Journal of Infrastructure, Policy and Development 2025, 9(1), 9754.
https://doi.org/10.24294/jipd9754

Review

Old-new enemy on the horizon? New factors for measuring inflation in Visegrad countries consumer baskets

Zoltán Sipiczki[1], Máté Bence Kralovics[2], Tibor Tatay[3,*], József Varga[4,5,6]

[1] Department of Investment, Finance and Accounting, Hungarian University of Agricultural and Life Sciences, H-7400 Kaposvar, Hungary
[2] Corvinus University of Budapest, H-1093 Budapest, Hungary
[3] Department of Statistics, Finances and Controlling, Széchenyi István University, Egyetem square 1, H-9026 Győr, Hungary
[4] Faculty of Economics, Socio-Human Sciences and Engineering, Sapientia Hungarian University of Transylvania, RO530104 Miercurea Ciuc, Romania
[5] Institute for Rural Development and Sustainable Economy, Hungarian University of Agriculture and Life Sciences, H-7400 Kaposvar, Hungary
[6] Department of Finance, Corvinus University of Budapest, H-1093 Budapest, Hungary
*** Corresponding author:** Tibor Tatay, tatay@sze.hu

CITATION

Sipiczki Z, Kralovics MB, Varga J, Tatay T. (2025). Old-new enemy on the horizon? New factors for measuring inflation in Visegrad countries consumer baskets. Journal of Infrastructure, Policy and Development. 9(1): 9754. https://doi.org/10.24294/jipd9754

ARTICLE INFO

Received: 20 October 2024
Accepted: 15 November 2024
Available online: 7 January 2025

Abstract: The impact of inflation on the economy cannot be ignored as it can affect it either positively or negatively. This is because inflation has a broad impact on the macroeconomy, such as economic growth, competitiveness and the distribution of wealth. Therefore, the way in which it is measured also requires particular attention. Our hypothesis is that the weights of the consumer baskets measuring inflation in the Central European countries (Visegrad countries: Poland, Slovakia, Czech Republic and Hungary) change dynamically under the influence of modern causes of inflation and we assume that the composition of the inflation baskets moves together due to the similar economic environment. The Visegrad countries (V4), consisting of Poland, Hungary, Czechia, and Slovakia, were selected for this study due to their unique position as a loose economic and political alliance within the European Union. While geographically close, these countries have different economic structures and policy responses, making them an interesting case for comparative analysis. Despite their proximity, it cannot be assumed that inflationary trends will develop similarly across these nations. This underexplored region presents an opportunity to examine how diverse macroeco-nomic factors shape inflation, adding valuable insights to the existing literature. In this study, we do not focus on comparing overall inflation trends between countries, but rather on examining the trends in the changes within the inflation baskets. The aim is to analyze how the composition of goods and services contributing to inflation shifts over time in each country, rather than simply looking at inflation rates. This approach allows us to explore deeper insights into the specific components driving inflationary pressures in the Visegrad countries, highlighting how the importance of certain goods and services evolves within the inflation basket across different economic environments. The weights of the consumer baskets measuring inflation are taken from the Inter-national Monetary Fund 2012–2022 data. We used the Kruskal-Wallis test to determine whether there are statistically significant differences between countries' consumer basket weights. Our results suggest that the inflation baskets of the four countries do not move significantly together, so there are significant differences in consumption patterns across nations regardless of geographical proximity. Also, contrary to our preliminary expectations, global megatrends such as demographic change, digitalisation and climate change have not yet had a significant impact on the weightings in the consumption baskets of the V4 countries. Therefore, these will require increased attention and preparation in the near future, as even if prices remain unchanged, measured inflation could change significantly across countries as weights shift.

Keywords: inflation; classical causes of inflation; modern causes of inflation; errors in inflation measurement

1. Introduction

In our study we explore similar ideas, but the central issue of our analysis is the methodology for measuring inflation, the most important target variable of monetary policy. Consumer price indices are widely used to index pensions and social security benefits. Consumer price indices are also used to index other payments, such as interest payments, rents or bond prices. Based on a thorough review of the relevant economic literature, we contend that special attention should be given to the methodology used for measuring inflation. Accordingly, we formulate our research question as follows.

We hypothesise that the weights of the consumer baskets measuring inflation in the Central European countries (Visegrad countries: Poland, Slovakia, Czech Republic and Hungary) are dynamically changing under the influence of modern causes of inflation and that the composition of the inflation baskets moves together due to the similar economic environment.

On this basis, we have categorized the causes of inflation into two groups: traditional and modern causes. While we argue that inflation measurement in relation to traditional causes generally provides accurate results, it proves inadequate when addressing modern causes. In this study, we explore some of the key elements contributing to this inadequacy.

1.1. Theoretical background: The classical causes of inflation

Milton Friedman, one of the most influential Nobel Prize-winning economists and economic adviser to President Reagan, among others, had a fundamental problem with the way monetary policy worked. In his view, the price of money is interest. And this price is nowadays set centrally, artificially, in the developed countries. And this brings us to perhaps the greatest contradiction of capitalism, since the price of its basic product, its most important asset, is set by a few decision-makers (Szabó, 2014).

The situation is further aggravated by the fact that the effects of the decisions of the monetary system are usually delayed rather than immediate. Friedman (1986), in 1976, when accepting the Nobel Prize, said that we are not able to see through the processes, and that therefore, because of the complexity of the economic system and the delayed consequences of its effects, we should pursue a calm, predictable monetary policy rather than an active one. Inflation is said to occur when the price level of not only one but several products or groups of products or services rises permanently (Bánfi, 1977). The first one is a completely natural process in a market economy, since prices are completely free and could vary freely. Of course, it matters what products' prices we examine, as well as which product receives what amount of weight. It is important that it provides a somewhat accurate representation of the nationwide average inflation rate (ECB, 2022). We can speak of inflation when the price level experiences a sustained increase. During such periods, prices rise, and certain products, product groups, or services can be purchased or obtained at a higher cost (Bánfi, 1977).

Inflation for infrequently traded goods and services has been on an upward trend since 2022 (Eurostat, 2023). This is shown in **Figure 1** below:

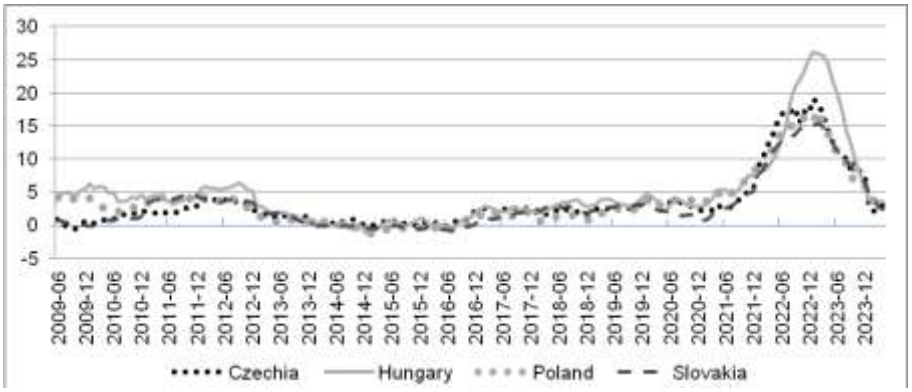

Figure 1. Inflation in Visegrad countries (HICP—monthly data (annual rate of change) %).
Source: (Eurostat, 2023).

1.2. The classical causes of inflation

The quantity theory of money is widely regarded as one of the primary explanations for inflation. This theory posits that variations in the money supply directly influence the overall economy and, consequently, the price level. Associated with classical economists, the theory suggests that changes in the quantity of money result in proportional shifts in the price level. Therefore, it can be stated that the price level of a given country is determined by its central bank, as it is responsible for the amount of money circulating in the country's economy. Thus, if the central bank alters, for example, increases the money supply, the price level also changes, in this case, it rises. The relationship between inflation and the quantity of money is illustrated in **Figure 2**, which represents the decades between 1870 and 2000 in the United States. It is evident that when more money was put into circulation, inflation was higher (e.g., in the 1910s, 1940s, and 1970s). During those decades when the growth rate of the money supply was high, inflation remained positive or close to 0. With International Monetary Fund annual country data from 1948 for countries that have such data Frain (2004) suggests that a relatively close relationship between money growth and inflation may exist over.

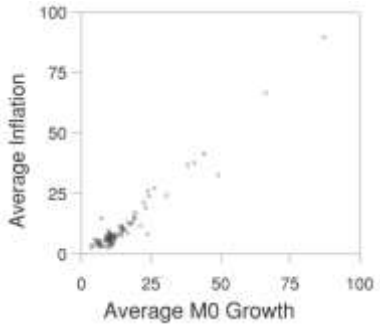

Figure 2. Scatter plots of average inflation and average growth rates of M0 for all Countries.
Source: (Frain, 2004).

This phenomenon has been substantiated in the long run, but in the short term, the relationship between the quantity theory of money and inflation has not been proven in this manner. **Figure 2**, which illustrates this short-term effect, reveals that

changes in the quantity of money have a delayed impact on inflation over time; however, the relationship between the two variables is not uniformly strong.

There are several periods in which the relationship between the quantity of money and inflation deviates from this assumption, for example, in 1963–1965 and 2003–2005. In these cases, despite the high growth rate of the money supply, inflation did not follow suit and remained low. Therefore, it is evident that in the long run, the statement made by Friedman holds true, that inflation is exclusively a monetary phenomenon, but not necessarily in the short term (Mishkin, 2020).

Friedman is a leading figure in the monetarist school, with its foundation in the aforementioned quantity theory of money, which highlights the relationships between money and various aspects of the economy, such as price level and production. Friedman argued that money serves as the driving force of the economy, functioning as a critical mechanism whose mismanagement can disrupt other economic components. In his writings, he stated: "All our experience indicates that the periodic disturbances in output and employment associated with inflations and deflations are monetary phenomena" (Friedman, 1986). Friedman assigned a significant role to monetary policy. According to his views, the goal of this policy is to prevent money from being the primary cause of economic disturbances, maintain economic stability, and contribute to resolving economic issues, such as controlling inflation through slower than desired monetary growth (Friedman, 1986).

On the other hand, the main proponent of the opposing Keynesian school, John Maynard Keynes, did not refute this basic premise; he did not oppose the quantity theory of money. The fundamental idea embedded in Keynesian economics is the income-expenditure theory, also known as the multiplier theory (Szepesi, 2013).

Keynes's starting point is that during the post-crisis recovery phase, rising incomes lead to proportional increases in consumption. However, after a certain point, consumption and income diverge as sufficient income accumulates, leading to an increase in savings propensity. Initially, individuals spend their additional income to cover deferred purchases from the crisis period, thus increasing consumption. Subsequently, the focus shifts to increasing a sense of security, which leads to an inclination towards saving. As a result, a portion of their income ends up in banks, which, in turn, transfers these savings into the production sphere in the form of loans. With further production growth, this entire process continues to expand, incomes rise, and the propensity to save increases, leading to a separation between income and consumption. The latter eventually surpasses market demand, resulting in overproduction crises. Keynes proposes that the gap between consumption and production should be filled by the government, acting as a "big spender," which would absorb savings and prevent them from flowing into production. To achieve this, the government should invest in socially beneficial, non-production sectors such as education, healthcare, etc. According to Keynes, the government can manage the trio of production, employment, and price stability, or their negative counterparts of recession, unemployment, and inflation (Gazdag, 2001).

It is important to mention another classical cause of inflation related to the previously mentioned one, namely, the budget deficit. During the 1973 oil crisis and the general energy and raw material crisis, governments attempted to protect and

rescue struggling sectors through state subsidies. However, this resulted in enormous budget deficits, becoming a major cause of inflation (Gazdag, 2001).

Another correlation used to explain inflation is the Phillips curve, which links the dynamics of unemployment and inflation. Phillips examined the relationship between unemployment and wage growth, illustrated in **Figure 3**. He found that when there is low unemployment in the labor market, workers' wages increase more rapidly due to their stronger bargaining position in the context of labor market tightness. In contrast, when the unemployment rate is higher, wage growth slows down. Phillips established his theory based on data from the United Kingdom; however, other economists extended this concept to several countries and connected wage levels, from a macroeconomic perspective, with a broader concept: inflation. The Phillips curve, representing the negative relationship between unemployment and inflation, was commonly used in the 1960s to explain changes in the price level (Picardo, 2022).

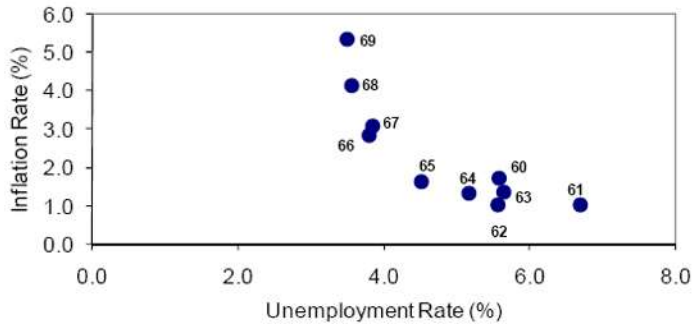

Figure 3. Inflation and unemployment rate in the United States during the 1960s.
Source: (Picardo, 2022).

The data suggested that the inverse relationship between the two variables holds in the long run, and policymakers can achieve a low unemployment rate by accepting a higher inflation rate. At first, this concept seemed viable and was applied, for example, in the United States in the mid-1960s. However, towards the end of the decade and afterward, when inflation started to increase continuously, surprisingly, the unemployment rate remained high. This indicated a flaw or incompleteness in the theory. Friedman and Phelps pointed out this deficiency: if workers and employers expect rising prices in the future, they adjust nominal wages in wage negotiations to maintain high real wages. In other words, labor market participants make decisions related to wages based on real wages, not nominal wages. Individuals are more concerned with how much they can actually buy with their wages, rather than just the numerical amount they are paid (Gelencsér et al., 2023). The Phillips curve supplemented with such expectations shows that in the long run, there is no correlation between the dynamics of inflation and the movement of the unemployment rate, only in the short term. Later, this theory was further complemented with another factor that could not be disregarded: the impact of supply shocks. The surge in oil prices during 1973 and 1979 led to soaring inflation, which compelled economists to augment the already supplemented Phillips curve. Supply shocks can result from both supply-side shocks, affecting the producible output given capital and labor, and cost shocks when workers receive higher wages than productivity growth, leading to increased production costs and inflation, or even consequences of rising import prices. These

supply shocks influence inflation and result in fluctuations that are not related to labor market tightness or inflation expectations, necessitating the enhancement of the curve (Mishkin, 2020). It is accepted that inflation expectations are also factors in an economy that have a significant impact on headline inflation (Abbasov and Karimov, 2020).

The concept of an "inflation basket" is central to measuring inflation. However, the composition of this basket can change over time, reflecting shifts in consumer preferences and the economy. This can lead to challenges in accurately measuring inflation, as the basket may not always reflect the true cost of living for individuals. Changes in inflation rates, influenced by factors like shifts in consumer behavior and economic conditions, can introduce additional uncertainty into financial calculations. (Markantonis et al., 2023)

1.3. The causes of inflation in the 21st century (digital age)

Modern inflationary pressures have significantly altered the composition of consumer baskets. The economic and social changes of recent decades, such as globalization, digitalization, and demographic aging, have resulted in new consumer habits that are reflected in the composition of consumer baskets.

Due to rising food prices and the increasing demand for a healthy lifestyle, the proportion of food in consumer baskets has generally increased. In particular, the demand for organic products and unprocessed foods has risen. The demand for services, especially education, healthcare, and leisure activities, is constantly growing. This trend is linked to rising incomes and increasing expectations for quality of life. Thanks to technological development, new products and services have appeared in consumer baskets, such as smartphones, computers, streaming services, and online shopping. These products and services play an increasingly important role in people's lives and significantly influence consumer habits. Fluctuations in energy prices and the growing demand for sustainability have changed the role of energy carriers in consumer baskets. Alternative energy sources, such as solar and wind energy, are playing an increasingly important role (Matolcsy et al., 2020; Tukhtabaev et al., 2022). The pandemic also significantly altered consumer behavior and the composition of consumer baskets. Consumers became more conscious of health and hygiene, leading to increased demand for products like sanitizers, masks, and vitamins. With economic uncertainty, consumers prioritized essential spending and cut back on discretionary purchases like travel and entertainment. The shift to remote work and online learning increased the demand for home office equipment, technology, and educational materials (Csiszárik-Kocsir et al., 2021).

These changes show that the composition of consumer baskets is not static but is constantly changing in response to economic and social changes. The classical economic models presented in the previous section are starting to lose their relevance in the 21st century, as they fail to provide explanations for ongoing processes. Therefore, it is necessary to explore other current paradigms that significantly influence inflation. Alongside classical factors, several new trends associated with the modern era and economic and technological development have emerged. These major developmental directions have rewritten the rules in the field of economics,

introducing new regularities and tendencies. Some of these "megatrends" include digitization, globalization, demographics, and climate change. These trends bring forth interesting phenomena from an economic perspective and in terms of exploring the causes of inflation, such as the revaluation of the role of services and the transformation of consumer behavior (Matolcsy et al., 2020). In the following, we will examine the most important among these modern factors.

1.3.1. Demographics

One of the most influential factors shaping the future economic and social situation is demographic changes. How societies, and within them, different age groups handle their savings, investments, make decisions in the labor market, and participate in the demand-supply relationship, all affect macroeconomic phenomena, including inflation. Our world is undergoing significant changes in terms of population size and composition, driven primarily by birth and mortality rates (Yoon et al., 2014).

The growth is partly due to declining birth rates (5 births per woman in 1950, now reduced to an average of 2.3 in 2021, which is expected to further decline), while the mortality rate is decreasing even more significantly. As a result, the age composition of our society is changing; it is aging. The number of elderly people is constantly increasing, and their percentage is growing in relation to the total world population. Estimates suggest that this percentage could rise from the current 10% to 16% by 2050. The impact of the aforementioned demographic changes on inflation is significant but varies greatly. The fact that the world's total population is growing has a positive effect on inflation, as it may result in increased overall demand (Yoon et al., 2014). On the other hand, recent years have seen decreasing inflation due to changes in the age structure of the population and increasing life expectancy (Matolcsy et al., 2020). The negative inflationary effect of an aging society can be explained, in part, by the different consumption-saving preferences and varying inflation expectations of the elderly population, potentially reducing overall demand (Yoon et al., 2014). Others attribute this phenomenon to the fact that the population aged 65 and older is more averse to inflation than the active working-age group, and they wield greater political power, which means they can influence the government's inflation policies and reduce inflation (Vlandas, 2016).

Furthermore, the increase in the proportion of the elderly population also means that there is less labor force in the economy, as the proportion of working-age individuals decreases, which in turn contributes to inflation (Yoon et al., 2014). The same phenomenon has a positive impact on inflation from another perspective: the fact that the number of working-age individuals decreases in the labor market places employees in a better position during wage negotiations, resulting in higher wages. This leads to increased incomes and internal demand, thus driving inflation. Not to mention that higher tax burdens on employees become inevitable to maintain the social safety net and ensure care for the elderly. This also indicates that workers, capitalizing on their strong bargaining position, will fight for higher wages (Goodhart and Pradhan, 2017).

Higher wages also increase the costs for companies, which is reflected in price increases. As a result, high inflation expectations intensify, prompting employees to negotiate for even higher wages during wage negotiations. Thus, this process becomes

a vicious circle, self-reinforcing, which is why it is called an inflation-wage spiral (Hajnal and Várhegyi, 2016).

The life-cycle theory proposed by Ando and Modigliani (1963) is also very interesting, suggesting that individuals' working and participating economic needs and saving vary according to their life span. While participation at young ages, consumption trends and savings are high, participation in the production of elderly products, and especially savings, falls considerably. This means inflationary effect that countries with a different proportion of working-age individuals tend to experience different inflation.

1.3.2. Globalization

As globalization entails the increasing interdependence of the world's economies, its expansion has reshaped international economic relations (Venditti et al., 2021). In today's world, inflation is not solely examined within the borders of individual countries; due to globalization, discussions now encompass cross-border economic processes, which also affect inflation. It is not just money itself that moves across countries, but also goods, services, and certain production factors, leading to ever-tightening economic ties between nations and closer proximity of inflation rates. This means that price levels are no longer solely determined by local economies and market conditions but are influenced by global trends (Matolcsy et al., 2020).

According to Guerrieri et al. (2010), global economic integration can significantly influence local inflation dynamics because intensified competition pushes individual companies to lower their prices to maintain competitiveness. If foreign competitors reduce their prices, domestic companies are also inclined to do so. In an open economy created by globalization, domestic inflation thus depends on the relative relationship between import and foreign goods and domestic prices. In more open economies, inflation is much more sensitive to external factors than internal ones, as trade barriers decrease, and new technologies spread through global production processes (Nagy and Tengely, 2018). Auer et al. (2019) also examined the inflation synchronizing effect of globalization and found that global value chains and input-output linkages significantly facilitate inflation co-movement among countries.

Auer et al. (2019) demonstrated this interdependence convincingly when investigating the strength of international input-output relationships. They found that global inflation shocks transmit significantly to individual countries. On average, a 1% inflationary shock in other countries raises domestic producer price inflation by 0.19%.

Digitalization and technological advancement also have significant impacts. From an inflationary perspective, it is essential to recognize that digitalization can bring about significant changes in corporate operations. New technologies such as automation, digital platforms, sensors, cloud-based storage, etc., may result in reduced costs for companies, leading to lower prices and, consequently, decreasing inflation (Dong et al., 2017).

Digitalization causes new technologies to completely transform traditional value chains, resulting in changes in sales channels, making way for a new form known as the platform economy. This process is also supported by price competition, which, through e-commerce facilitated by digital platforms, exerts a deflationary effect.

Online stores are more transparent, making it easier to compare prices of different companies, intensifying competition, and reducing companies' pricing power (Dong et al., 2017). Additionally, e-commerce lowers costs in both small and large-scale trade as online platforms for selling products and services are cheaper than traditional retail outlets. The absence of physical stores eliminates rental fees and reduces labor costs as there is no need for personnel in a virtual store. The resultant lower costs lead to price reductions for products and services (Matolcsy et al., 2020).

1.3.3. Climate change

Climate change is also among the current global trends, and its macroeconomic impact and effect on banking sector cannot be neglected (Lamanda and Vőneki, 2023). One of its effects could be the destabilization of medium-term inflation expectations. Another important impact is the possibility of inducing a series of supply-side shocks. Arora et al. (2019) found that the climate change is projected to lower yields by 33–64% over 2031–2055 relative to 1981–2005, with soya bean being the least and alfalfa the most affected crops. According to Melo-Velandia et al. (2022), climate change and the intensification of extreme weather events are primary factors contributing to elevated food prices.

Central banks find it more challenging to adjust to supply-side shocks compared to demand-side shocks because the former influences inflation and output in opposing directions. If output increases, inflation decreases, and vice versa. Climate change brings about the latter, as factors like droughts, heatwaves, hurricanes, and floods lead to decreased crop yields, raising food prices (Bareith-Fertő, 2023). Conversely, rising sea levels can create negative demand-side shocks as demand falls for properties located in affected areas, leading to significant drops in real estate prices (Coeuré, 2018).

Furthermore, the demographic changes discussed earlier further exacerbate this situation since the growing population requires more land and drinking water, which becomes increasingly scarce due to climate change.

Besides the major trends of the 21st century, it is important to mention other factors influencing inflation. According to Hajnal and Várhegyi (2016), prices are determined by the balance of supply and demand. An instance of excess demand can arise due to a health emergency, as seen in the aftermath of the coronavirus outbreak in 2020. Increased demand outpaced supply recovery due to the resources and time required to restore production to pre-crisis levels, resulting in an inflationary environment (Balogh, 2021; Nagy et al., 2023). According to Wu and Xu (2021) the main driving force of food price is the price inertia shock, rather than the agricultural output or the vertical chain of price transmission shocks. Their findings support the view that price expectation is the key shifter of food price.

Markantonis et al. (2023) highlights the importance of considering inflation rates when assessing investment risk, particularly in infrastructure projects. This is crucial because inflation erodes the purchasing power of money over time, affecting the real cost of projects.

2. Materials and methods

Consumer Price Indexes (CPI) are index numbers that measure the price changes

of goods and services purchased by households to directly or indirectly satisfy their needs and preferences. In practice, most consumer price indexes are calculated as weighted averages of percentage price changes for a specific group or "basket" of consumer goods, with the weights reflecting the relative significance of these goods in household consumption during a given period.

To ensure further coordination and harmonization in the collection of consumer price index data, international organizations, namely the International Monetary Fund (IMF) and the Organisation for Economic Co-operation and Development (OECD), have agreed to take responsibility for the international collection and dissemination of national consumer price index data. As part of this data collection initiative, countries report aggregated indexes for all items, as well as more detailed indexes and weights for 12 consumption subgroups (according to the so-called COICOP classification), along with detailed metadata. During this process, the OECD collects and verifies the data for its member countries.

Consumer price statistics are based on the observation of approximately 1000 goods and services. To accurately reflect the impact of price changes on household expenditures, it is essential to know the role and weight of these items in consumption. The weights used in the calculation of the consumer price index represent the shares of product and service groups in total household consumption. These weights are reviewed annually based on household consumption patterns.

The formula for calculating the overall consumer price index is as Equation (1):

Laspeyres-price index:

$$I_L = \frac{\Sigma P_{it} Q_{i0}}{\Sigma P_{i0} Q_{i0}} \quad (1)$$

where P_{i0} is the price of commodity I at time 0; Q_{i0} is the quantity of commodity I at time 0; P_{it} is the price of commodity I at time t.

The purpose of calculating the Harmonized Index of Consumer Prices (HICP) is to provide international comparisons among the member states of the European Union. The index is calculated with consideration of national specificities, and there are no mandatory requirements for the selected goods and services. However, the use of the international abbreviation for the Classification of Individual Consumption According to Purpose (COICOP) is mandatory.

The weights of the consumer baskets used to measure inflation in Poland, Slovakia, the Czech Republic, and Hungary were based on data from the International Monetary Fund (IMF) for the years 2004–2023 (IMF, 2023).

We used Kruskal-Wallis test to determine if there are statistically significant differences in the weights of consumer baskets among the countries.

The H statistic represents the test statistic of the Kruskal-Wallis test. Under the null hypothesis, the chi-square distribution approximates the distribution of H. Due to the ordinal scales, the distributions were examined using the non-parametric Krus-kal-Wallis test. The Kruskal-Wallis test (H-test) is used for hypothesis testing of multiple independent samples when the assumptions of one-way ANOVA are not met.

The framework for statistic H is as Equation (2):

Kruskal-Wallis formula:

$$H = \frac{12}{n(n+1)} \Sigma \frac{R_i^2}{n_i} - 3(n+1) \quad (2)$$

where "n" is the total number, "n_i" is the number in the "i" th group, and R_i is the total sum of ranks in the "i" th group. The value of H is tested using the Chi-squared distribution with degree of freedom $k - 1$, where k is the number of groups.

3. Results and discussion

The majority of products included in the inflation consumer basket consist of food, clothing and footwear, fuels, healthcare services, accommodations, and entertainment options. In Central and Eastern European countries, the weights of products in the inflation consumer basket are roughly similar, as people have similar needs and consumption habits.

For food, its weight represents 15%–25% of the consumer basket in all countries, signifying a significant portion. Since 2012, there has been a growing trend observed in the case of the Visegrad countries, illustrated in **Figure 4**.

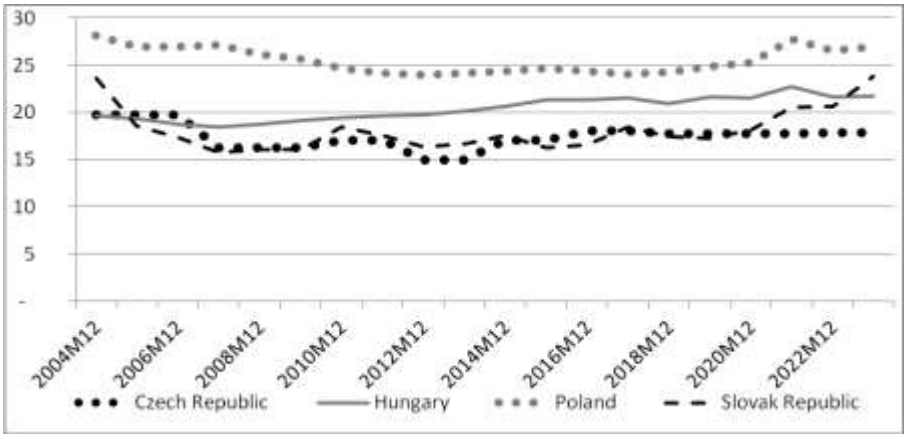

Figure 4. Weights of food and non-alcoholic beverages in the consumer basket in Poland, Slovakia, the Czech Republic, and Hungary from 2004 to 2023 (%).
Source: own editing based on IMF 2023 data.

The growth in food consumption is one of the most important and significant trends observed during the analysis of consumer baskets. Several factors contribute to the increased presence of food in the consumer baskets of individual countries. Economic growth and rising incomes in various countries allow consumers to purchase more and higher-quality (more expensive) food items. British Broken Plate report by The Food Foundation released in 2023, found that healthy food is usually twice as expensive as less healthy food, on a per calorie basis (Food Foundation, 2023). People are becoming increasingly aware of the importance of healthy nutrition and are paying more attention to consuming healthy foods, such as fruits, vegetables, and whole grains. As a result, the weight of food items in the consumer basket is increasing.

Another effect is that those with lower and decreasing income levels are forced to spend more on food items at the expense of other consumption groups. Particularly in a high food inflation environment, individuals in disadvantaged financial situations

tend to reduce expenses on entertainment, clothing, and other non-essential items, thereby increasing the proportion of food in their consumer baskets.

Although there is a similar upward trend observed in the four examined countries, there is a statistically significant relationship between Slovakia and the Czech Republic based on the Kruskal-Wallis test (see Appendix **Figure A1**). According to the data, from 2004 to 2023, Poland consistently had the highest proportion of food in the average consumer basket.

The proportion of alcoholic beverages, tobacco, and narcotics in the consumer basket only changed slightly in Poland, Slovakia, Czech Republic, and in Hungary: it remain 5% to 10% during the 2004–2023 period, illustrated in **Figure 5**. According to our findings, there are significant differences in the proportions between these countries (see Appendix **Figure A2**).

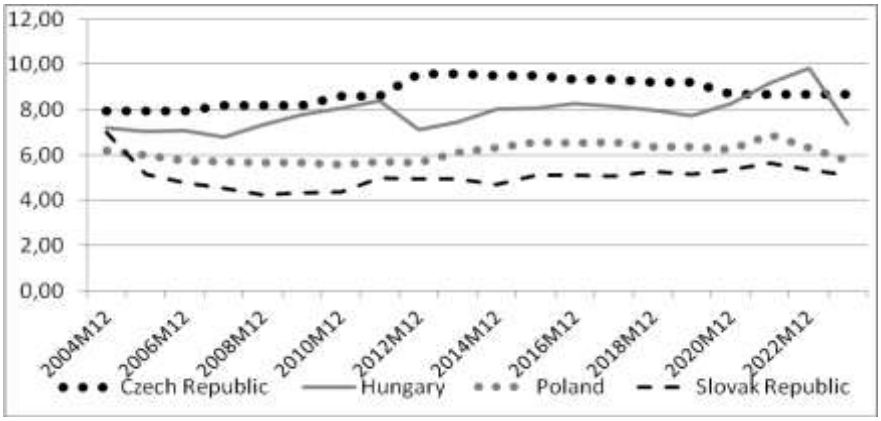

Figure 5. Weights of alcoholic beverages, tobacco, and narcotics in the consumer basket in Poland, Slovakia, the Czech Republic, and Hungary from 2004 to 2023 (%).

Source: own editing based on IMF 2023 data.

The proportion of income spent on transportation has not changed significantly, but Hungarians allocate a much larger share of their consumer basket to this consumption group compared to neighboring countries. It is probable that the closures due to the 2020–2021 pandemic and the subsequent decline in travel expenses led to a slight reduction in the amount spent on transportation by the population in Slovakia. However, this trend is not observed in the other examined countries (see **Figure 6**). Due to the global trend of digitalization, we assumed that the proportion spent on transportation would decrease (due to the rise of remote work, online conferences, and meetings). However, this trend has not yet appeared in the consumer habits of the examined countries based on the consumer baskets of statistical offices (see Appendix **Figure A3**).

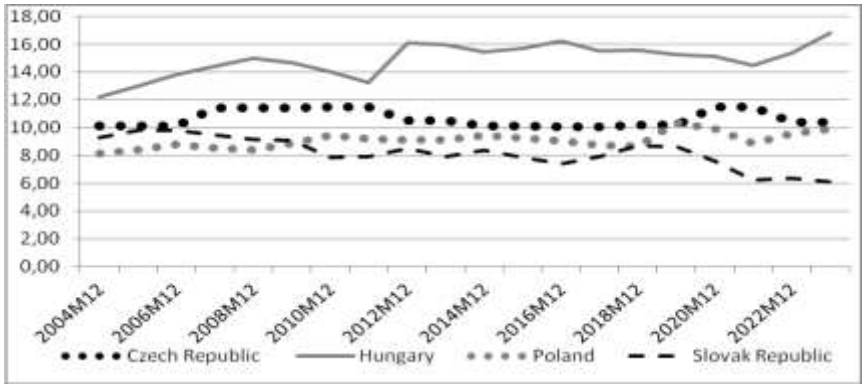

Figure 6. Transport weights in the consumer basket for Poland, Slovakia, Czech Republic and Hungary 2004 to 2023 (in %).
Source: own editing based on IMF 2023 data.

In 2022, the significant increase in energy costs due to the Russian-Ukrainian war and the subsequent deterioration in the availability of energy sources had little impact on the consumer baskets of the countries surveyed. Moreover, in the case of Hungary, where overheads had previously been much less important, the share of this cost group in the consumer basket even decreased over the period under review (see **Figure 7**). According to our findings, there are significant differences in the proportions between these countries (see Appendix **Figure A4**). According to Eurostat, tax and subsidy policies and price controls in individual countries may have had a significant impact on prices.

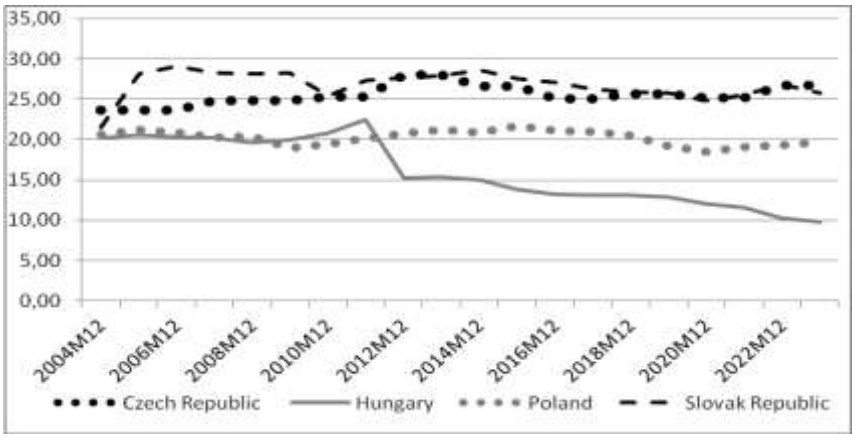

Figure 7. Weightings of housing, water, electricity, gas and other fuels in the consumer basket for Poland, Slovakia, the Czech Republic and Hungary 2004 to 2023 (%).
Source: own editing based on IMF 2023 data.

For the modern causes of inflation, a significant effect is the higher share of health care expenditure due to an ageing population. These dynamics have not yet significantly changed the consumption patterns of the Visegrad countries, a slightly increasing trend in the countries surveyed (see **Figure 8**).

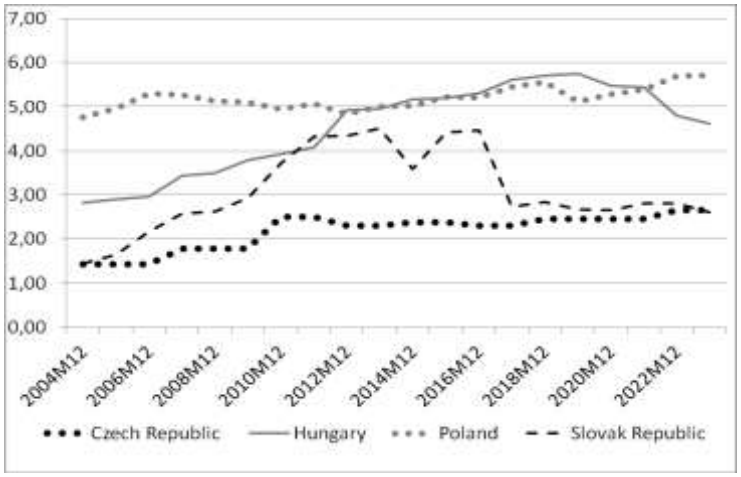

Figure 8. Weightings in the consumer basket of health goods and services for Poland, Slovakia, Czech Republic and Hungary 2004 to 2023 (%).
Source: own editing based on IMF 2023 data.

Based on the Kruskal-Wallis Test, the weightings of the Visegrad countries in the consumer basket of health goods and services are significantly similar for Hungary and Poland, but not for Slovakia and the Czech Republic (See Appendix **Figure A5**).

Another paradigm shift effect is the spread of cheaper, faster and more wide-spread communication due to digitalisation. However, the share of money spent on communication in consumer baskets is stagnating in the countries studied (see **Figure 9**).

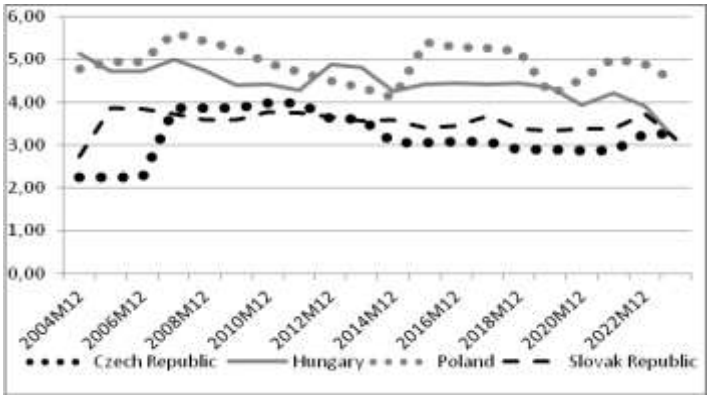

Figure 9. Weightings of communication-related goods and services in the consumer basket for Poland, Slovakia, the Czech Republic and Hungary 2004 to 2023 (%).
Source: own editing based on IMF 2023 data.

Based on the Kruskal-Wallis Test, the weightings in the consumer basket of communication-related goods and services in the Visegrad countries are not significantly similar (See Appendix **Figure A6**).

The composition and weighting of the consumer basket in each country therefore reflects the consumption patterns and economic situation of the country concerned. The consumer baskets of Hungary, Slovakia, the Czech Republic and Poland are not weighted similarly, despite the fact these Central and Eastern European countries have more or less similar economic, social and cultural environments. Based on the

Kruskal-Wallis Test, there are differences in the composition of consumer baskets which may have an impact on the measurement of inflation.

4. Discussion

Although similar trends are observed in the four examined countries, a significant close relationship is rarely observed, and only in the case of Slovakia-Czech Republic and Hungary-Poland pairs based on the Kruskal-Wallis test.

According to our findings, the current inflationary modern megatrends found in the literature have not yet appeared in the consumer habits of the examined countries based on the consumer baskets of statistical offices.

We assumed an increase in the proportion of the food group due to climate change and income inequalities. However, based on the data, the proportion of the food group within the average consumer basket increased only slightly. Changes due to digitalization also did not affect, for example, the proportion of income spent on transportation or the amount spent on communication by consumers.

Based on the Kruskal-Wallis test, the weights of health products and services in the consumer basket for Visegrad countries significantly match those of Hungary and Poland, but not in the case of Slovakia and Czech Republic. However, our assumption of a jointly increasing trend due to demographic changes was not observed within the examined timeframe.

Therefore, our results indicate that the inflation baskets of the examined four countries do not move together significantly, meaning significant differences exist in the consumption habits of the nations independent of geographical proximity. Moreover, contrary to our initial expectations, global megatrends such as demographic changes, digitalization, and climate change have not had a significant impact on the weights in the consumer baskets of Visegrad countries. These factors should be closely monitored and prepared for in the near future, as even with unchanged prices, shifts in weights could lead to significant changes in measured inflation in these countries.

Demographic changes, digitalization, and climate change have not significantly impacted the weighting of consumption baskets in the Visegrad countries for several reasons. First, the demographic shifts, such as aging populations or migration, tend to influence long-term economic trends but do not immediately alter the structure of short-term consumer spending in these economies. Second, while digitalization is advancing, its effects are primarily felt in specific sectors, such as technology and services, without drastically changing the broader consumption patterns or weightings in the inflation basket. Lastly, though climate change is a critical global issue, its direct influence on consumer choices in the V4 region has been limited so far, as environmental policies and shifts toward green consumption are still in early stages, and have not yet led to substantial changes in the overall composition of goods and services in their inflation baskets.

5. Conclusions

This study aimed to investigate the dynamics of consumer basket weights in the Visegrad countries (Poland, Slovakia, Czech Republic, and Hungary) over the past two decades. By analyzing data from the International Monetary Fund, we sought to

understand how the composition of these baskets has evolved under the influence of both traditional and modern economic factors.

Our findings indicate that while there are similarities in the overall trends, significant differences persist among the four countries. The weight of food items has notably increased in all countries, likely due to factors such as rising incomes, changing dietary preferences, and inflationary pressures. However, the magnitude of this increase varies across countries.

Contrary to our initial expectations, the impact of modern economic factors, such as globalization, digitization, and climate change, has not yet been significantly reflected in the weights of consumer baskets. This suggests that while these factors are shaping the broader economic landscape, their immediate impact on consumer spending patterns may be more subtle.

It is important to note that the analysis is based on historical data, and future trends may differ. As economies continue to evolve and new challenges emerge, the composition of consumer baskets may undergo further shifts. Future research could explore the potential impact of specific policy interventions, such as taxation or subsidies, on consumer behavior and, consequently, on the weights of consumer baskets. Furthermore, a deeper dive into the specific items within each category could provide more granular insights into consumer preferences and spending patterns. For instance, analyzing the changing preferences for organic or locally sourced food within the food category could reveal interesting trends.

By understanding the dynamics of consumer basket weights, policymakers can make more informed decisions regarding economic policies and social welfare programs. Additionally, businesses can gain valuable insights into consumer behavior and adjust their strategies accordingly.

Conflict of interest: The authors declare no conflict of interest.

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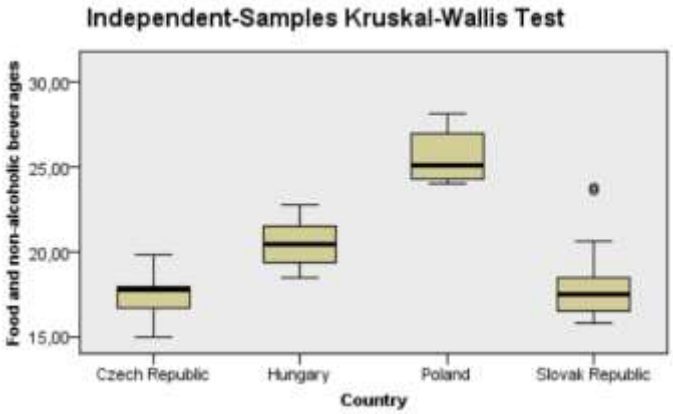
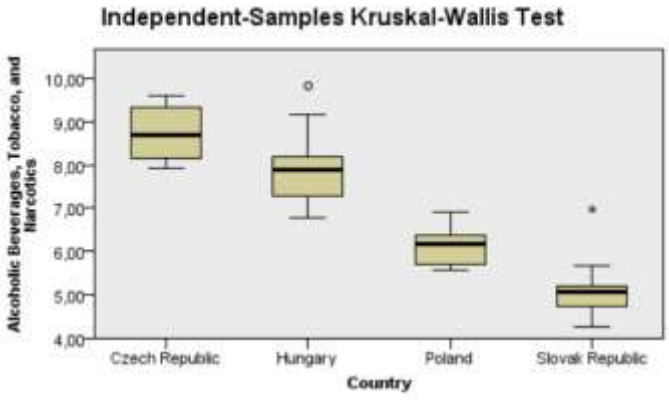
Appendix



Total N	80
Test Statistic	57,977
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	,000

1. The test statistic is adjusted for ties.

Figure A1. Food and non-alcoholic beverages.



Total N	80
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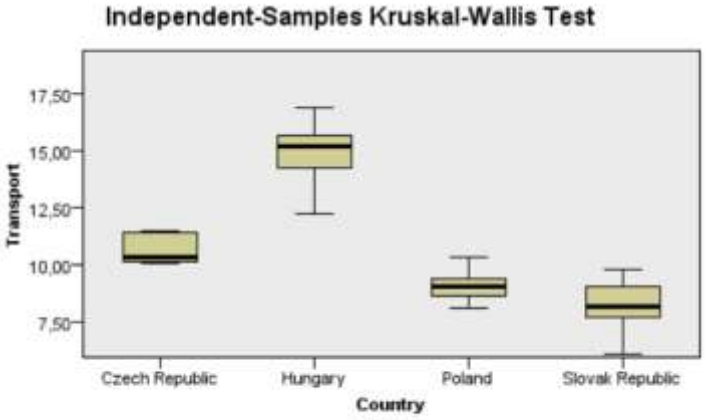
1. The test statistic is adjusted for ties.

Figure A2. Alcoholic beverages, tobacco, and narcotics.



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Degrees of Freedom	3
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1. The test statistic is adjusted for ties.

Figure A3. Transport.

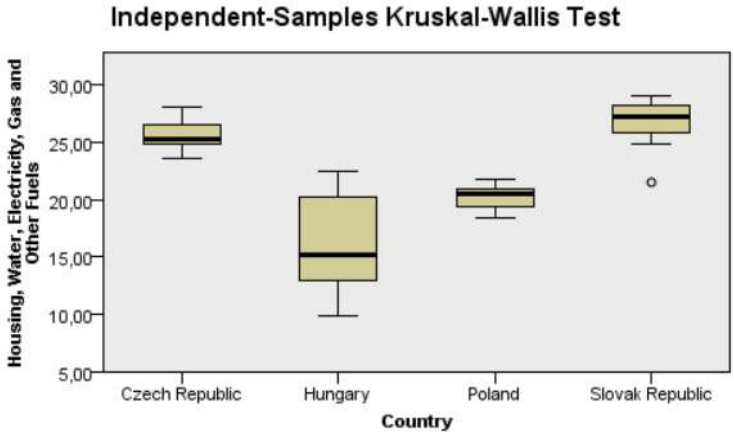

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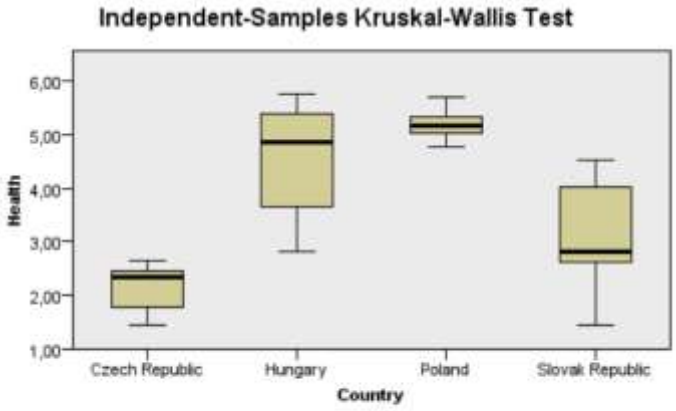
Figure A4. Housing, water, electricity, gas and other fuels.



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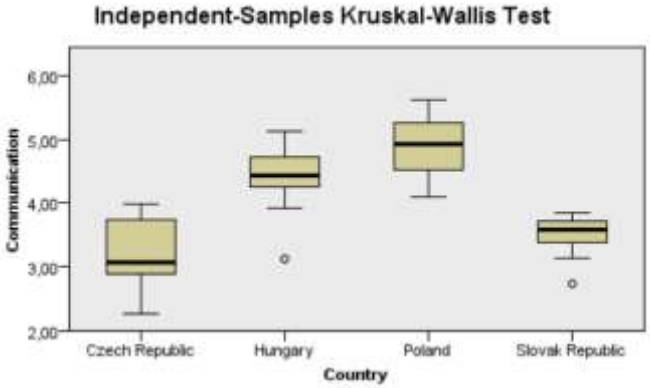
Asymptotic Sig. (2-sided test)	,000

1. The test statistic is adjusted for ties.

Figure A5. Health.



Total N	80
Test Statistic	58,419
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	,000

1. The test statistic is adjusted for ties.

Figure A6. Communication.