, aggregate demand, fiscal, monetary, and technological shocks (Kilian L., Lütkepohl H., 2017).

The following approaches to identifying shocks in a SVAR model can be distinguished (Breitung J., Bruggemann R., Lutkepohl H. , 2004):

- ✓ the Cholesky decomposition is applied to the estimated residual covariance matrix, whereunder the order from less endogenous to more endogenous one should be preserved;
- ✓ formulation of structural equations for errors;
- ✓ restriction on the long-term effect of shocks, including restrictions on signs (the most common example is the neutrality of money in the long run).

Equation (1) characterizes the relationship between the given VAR equation and the SVAR specification. This equation is further transformed by moving the structural variable in front of the endogenous parameters into the form:

$$Y_t = A^{-1}A_1^S\,Y_{t-1} + \cdots + A^{-1}A_p^s\,Y_{t-p} + \ A^{-1}C^sX_t + A^{-1}Bu_t \text{ (2)}$$

Then, equation (2) as a result can be conceived of as:

$$Y_t = A_1\,Y_{t-1} + \cdots + A_p\,Y_{t-p} + \ CX_t + \epsilon_t, \text{ (3)}$$

where matrices $A_i = A^{-1}A_i^S$, $C = A^{-1}C^s$, $S = A^{-1}B$ are presented.

The last correlation S actually characterizes the relationship between structural shocks and model shocks in an abbreviated (reduced) form. Where $A^{-1}Bu_t = Su_t = \epsilon_t$, $E(\epsilon_t\epsilon_t') = \sum \in = A^{-1}BB'^{A^{-1}\prime} = SS'$.

The work will impose short-term restrictions based on the matrix S. Two types of standard restrictions are set on the structural matrix of variances and deviations:

1. Structural shocks are supposed to be orthogonal;
2. The structural shocks variation is normalized to 1.

In the matrix of short-term restrictions, shocks are ordered from least endogenous to most endogenous ones. Thus, real income and credit shocks are primary to demand, and the interest rate shock is dependent on all other shocks. In general, the vector autoregression model can be represented as a system:

$$\begin{cases} incomes_t = \alpha_{10} + \alpha_{11} incomes_{t-1} + \alpha_{12} credits_{t-1} + \alpha_{13} demand_{t-1} + \alpha_{14} interest_{t-1} \\ credits_t = \alpha_{20} + \alpha_{21} incomes_{t-1} + \alpha_{22} credits_{t-1} + \alpha_{23} demand_{t-1} + \alpha_{24} interest_{t-1} \\ demand_t = \alpha_{30} + \alpha_{31} incomes_{t-1} + \alpha_{32} credits_{t-1} + \alpha_{33} demand_{t-1} + \alpha_{34} interest_{t-1} \\ interest_t = \alpha_{40} + \alpha_{41} incomes_{t-1} + \alpha_{42} credits_{t-1} + \alpha_{43} demand_{t-1} + \alpha_{44} interest_{t-1} \end{cases}$$

where, incomes_t – a quarterly index of real money income per capita; credits_t – a quarterly index of real rates of consumer loan disbursements; demand_t – a quarterly index of real rates of growth in the estimated demand; interest_t – is a short-term interest rate on retail loans as a quarterly average, and; α_{ij}- estimated parameters.

The matrix of short-term restrictions corresponding to a priori ideas about the mutual influence of parameters on each other is presented below:

	Incomes	Credits	Demand	Interest
Incomes	NA	0	0	0
Credits	NA	NA	0	NA
Demand	NA	NA	NA	0
Interest	NA	0	NA	0.5 pp

Incomes are not affected by credit, demand and interest rate shocks. Loans are affected by real income shocks (the higher the income, the greater the credit repayment capacity), as well as interest rate shocks through the monetary policy interest channel. Demand is affected by income and credit shocks. The interest rate is affected by income and demand shocks. Value 0.5 pp before an interest rate shock, characterizes the likelihood of tightening lending terms. However, in the short-term as in the work by (Закирзянов, 2021) (Zakirzyanov, 2021) for the Russian economy, interest rate on loans did not show significant responses. Therefore, in the constraint matrix, the value before the lending shock with respect to the interest rate is 0. The NA values indicate the magnitude of shocks of one standard deviation, which will be estimated by the maximum likelihood method.

1.4. A Short Excursus to the History of Household Consumption in Kazakhstan

In most economies of the world, household consumption accounts for the largest share in the structure of gross domestic product (GDP) and is one of the main drivers of economic growth. Consumer demand in Kazakhstan accounts for slightly more than half of GDP, whose share in GDP since 2005 has averaged 48%.

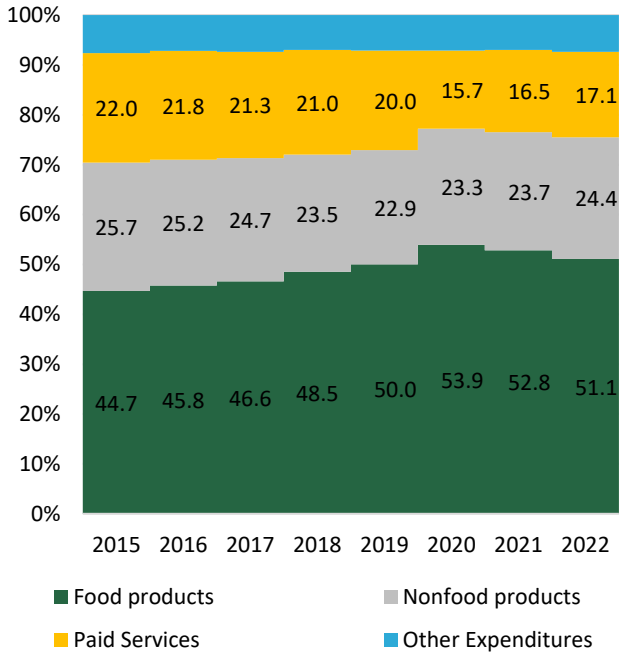
Depending on stages of the business cycle, there is a slight increase and decrease in the nominal share of household consumption in GDP. In particular, the declines are associated with periods of boom in oil prices and, accordingly, expansion in the share of nominal exports.

Despite the significant growth in GDP per capita, consumer behavior in the country remains virtually unchanged. A feature of consumption in Kazakhstan is the high share of population's spending on food. Its share varies from 45% during a favorable

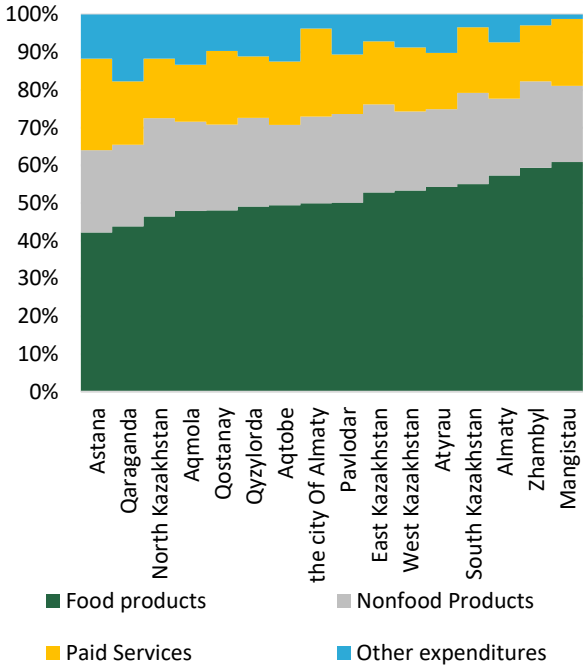
economic situation in the country, rising above 50% during periods of crisis (Graph 6). In the world ranking, Kazakhstan is one of the countries with a high share of spending on food, significantly ahead of developed countries, as well as most developing economies of the world (Attachment C).

According to the latest data, the share of spending on food continues to account for more than 50% of total expenditures. The range of variation between regions with the largest and smallest shares of spending on food is about 20 percentage points (Graph 7).

Graph 6. Structure of Household Spending



Graph 7. Structure of Household Spending by Regions in 2022



Source: BNS ASPR

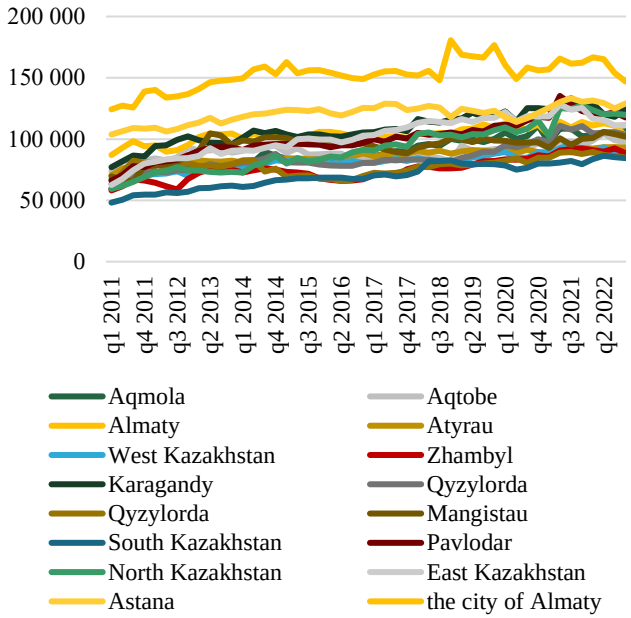
One of the reasons for the existing consumer preferences in Kazakhstan is the established habits associated with cooking and eating at home. The share of spending on eating out is small and has not changed significantly since 2011 (2.9% in 2011, in 2022 – 2.2%).

The population level of well-being also has an effect on the high level of spending on food. Regions with the lowest consumer spending per capita and a high share of food expenditures are characterized by a relatively low level of solvency in the country. These include South Kazakhstan (Turkestan region and the city of Shymkent), Zhambyl, Kyzylorda and Mangistau regions (Graph 7). The leaders in terms of consumer spending per capita are the city of Almaty, with a large gap from other regions, and the city of Astana (Graph 8). The interregional consumption gap has not changed significantly since 2011, and the standard deviation during the survey period remains almost unchanged.

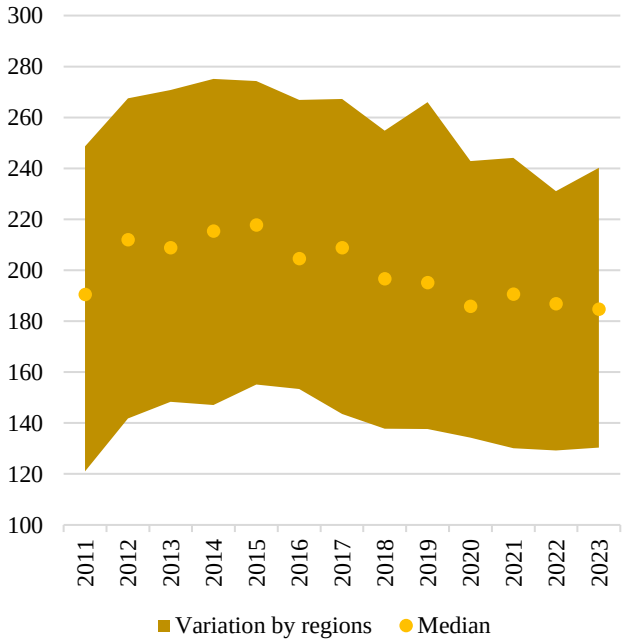
At the same time, there is a slight deterioration in the financial situation of the population, expressed in a decline in the median ratio of income used for consumption

to the cost of living. This happens in conditions of rapid growth of the cost of living compared to income of the population (Graph 9).

Graph 8. Dynamics of Real Spending per Capita by Regions, in the Tenge



Graph 9. Ratio Between Incomes Used for Consumption and the Minimum Subsistence Level, as %

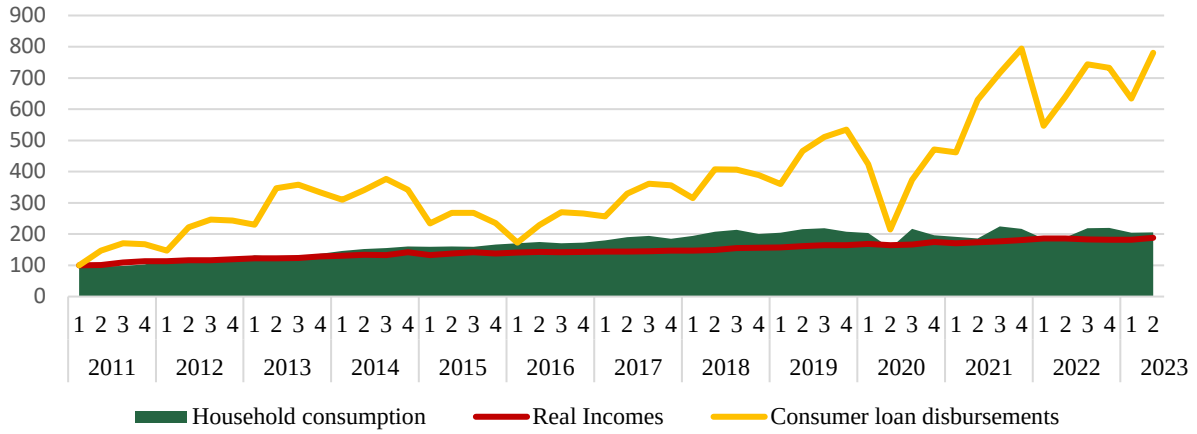


Source: BNS ASPR, NBK's computations

Slower income growth is observed not only in relation to the cost of living, but also in relation to household consumption. Thus, over a large portion of the observed period, there is a lag in the accumulated growth of household income compared to accumulated spending on consumption. The part of consumption not covered by existing incomes is ensured by the growth of consumer loans. Consequently, the annual real increase in consumer lending (Attachment D) fuels household demand, thereby its growth rate has almost always been higher than the level of household income (Graph 10). The exception is the period since the beginning of the pandemic, when consumption decreased significantly due to quarantine restrictions, and the reduction in income was not so dramatic amid significant support from the government. Then, as the quarantine eased, consumer spending recovered until the tragic events of January, where demand again decreased significantly in most regions of the country. Currently, income growth continues to lag behind consumer demand.

At the same time, in half of the regions, income growth completely covers the current volume of consumption, including in West Kazakhstan, Mangistau, Atyrau, Almaty, Karaganda, North Kazakhstan, East Kazakhstan, Zhambyl regions (Attachment E).

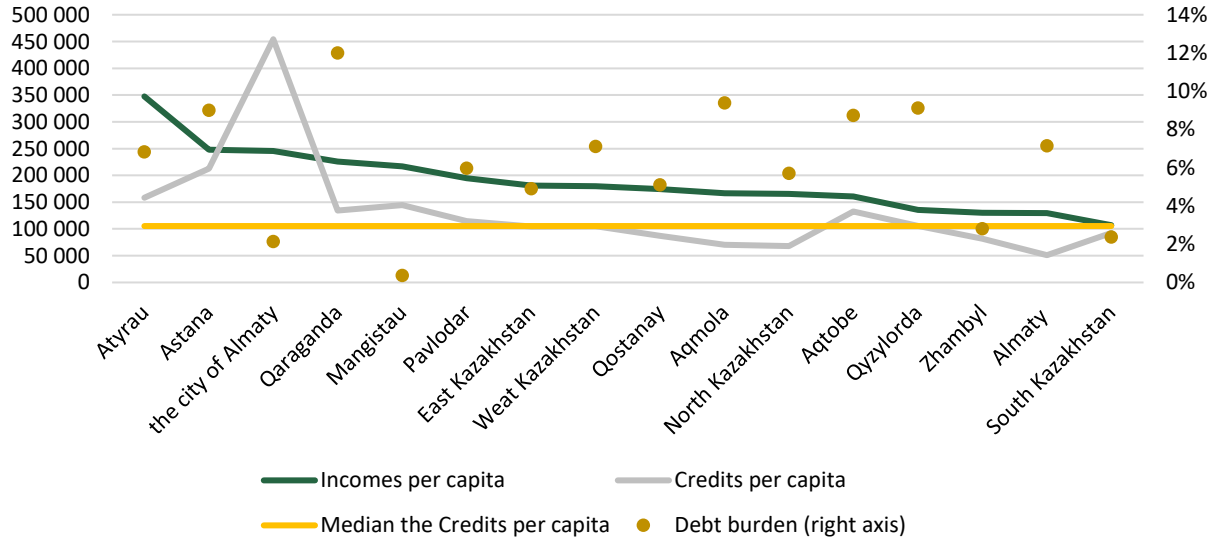
Graph 10. Accumulated Index of Household Consumption, Household Income and Consumer Loan Disbursements (in Real Terms, Q1 2011=100)



Source: BNS ASPR, the author's computations

Due to the possibility of obtaining a larger volume of loans with higher income, there is a positive correlation between average per capita income and provided loans per capita at a regional level (Graph 11). Against this background, despite the growth of consumer lending in all regions of the country, the distribution of regions in terms of the volume of provided loans per capita remains uneven. In Almaty, income per capita lags far behind provided loans per capita, and in Astana, income and loans are almost equal in volume, which explains the significant excess of consumption rates over income in these cities. The concentration of provided loans in the cities of Astana and Almaty at the end of the second quarter of 2023 amounted to 44% of total consumer lending.

Graph 11. Consumer Loans and Per Capita Income[4], Debt Burden Level by Regions, Tenge



Source the author's computations

[4] According to its methodology, the BNS ASPR takes into account income from hired work, self-employment, transfers and other income (insurance payments, interest on deposits and others).

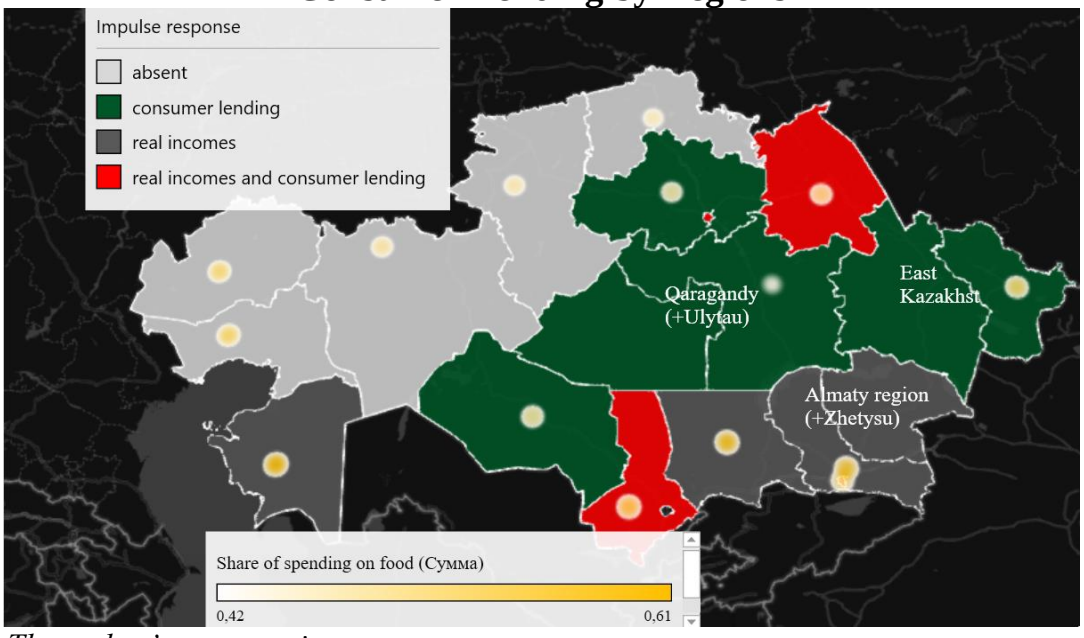
At the same time, based on the BNS ASPR data, it is interesting that there is no relationship between the origination of loans to the population and the level of debt burden by region, which is calculated as the ratio of loan and debt payments for the quarter to per capita income for the quarter (Graph 11). That is, regions that have approximately the same level of income and loans per capita have different levels of debt burden. One of the reasons may be the level of non-bank lending that is not taken into account in the study, which may affect the amount of quarterly household loan repayment expenses calculated by the BNS ASPR.

1.5. An Empirical Assessment of Impact by Income and Credits on Consumer Spending in Kazakhstan

Models of structural vector autoregressions were constructed for 16 regions of Kazakhstan with assessment of functions of impulse responses of consumer demand to shocks in household income and consumer lending. According to the results of the analysis, some regions do not have significant responses of consumer demand to shocks of changes in either income or consumer lending. Probably one of the reasons is the quality of demand statistics for these regions.

Of the remaining regions, 50% have statistically significant positive responses to both lending and money income (Figure 1). Half of these regions have either an income-only response or a lending-only response (Attachment F).

Figure 1. Responses from Consumer Demand to Shocks of Wages and Consumer Lending by Regions



Source: The author's computations

Cities such as Astana, Almaty, as well as the Pavlodar region and South Kazakhstan have responded both to income and to lending. Moreover, in all cases the response to lending is higher than to income.

Zhambyl, Almaty and Mangistau regions have a statistically significant response only to changes in real household income.

East Kazakhstan, Akmola, Karaganda and Kyzylorda regions showed a response only to changes in consumer lending.

In general, from a regional perspective, the analysis showed that consumer lending is the main driver of consumption. Regions with a greater response to consumer lending are characterized by a high level of credits per capita (above the national median, with the exception of the Akmola region) and lower spending on food in the expenditure structure. Regions with a statistically significant effect only on real income have a similar feature – a weak level of solvency, lower access to credit (with the exception of the Mangistau region) and, as a result, a large share of food expenditures (Figure 1).

At the same time, 30% of regions did not show significant responses to income and credit shocks, which requires further analysis and probably a further effort in finding other proxy indicators of demand by region.

Additionally, to quantify the response of consumption to shocks, the cumulative impulse response of consumption to an income shock was divided by the cumulative response of income to an income shock for standard deviation according to Cholesky. The same procedure was carried out for lending. This technique is referred to as the procedure for normalizing cumulative impulse response functions, proposed in the work by (Mihailov, 2008).

The magnitude of the consumption response to a 1% credit shock ranges from 0.5% to 1.9%. The consumption response to a 1% real income shock ranges from 0.2% to 1.2%. Thus, consumer lending serves as the main driver of consumer demand by regions in Kazakhstan.

To check reliability of the obtained estimates of impulse responses, structural vector autoregression models were built for each region with and without taking into account exogenous parameters. The significance of responses and the magnitude of the response from shocks in the absence and presence of exogenous variables do not differ greatly, which allows us to conclude that the estimates obtained in the study are robust (Attachment G). The exception was the Akmola region, where, according to the reduced model, a statistically significant negative response of consumption to income was obtained, which slightly comptomises the results obtained for the region.

1.6. Findings and Recommendations for Further Studies

The study uses the SVAR methodology, on the basis of which one can look at consumption over time from the point of view of introduced short-term restrictions and shocks based on theory. SVAR models were built for 16 regions of the country and estimates of the accumulated impulse responses of consumer demand by region to shocks in real incomes of the population and the issuance of consumer loans were obtained. The analysis revealed that about 30% of regions do not have statistically significant consumption responses to the selected shocks. Some regions respond to both income shocks and lending, the remaining regions either respond only to income, some only to lending.

At the same time, a certain common feature of regions that have only income responses can be traced – this is a high share of spending on food and lower purchasing power of the population and, consequently, lower consumer spending per capita. Thus,

households in “less wealthy regions”, limited in attracting consumer loans, channel available resources mainly to the purchase of essential goods, that is, food

In most regions of the country, lending turned out to be the main driver of consumer demand. From the point of view of the effectiveness of monetary policy instruments, this means that by increasing the efficiency of the monetary policy interest rate channel, measures to stimulate or, conversely, curb demand, will primarily be effective in regions where consumer lending is the main driver.

In our work, we said that a greater response of consumption to lending is observed in regions where the share of expenses on non-food products is high, and vice versa, in regions with a high share of food expenditures, there is a response to household income. Therefore, to further understand demand, future research could focus on price and income elasticity of demand across product categories. This is primarily of interest from the point of view of the impact of monetary policy on demand, since there are a number of regulated categories of goods and services, as well as very volatile goods, which monetary policy can influence to a lesser extent. Such works are widespread, and the authors are interested in the issue of redistribution of the ratio of consumer spending between food and non-food products, as well as the degree of vulnerability of low-income segments of the population to price shocks.

However, this type of analysis requires granular microdata on demand, which can be obtained from a household survey. Consequently, the main vector for further research on demand primarily depends on the effort to improve quality and gain access to demand statistics.

List of References

Breitung J., Bruggemann R., Lutkepohl H. . (2004). Structural Vector Autoregressive Modeling and Impulse Responses. *Cambridge University Press*.

Carlino G., D. .. (1998). The diferrent regional effects of monetary policy.

Crawley, E., Kuchler, A. (2020). Consumption Heterogeneity: Micro Drivers and Macro Implications.

Dornbusch, R. a. (1987). Macroeconomics.

E.Hall, R. (1978). Stochastic Implications of Life Cycle-Permanent Income Hypothesis: Theory and Evidence.

Flavin, M. A. (1981). The Adjustment of Consumption to Changing. *Journal of Political Economy*.

James E. H. Davidson, David F. Hendry, Frank Srba, Stephen Yeo. (1978). Econometric Modelling of the Aggregate Time-Series Relationship Between Consumers' Expenditure and Income in the United Kingdom.

Kilian L., Lütkepohl H. (2017). Structural vector autoregressive analysis. *Cambridge University Press*.

Midori Wakabayashi; Charles Yuji Horioka. (August 2005 г.). Borrowing Constraints and Consumption Behavior in Japan.

Mihailov, A. (2008). Exchange rate pass-through to prices in macrodata: a comparative sensitivity analysis.

Singh, B. (2004). Modelling real private consumption expenditure–an empirical study on Fiji.

Zhuzbayev A., Seidakhmetova B. (2019). Impact of Factors on Consumer Demand in Kazakhstan: n Empirical Assessment.

Zakirzyanov, R. (2021). Assessing the Factors of Rgional Differentiation of Consumer Demand in the Russian Federation.

Attachments

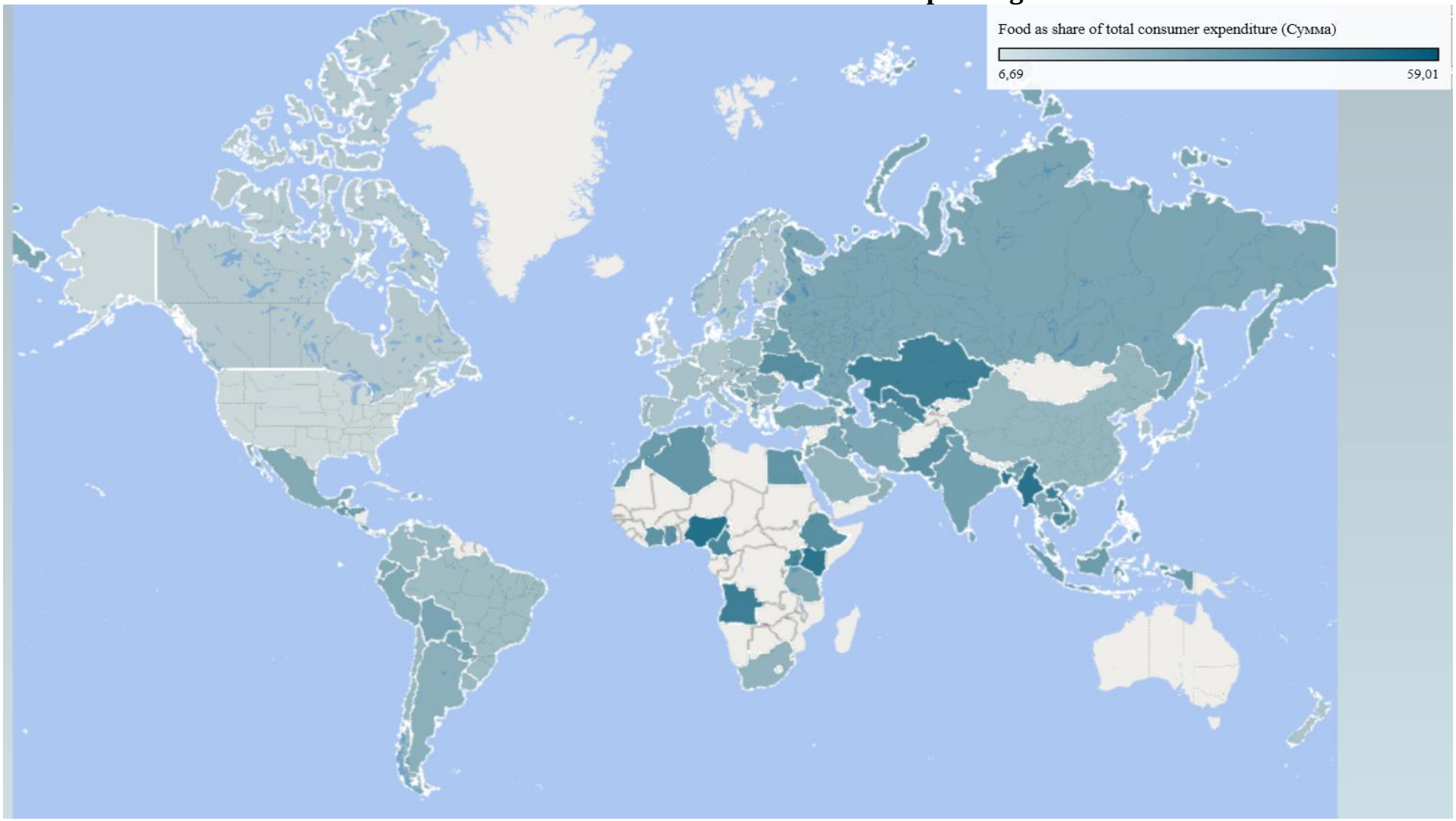
A. List of Regions

Akmola	
Aktobe	
Almaty	+Zhetisu
Atyrau	
West Kazakhstan	
Zhambyl	
Karaganda	+Ulytau
Kostanai	
Kyzylorda	
Mangistau	
South Kazakhstan	Turkestan+city of Shymkent
Pavlodar	
North Kazakhstan	
East Kazakhstan	+Abai
city of Astana	
city of Almaty	

B. Comparison of Statistical Characteristics of Demand Indicators

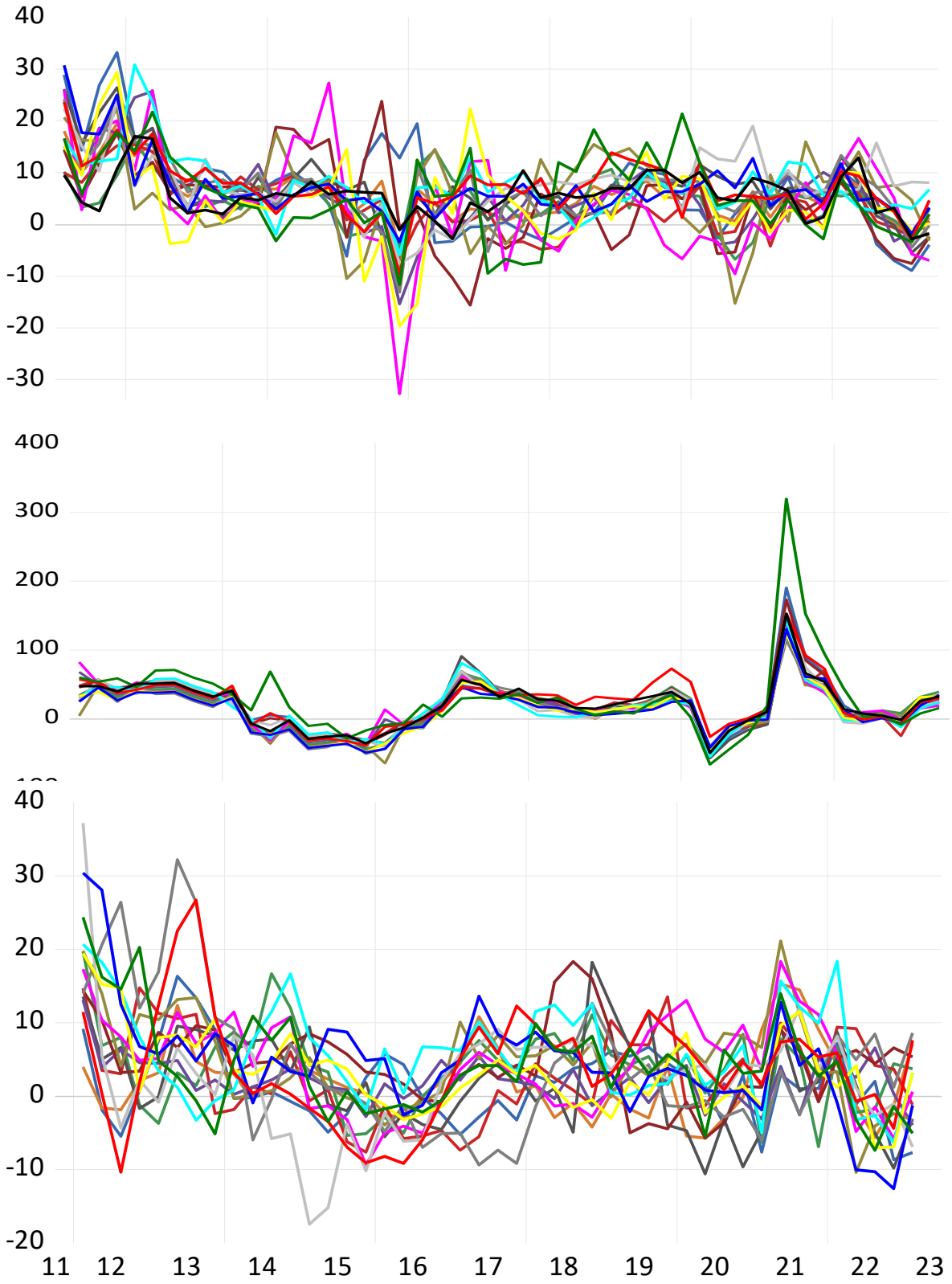
	Estimate	Spending per capita	Demand in the SNA
Mean	5.263054	0.758442	5.264263
Median	6.311852	0.823544	3.934012
Maximum	18.59252	13.50702	44.2
Minimum	-20.07729	-10.34595	-20.4
Std. Dev.	7.548739	6.067524	10.63636
Skewness	-0.883588	-0.006447	1.483034
Kurtosis	4.545407	2.226734	6.955426
Jarque-Bera	10.33349	1.121451	45.83054
Probability	0.005703	0.570795	0
Sum	236.8374	34.12989	236.8918

Attachment C. Countries in Terms of Share of Spending on Food



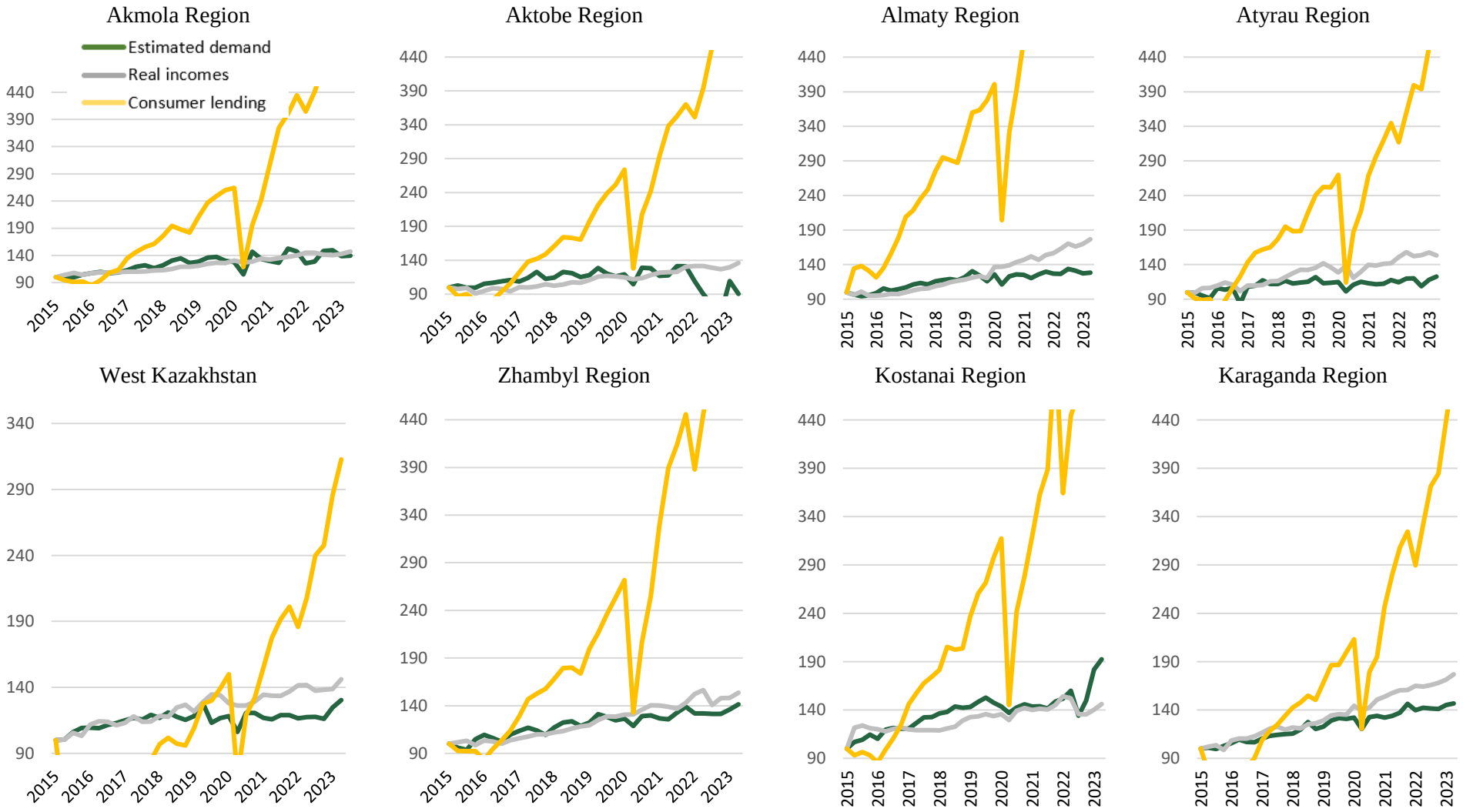
Source: compiled by the author based on the IMF data for 2021
Food as share of total consumer expenditure (sum)

Attachment D. Annual Change in Real Money Income, Disbursed Loans and Consumption by Regions

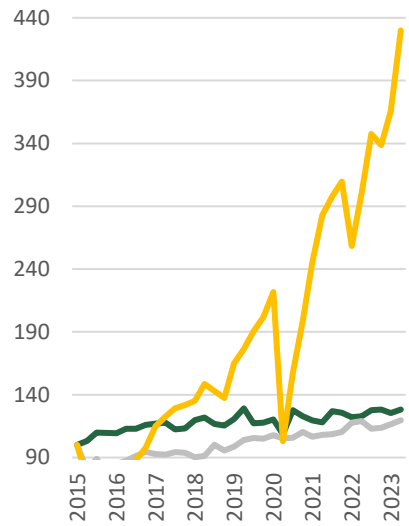


Source: BNS ASPR, the author's computations

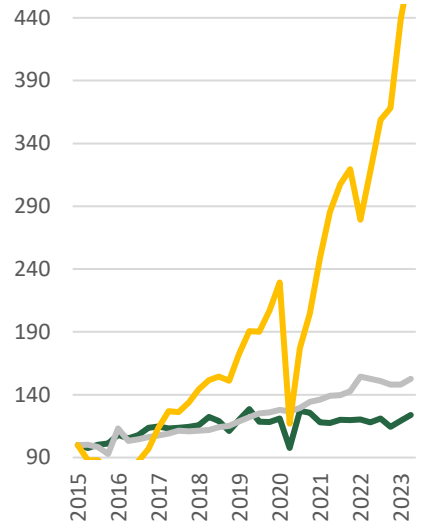
Attachment E. Accumulated Index of Growth Rates of Consumer Demand, Income and Lending by regions, % (2015 Q1=100)



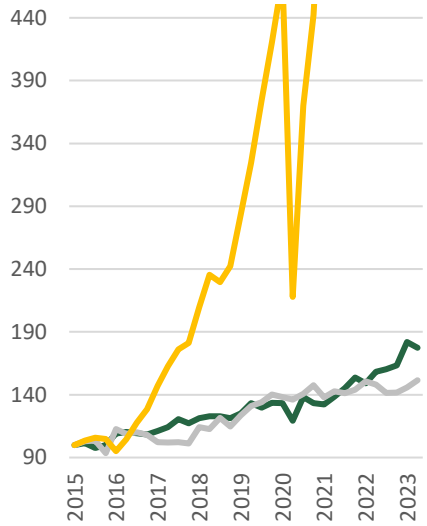
Kyzylorda Region



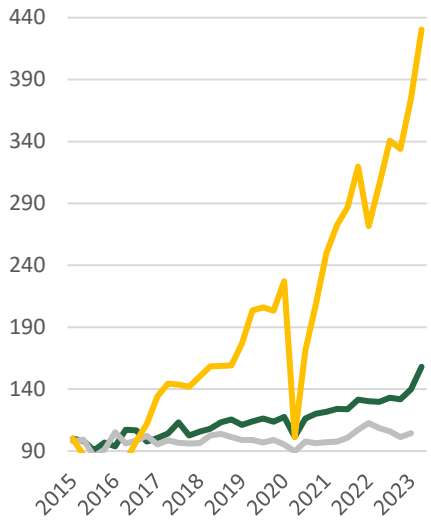
Mangistau Region



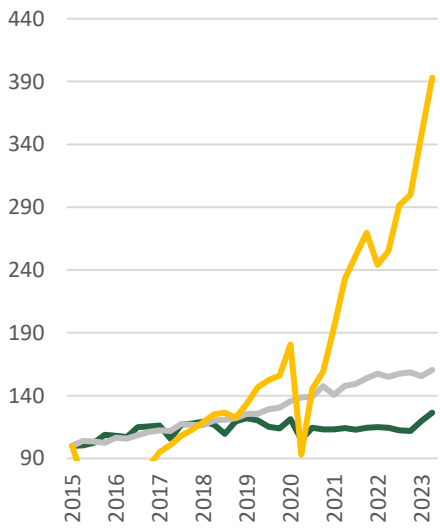
South Kazakhstan



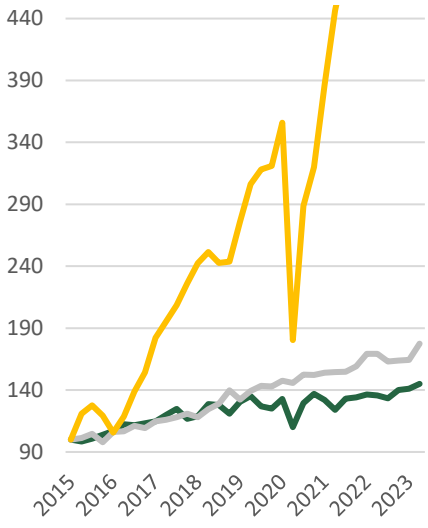
Pavlodar Region



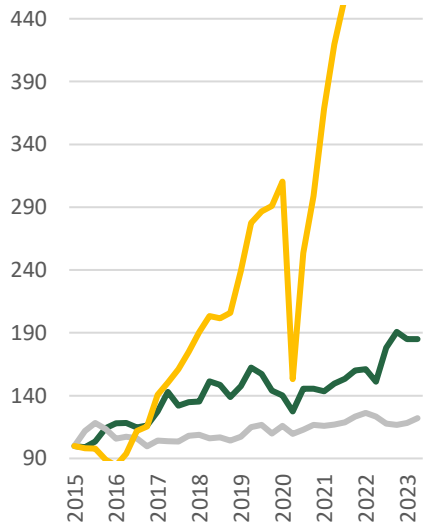
North Kazakhstan



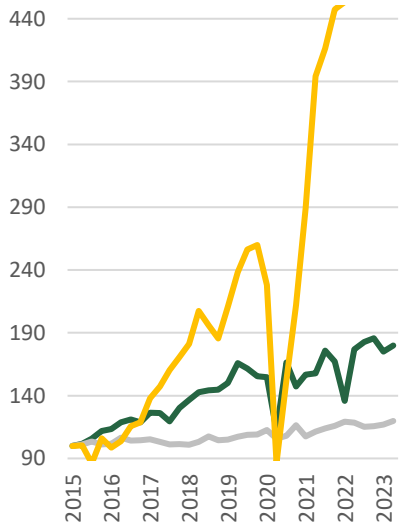
East Kazakhstan



city of Astana



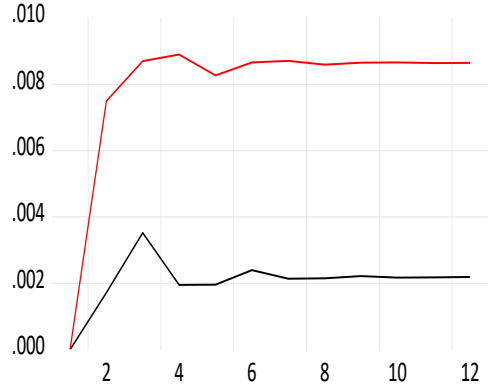
city of Almaty



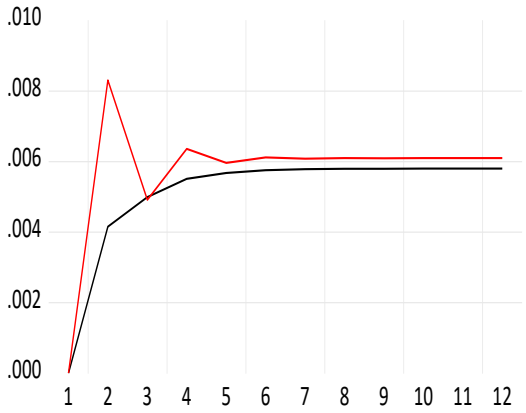
Attachment F. Function of Accumulated Impulse Responses of Consumption to Shocks of Explanatory Variables (1 St. Deviation)

Black line - Income shock; Red line - Credit shock

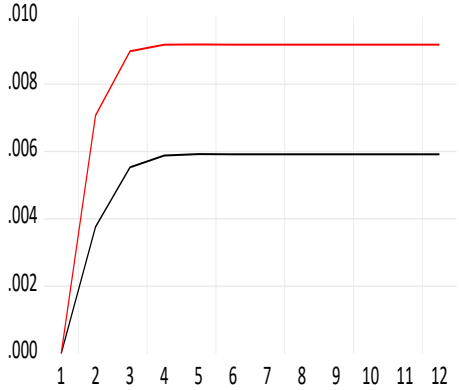
city of Almaty



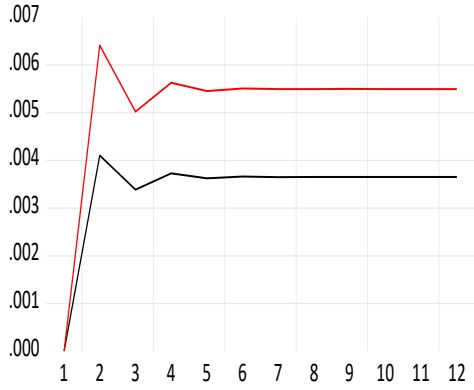
Pavlodar Region



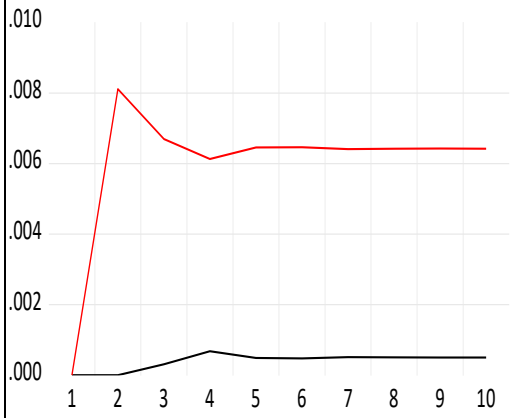
South Kazakhstan



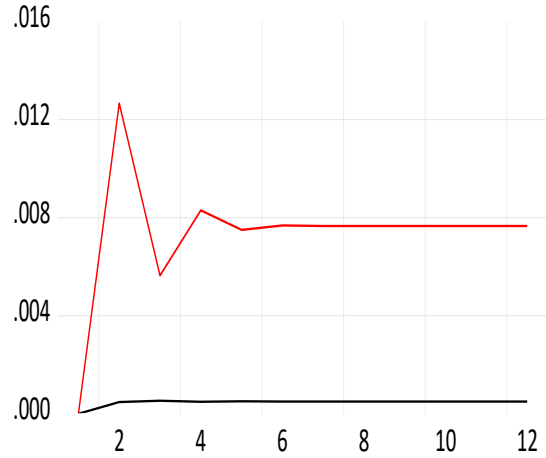
city of Astana



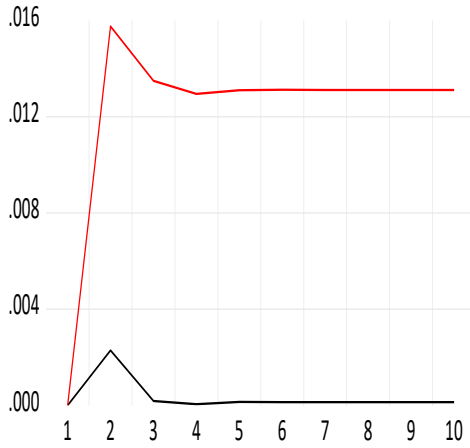
Akmola Region



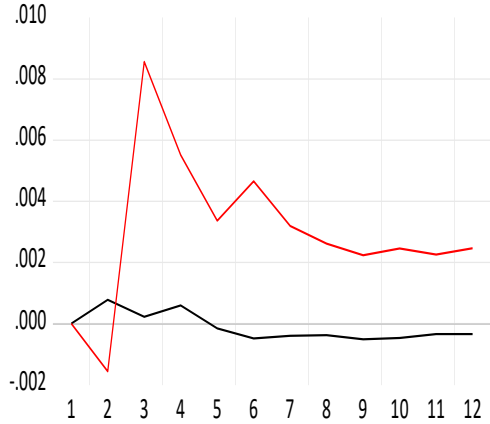
East Kazakhstan

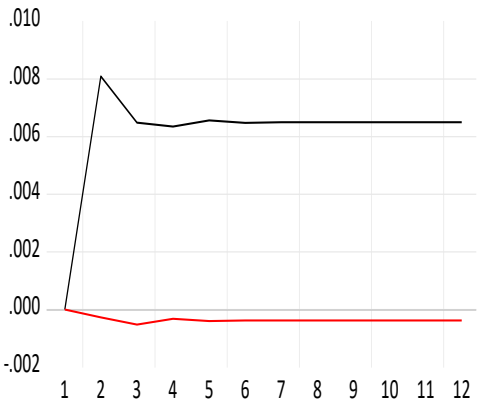
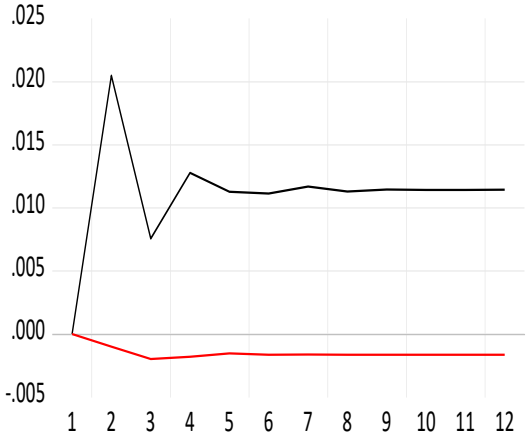
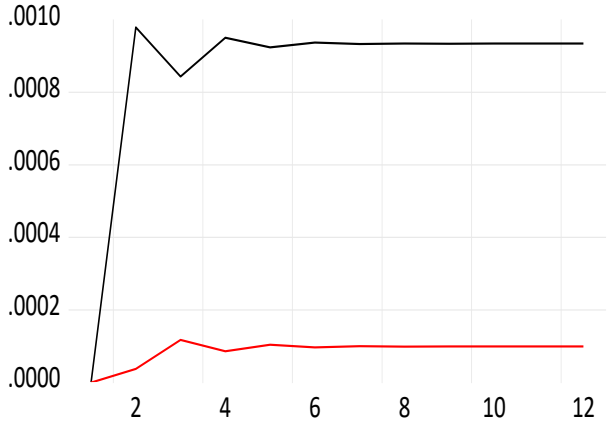


Kyzylorda Region



Karaganda Region



Almaty Region	Mangistau Region	Zhambyl Region
		

Attachment G. Magnitude of Accumulated Responses of Consumer Lending to Shocks of Lending and Real Income Based on the Results of Normalization Process. Comparison of Model Results with and without Exogenous Variables.

	Including exogenous variables		Excluding exogenous variables	
	Magnitude of response to1% shock of income	Magnitude of response to1% shock of credits	Magnitude of response to1% shock of income	Magnitude of response to1% shock of credits
Akmola Region	Absent	0.5%	-0.3%	0.67%
Aktobe Region	Absent		Absent	
Almaty Region	0.61%	Absent	0.54%	Absent
Atyrau Region	Absent		Absent	
West Kazakhstan	Absent		Absent	
Zhambyl Region	0.26%	Absent	0.4%	Absent
Karaganda Region	Absent	1.12%	Absent	1.4%
Kostanai Region	Absent		Absent	
Kyzylorda Region	Absent	1.91%	Absent	2.1%
Mangistau Region	1.24%	Absent	1.76%	Absent
South Kazakhstan	0.53%	0.52%	1.0%	0.6%
Pavlodar Region	0.41%	0.65%	0.9%	0.5%
North Kazakhstan	Absent		Absent	
East Kazakhstan	Absent	0.81%	Absent	1.5%
city of Astana	0.32%	1.24%	0.5%	0.95%
city of Almaty	0.25%	1.78%	0.16%	0.86%