DYNAMICS OF CONSUMER PRICES AND VOLUME OF TURNOVER IN RETAIL TRADE OF FOOD PRODUCTS

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ABSTRACT

This paper analyses the dynamics of consumer prices and the volume of turnover in the retail sale of food products in the Republic of Serbia in the period from 2006 to 2022. The focus of the research is on the impact of inflation and unemployment rates on the real volume of turnover of these products using multi-factor regression. The results show that inflation does not have a statistically significant impact on the real volume of turnover of most food products, while the unemployment rate has a significant negative impact. However, the exceptions are sugar-based and chocolate-based products, where price increases have a significant positive impact on turnover. This analysis provides insights into the key macroeconomic factors influencing consumer habits and market dynamics in the face of inflation and unemployment. The results of the research can serve as a basis for creating policies and strategies that will help retailers effectively manage their business in conditions of economic uncertainty.

Introduction

The subject of this paper is the analysis of the dynamics of consumer prices and the volume of turnover in the retail sale of food products in the Republic of Serbia in the period from 2006 to 2022. The aim of the research is to examine how inflation and unemployment affect the real volume of turnover of these products. Using multi-factor regression, the research aims to identify the key factors that shape consumer habits and market

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dynamics in conditions of inflation. The relevance of this subject is indisputable, given that periods of high inflation are often accompanied by significant economic challenges, both for consumers and businesses. An increase in the price of basic foodstuffs can have far-reaching consequences on the purchasing power of consumers, and therefore on overall economic activity. In the Republic of Serbia, inflation and unemployment are significant challenges affecting the stability and growth of the retail sector. Analyzing these factors can provide important insights into how consumers react to changes in prices and unemployment, as well as how retailers can adapt to these changes. The expected results of the research include the identification of the relationship between inflation, unemployment and the real volume of food turnover. Particular attention will be paid to the analysis of different product groups to determine whether all products respond to the same macroeconomic pressures in a similar way. The results of this research can serve as a basis for creating policies and strategies that will help retailers effectively manage their business in the face of inflation and unemployment.

Literature review

Inflation is a macroeconomic occurrence characterized by a widespread rise in the overall price level of products and services within an economy over a specific duration (Bordeaux & Orphanides, 2013). Inflation leads to a loss in the purchasing power of a currency, resulting in the ability to acquire fewer products or services with the same amount of money (Samuelson, 2008). Inflation is the rate at which the prices of goods and services increase during a specific time period, often a year (Branch, 2004; Brachinger, 2008). Therefore, the cost of living is determined by the prices of everyday things and their respective allocation within the overall budget. Countries compile a list of commonly purchased products and services and monitor the cumulative cost of purchasing those items over a period of time in order to determine the average cost of living. Simultaneous and quick increases in a significant number of prices indicate severe inflation, which signifies a decrease in the value of money and its reduced purchasing power. This scenario contrasts with situations where the price of only a limited number of items increases, as in such cases, their worth only fluctuates in relation to other items (Andrade et al., 2023).

High inflation brings a variety of problems to market participants. Businesses face difficulties when the cost of materials and labor they need to make products rises. This encourages them to find ways to increase the prices of their products while remaining competitive in the market. For investors, high inflation means more uncertainty, which can force them to ask for a higher guarantee or premium because of the risk they are taking. This can increase the cost of borrowing money for firms, so they can delay investments and miss out on growth opportunities (Dutt & Padmanabhan, 2011).

Consumers are affected by the fact that their incomes do not keep up with the rise in prices, so over time they can afford less and less products. In other words, their real purchasing power is decreasing. To adjust, consumers may postpone the purchase of some more expensive items, spend more on basic products instead of luxury items,

choose cheaper products or brands, or shop at places with higher discounts instead of regular stores (Richard, 2022).

Inflation poses a significant challenge for both the government and state authorities as it carries the risk of perpetuating a cycle where rising prices are consistently matched by increases in personal wages. This, in turn, can exacerbate issues related to wealth distribution within the country. Some employees may have the ability to align their earnings with inflation, while others may not, resulting in inequality. Central banks are frequently compelled to implement stricter monetary policies in response to high inflation, resulting in increased borrowing expenses for businesses (Kalish & Wolf, 2022). This can compel corporations to decrease or delay their investments, thus impeding economic growth. This phenomenon is most noticeable in nations like Australia, New Zealand, and the United Kingdom, where it is usual for mortgage rates to fluctuate. When the central bank increases interest rates, it directly affects the rising costs of mortgages. This results in increased monthly expenditures for individuals paying their mortgages, which can have a substantial impact on their spending patterns and further impede economic growth.

Inflation can be monitored using many indicators. Authorized state entities calculate and publish "official" inflation numbers, particularly during periods of high inflation. Additionally, individual households must consider the actual expenses they incur for their daily living, as well as their personal anticipations for future inflation. The official inflation data, such as the Consumer Price Index published by the Statistical Office of the Republic of Serbia, provide information on the average cost of living. This data examines the changes in prices of commonly purchased goods and services over time (RZS, 2024). Subsequently, these modifications are used to articulate the comprehensive inflation rate, sometimes denoted as a yearly variation.

Several studies have found significant disparities in inflation forecasts across various societal groups (Bonfrer et al., 2022). This can be partially attributed to the fact that various households purchase distinct items and services, resulting in differential exposure to fluctuations in prices. Furthermore, this variance can be ascribed to variations in prior encounters with inflation, disparities in consumers' cognitive capacities, and demographic attributes such as gender, age, and ethnicity.

Based on the above evidence, it is evident that inflation is not a straightforward or consistent phenomenon. It can be comprehended on various levels, ranging from a broad perspective to specific homes, and can be quantified through both actual fluctuations in prices and subjective judgments and anticipations.

When it comes to marketing research on the effects of inflation so far, they are quite modest and limited. Thus, research can be singled out where inflation is viewed as a limiting factor (Golder et al. 2013) or inflation is introduced as a control variable (Deleersnyder et al. 2009; Mela et al. 1997). Thus, by looking at the research that analyzes the basic implications of the increase in the inflation rate, we can single out research that analyzes the impact on consumer knowledge about prices, the perception

of price fairness and price sensitivity. Other research provides indirect insights into how inflation can affect consumers.

Research shows that high inflation can be perceived as a threat to consumer welfare, which can be an incentive to monitor and understand price information more closely, thereby improving consumer knowledge of prices (Jacoby & Olson, 1977). However, economic research has shown a positive correlation between inflation rates and price variation in markets (Parks, 1978), which can hinder consumers' ability to use price information accurately. Therefore, consumer knowledge of prices suffers in an inflationary environment (Estelami et al., 2001).

When it comes to price sensitivity, there are several studies on how inflation affects consumers. On the one hand, it is thought that because consumers' knowledge of prices is lower during periods of higher inflation (Estelami et al., 2001), consumers become more inclined to pay any price, leading to less elastic demand. On the other hand, the high inflation rate, as well as media attention paid to prices, can make consumers more aware and sensitive to price changes.

Research on economic recessions, currency crises, or rising gasoline costs might provide valuable information on how inflation impacts consumers. The results of these studies suggest that a reduction in disposable income frequently results in a decline in consumption, not only in the long run but also across various channels, categories, and brands. These changes typically exhibit asymmetry, occurring rapidly but gradually dissipating, and are partially enduring. Furthermore, a reduction in nationwide promotional campaigns and advancements in product development can intensify certain consumer responses. It is crucial to highlight that the cause of the decline in revenue has a substantial influence, whether it is due to business-cyclical fluctuations or individual changes in category-specific prices, such as gasoline.

According to business cycle research (Lamey et al., 2007; Lamey, 2014), inflation has led to an immediate decline in revenues, leading consumers to shift to private label products and more affordable outlets, such as discount stores. Recent research shows that in developed economies, especially in Western Europe, consumers are more likely than in the US to react to price increases by switching to cheaper products (Europanel, 2023). Within the EU, significant differences have been observed between countries, which may be due to variations in producer behavior, market structure or institutional context of the country.

With these facts in mind, retailers are starting to use a variety of strategies to meet the challenges of inflation, with cost controls and various consumer-focused support measures being the most used. However, in addition to these conventional strategies, there are also smaller ethical practices such as „shrinking", „skimpflation", and „greedflation" (Kamakura & Du, 2012). These strategies involve reducing the quantity or quality of products without informing the consumer, or increasing prices unfairly, which can significantly undermine consumer confidence and damage the retailer's reputation.

One of the strategies used by retailers is to control and manage costs. Various cost components in the food supply chain, including raw materials, ingredients, packaging, energy, transportation, and labor, have experienced significant inflation. To maintain profitability, many retailers have taken steps to reduce internal costs or pass on increased costs to consumers or other participants in the supply chain. For example, retailers such as Amazon, which has delayed or canceled the opening of several distribution centers, the British Co-op, which plans to cut jobs, and Target, which is facing excess inventory, are taking steps to reduce internal costs. Also, Austria's SPAR reduces energy consumption, while Japan's FamilyMart uses robots to work in cold stores to save on labor costs (Edge by Ascential 2022).

On the other hand, some retailers try to pass on the costs to consumers. For example, Walmart's Sema Club is raising annual membership fees, Amazon is increasing its subscription to Prime services, and Britain's Sainsbury's is increasing the price of its delivery services. While consumers often accept reasonable price increases to reflect rising costs, they may become wary if competitors do not follow the same policy. Increases that are made in a less transparent way, such as reducing the quantity of products without lowering the price, can cause negative reactions, especially during periods when consumer budgets are already under pressure. It would be useful for retailers to transparently disclose the reasons for price increases and to avoid being the first to increase prices in their industry, and to offer new benefits in addition to price increases, such as faster delivery or additional content, in order to reduce negative reactions from consumers.

Rather than transferring the additional expenses to their customers, which may potentially harm their ability to compete, several merchants have attempted to transfer the responsibility to their suppliers. As an illustration, Amazon has implemented fuel and inflation charges for third-party vendors, Allegro has raised commissions for sellers on its platforms, and Tesco has escalated expenses for suppliers utilizing its main distribution service. Based on a recent survey conducted by the Supply Chain Institute (IPLC, 2022), it was found that 70% of suppliers have attempted to negotiate higher wholesale prices. However, over 50% of these suppliers have faced demands to reduce costs instead. Within such a context, the process of pricing discussions becomes increasingly intricate, leading to a higher occurrence of conflicts.

To gain more control over the costs of their brands and reduce supply chain risks, some retailers have opted for vertical integration. For example, Ahold Delhaize has opened the largest bottling plant in the Benelux, while Lidl is planning a new water treatment plant in the UK. Vertical integration allows for direct cost reductions through the elimination of intermediaries and provides indirect benefits such as a better understanding of the justification of suppliers' requests for price increases (Neerman, 2022).

One of the strategies to address the challenges of inflation is to reorganize loyalty programs, where they are tied to brand offerings. For example, the French supermarket Intermarché has offered price reductions on 1,800 branded products, but only for holders

of its loyalty cards, while its competitor E. Leclerc has introduced an "anti-inflation shield", where price inflation on 120 best-selling products is automatically reimbursed at checkout, but only for loyalty card holders. These strategies allow retailers to differentiate themselves from the competition and potentially increase customer loyalty by adding additional benefits, such as additional price reductions (Edge by Ascential 2022).

Other retailers have tried to make their loyalty programs more appealing by adding new features. For example, Instacart has relaunched its loyalty program as Instacart+, enabling family accounts and exclusive benefits for Chase members. Coop Sweden has partnered with an electricity provider to offer lower electricity prices to its members. There is a tendency among retailers to join loyalty programs that involve multiple vendors or to highlight their role in such programs.

Research methodology, hypotheses and data

Since inflation represents a general increase in prices, the research question arises as to how the increase in product prices affects consumption, i.e. the volume of sales, and therefore the turnover of those same products. The focus of our research is on the prices of food products and non-alcoholic beverages and the volume of their retail turnover in the Republic of Serbia. It is quite logical that an increase in the price of food products leads to a higher volume of turnover in this type of product. However, the question arises as to whether there is a real increase in the volume of sales of this type of product.

For this reason, we set up a research null and alternative hypothesis:

H0: The increase in prices of food products and non-alcoholic beverages does not have a statistically significant impact on the real volume of sales of this type of product.

H1: The increase in prices of food products and non-alcoholic beverages has a statistically significant impact on the real volume of sales of this type of product.

In order to find an answer to this research question, and thus to prove hypotheses, we need to establish indicators by which we monitor the increase in prices and the volume of turnover for certain types of products. The increase in prices of a certain type of product is monitored by the movement of the price index for a specific type of product, while on the other hand, the volume of turnover is monitored by the turnover index for that same type of product. However, the growth of turnover, in addition to the real increase in the volume of turnover, also includes an increase that is under the influence of inflation, i.e. an increase in the price of a certain type of product. For this reason, in order to monitor the increase in real turnover, we will use index of real volume of turnover for a specific type of product, which excludes the impact of inflation and sees whether there has actually been an changing in real consumption in a certain type of product. [4]

4 Real Turnover Index=(Price Index/Nominal Turnover Index)×100 and it is calculated by authors using official statistic data

In accordance with the methodological requirements defined in this way, and based on official statistical data, we have recalculated the price index of food products and non-alcoholic beverages, then the index of real turnover of food products and non-alcoholic beverages in retail sale in Serbia. The observation period was from 2006 to 2022. During this period, there were two global inflationary waves, which were caused by the influence of various factors. The first, during the 2008 financial crisis, when the US and EU monetary authorities bailed out their financial institutions, and the second during the war in Ukraine, when supply chains were disrupted, and energy prices soared. More precisely, when inflation occurred due to an increase in aggregate demand because of 'pumping' money into saving the financial sector, and cost-push inflation appeared, when the prices of key inputs, fuel, and strategic agricultural products significantly increased.

To monitor the impact of inflation on the real volume of food turnover, we will use the statistical method of multifactorial regression. Multifactor regression is a method of statistical analysis used to examine the relationship between a single dependent variable and multiple independent variables. This method makes it possible to estimate the effect of each of the independent variables on the dependent variable, by controlling the effects of other independent variables. By using multifactorial regression, it is possible to identify which factors contribute most to changes in the dependent variable and how these factors relate to each other. In this research, the dependent variable will be the index of real volume of turnover of food products and non-alcoholic beverages. It represents the real change in the quantity of these types of products that end consumers purchased in retail. While the dependent variable will be the price index of the same type of product. As a control, the second dependent variable, we will use the unemployment rate. This is because the unemployment rate, along with inflation, is one of the most important real macroeconomic variables, with the difference that it, unlike inflation, bears the epithet of a real variable.

Research results and discussion

Data on the movement of the price index and the real index of turnover of food products and non-alcoholic beverages in retail sale, as well as the unemployment rate in the Republic of Serbia are presented in Table 1.

Table 1. The changing of the price index, index of real volume of turnover of food products, non-alcoholic beverages, and the unemployment rate in the Republic of Serbia.

Year	Price index of food products and non-alcoholic beverages[5] (Base index 2006 = 100)	Index of real volume of turnover of food products and non-alcoholic beverages (Base index 2006 = 100)	Unemployment rate (%)
2006	100,0	100,0	15,4%
2007	119,7	113,1	14,8%
2008	136,2	118,4	14,4%
2009	137,3	100,2	16,9%

5 Base year 2006

Year	Price index of food products and non-alcoholic beverages[5] (Base index 2006 = 100)	Index of real volume of turnover of food products and non-alcoholic beverages (Base index 2006 = 100)	Unemployment rate (%)
2010	152,0	100,5	20,0%
2011	161,8	102,4	23,3%
2012	186,6	89,8	24,6%
2013	181,9	93,2	23,0%
2014	186,0	96,8	19,7%
2015	185,8	99,9	18,2%
2016	186,7	106,1	15,9%
2017	194,4	109,3	14,1%
2018	199,6	110,8	13,3%
2019	203,6	121,6	10,9%
2020	207,4	130,7	9,5%
2021	232,3	129,3	11,5%
2022	286,7	128,3	9,80%

Source: Calculated on the basis of https://data.stat.gov.rs/

The results of multivariate regression, in which the dependent variable is the index of real volume of turnover of food products and non-alcoholic beverages, and the independent variables are the price index of that type of product and the unemployment rate in the Republic of Serbia are shown in Table 2.

Table 2. Results of multifactorial regression

Argument	Coefficient	Standard Error	T-value	P-value	95% confidence interval
Interception (constant)	135.6409	9.712	13.967	0.000	[114.811, 156.471]
Price index	0.0544	0.035	1.563	0.140	[-0.020, 0.129]
Unemployment rate	-2.2588	0.327	-6.918	0.000	[-2.959, -1.559]

Source: Authors' calculations by using statistical software STATA 12

The results of multivariate regression show that 83% of the variability in the real volume of food and non-alcoholic beverage turnover can be explained by changes in the price index and unemployment rate (R-squared = 0.830). The interception (constant) is statistically significant ($P < 0.001$), with a coefficient of 135.6409, indicating the baseline level of real traffic volume when the independent variables are at zero. The price index has a coefficient of 0.0544, but this result is not statistically significant ($P = 0.140$). This suggests that, when other factors are considered, changes in the price index do not have a significant impact on the real volume of turnover. The unemployment rate shows a significant negative impact on the real volume of turnover, with a coefficient of -2.2588 ($P < 0.001$). This means that for every percentage point increase in the

unemployment rate, the real volume of turnover decreases by about 2.26 units.

These results indicate that the unemployment rate is a key factor that negatively affects the real volume of retail trade in food and non-alcoholic beverages, while the price index does not have a statistically significant impact when other factors are controlled. This analysis shows that the hypothesis about the impact of price changes on the real volume of turnover is not valid in the case of a complete group of food products and non-alcoholic beverages in retail sale in Serbia. This unexpected result can be attributed to the fact that the group of food products and non-alcoholic beverages is not homogenous. Different types of food and beverages have varying levels of demand elasticity in response to price changes. Essential food items typically have inelastic demand, meaning that even with price increases, consumers continue to purchase them in relatively stable quantities. On the other hand, non-essential or less frequently consumed products within the same group may exhibit more elastic demand, where consumers are more responsive to price fluctuations. This diversity within the group can obscure the overall impact of price changes on the real volume of turnover, making it difficult to draw uniform conclusions. For this reason, we have broken down the analysis into special groups of food products kept by official statistics in Serbia. According to official statistics in the Republic of Serbia, there are seven groups of food products. The first group consists of: bread, cereals, pasta, and bakery products. The second group consists of: meat and fish. The third group consists of: milk, dairy products, and eggs. The fourth group consists of: oils and fats. The fifth group consists of: fruits and vegetables. The sixth group consists of: sugar, chocolate, and sugar-based products, and the seventh group consists of: non-alcoholic beverages.

Interestingly, the results of multivariate regression, showed similar results in the case of six groups of food products. More precisely, the level of price change did not have a statistically significant impact on the real sales volume of the first, second, third, fourth, fifth, and seventh groups of food products. This means that the change in price levels did not have a statistically significant impact on the real sales volume of bread, cereals, pasta, bakery products, meat, fish, milk, dairy products, eggs, oils, fats, fruits, vegetables, and non-alcoholic beverages. This leads to the conclusion that, for these food products, the case of inelastic demand in relation to price increases applies. On the other hand, for this group of products, in the conducted regression analysis, the level of unemployment, as a control determinant of demand for these products, has a statistically significant impact (Table 2). This could open up some other research questions.

The exception is the sixth group of food products, namely sugar, chocolate and sugar-based products. Data for the sixth group of food products are presented in Table 3.

Table 3. The price index of the sixth group of products (sugar, chocolate and sugar-based products)

Year	Price index for sugar, jam, honey, chocolate (Base index 2006 = 100)	Index of real volume of turnover of sugar, chocolate and sugar-based products (Base index 2006 = 100)	Unemployment rate in %
2006	100,0	100,0	15,4%
2007	102,5	116,4	14,8%
2008	111,9	123,3	14,4%
2009	120,5	110,9	16,9%
2010	134,7	97,7	20,0%
2011	156,6	106,3	23,3%
2012	159,4	106,2	24,6%
2013	154,8	114,1	23,0%
2014	146,1	130,5	19,7%
2015	159,3	133,4	18,2%
2016	169,1	136,1	15,9%
2017	167,8	141,9	14,1%
2018	163,3	146,9	13,3%
2019	170,3	156,6	10,9%
2020	172,3	169,0	9,5%
2021	186,4	166,9	11,5%
2022	215,4	180,5	9,8%

Source: Calculated on the basis of https://data.stat.gov.rs/

The results of multi-factor regression in which the dependent variable is the index of real volume of turnover of sugar, chocolate and sugar-based products in retail, and the independent variables are the price index of that type of product and the unemployment rate in the Republic of Serbia are shown in Table 4.

Table 4. Results of multifactorial regression

Argument	Coefficient	Standard Error	T-value	P-value	95% confidence interval
Interception (constant)	117.9717	16.436	7.178	0.000	[82.161, 153.782]
Price index	0.4600	0.078	5.898	0.000	[0.290, 0.630]
Unemployment rate	-3.4548	0.393	-8.781	0.000	[-4.312, -2.597]

Source: Authors' calculations by using statistical software STATA 12

The results of the multifactorial regression show that the model explains 94.3% of the variability in the real volume of turnover of sugar, jam, honey and chocolate (R-squared = 0.943). This indicates a high degree of predictive power of the model, which means that most of the variability in the dependent variable can be explained by changes in the

independent variables. The intercept (constant) is statistically significant ($P < 0.001$), with a coefficient of 117.9717, indicating the baseline level of real sales volume when the independent variables are zero. The price index has a coefficient of 0.4600, which is statistically significant ($P < 0.001$). This means that with each increase in the price index by one unit, the real volume of turnover increases by 0.460 units, which indicates a positive relationship between the price growth and the real turnover of sugar, jam, honey and chocolate. The unemployment rate shows a significant negative impact on the real volume of turnover, with a coefficient of -3.4548 ($P < 0.001$). This means that for every increase in the unemployment rate by one percentage point, the real volume of turnover decreases by 3.4548 units.

These results suggest that the growth of the price index, from the point of view of statistics, has a positive effect on the real volume of trade in sugar, jam, honey and chocolate, while the increase in the unemployment rate has a negative impact. The model shows a high degree of explanation, which implies that the analyzed variables are key factors in determining the real turnover of these products.

Based on the results obtained, it can be concluded that the change in prices is a statistically significant variable for the real volume of turnover in the case of this group of products, and the same applies to the unemployment rate. The results obtained are particularly significant because products based on sugar and chocolate can have the epithet of luxury products and the increase in prices has a statistically significant impact on the growth of demand. In addition, the impact of increased unemployment further reduces the demand for these products more intensely than in the case of basic foodstuffs whose real volume of turnover carries the epithet of price inelasticity, from the point of view of statistical significance. In this way, the alternative hypothesis that the change in prices has a statistically significant impact on the real level of sales of food products is considered valid only in the case of the real volume of retail turnover for products such as sugar, chocolate and sugar-based products.

Conclusions

The analysis showed that the hypothesis about the impact of price changes on the real level of sales of food products in retail has a statistically significant impact only in the case of real turnover for products such as sugar, chocolate and sugar-based products. In the case of basic foodstuffs, the price level cannot be considered a statistically significant determinant for the real volume of turnover of this type of product in retail in Serbia. The results of the analysis have opened another important research question, which is that real macroeconomic factors, such as the unemployment rate, have a permanently statistically significant impact on the real turnover of food products in retail in Serbia. More precisely, for each product group individually, the increase in unemployment has a statistically significant negative impact on the real volume of turnover for each product group. In addition, in the case of basic foodstuffs, this negative impact is statistically significant, but milder, while in the case of products bearing the epithet of luxury products, this negative impact is more pronounced. This shows that in the case

of the analysis of the real turnover of food products in Serbia, inflation as a monetary macroeconomic phenomenon has a statistically important, but not as strong impact as the unemployment rate, which is a real macroeconomic phenomenon.

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Conflict of interests

The authors declare no conflict of interest.

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