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Analysis of Inflation Trends in Urban and Rural Parts of Azerbaijan: Main Drivers and Links to Oil Revenue

Working Paper No. 3

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Abstract

Inflation is one of the most important economic indicators for a country. Understanding inflation based on the consumer spending patterns allows for better conceptualization of the phenomenon and improved policy responses for the unwanted developments, more precisely, increased price levels in consumer markets. The current working paper develops Consumer Price Index-based inflation indicator via the help of the Laspeyres price index in the case of Azerbaijan to evaluate the post-booming period (which is since 2011). Moreover, the significant results of correlation analysis between the Paasche Price Index and oil prices, oil revenue, and real effective exchange rate (REER) demonstrate initial signals about the urban and rural inflation dynamics and trends in the case of oil-rich Azerbaijan.

JEL Classification: E01, E31, F41, O50

Keywords: Inflation, Macroeconomic Data, Consumer Price Index (CPI), Oil revenue, Laspeyres Index, Paasche Index, Azerbaijan Economy

Executive Summary

The paper discusses the inflation trends of the Azerbaijan economy since the oil revenue booming transformed the collapsed national economy from 2008 through 2011. As a post-soviet and oil-rich country, Azerbaijan adopted extractive industry-led economic development and growth. That is why Azerbaijan has been evaluated from the angle of Dutch disease or Natural Resource Curse theories. In fact, the share of agriculture and non-oil manufacturing is low. Accordingly, oil abundance and export dependency on minerals heavily determine the inflationary pressures; however, for the decisionmakers, the decomposition of consumer spendings and inflationary trends should be the point of departure during the process of policymaking. Therefore, the chief rationale of this study is to evaluate Azerbaijan's inflation trends in the post-boom period relying on the Consumer Price Index (CPI)-based inflation. To do so, both urban and rural annual per capita prices have been transformed into Laspeyres price indices to calculate absolute and relative contributions of several goods and services categories to the overall inflation. The decomposition of the CPI and its contributions to the inflation rate allows us to better understand the inflationary pressures in line with oil revenue that rarely was a central topic among the international publications. Moreover, to address the connection between the inflationary trends and oil revenue, the Paasche index was also utilized together with the correlation analysis as an empirical experiment.

Results indicate that both in urban and rural regions of Azerbaijan, the food category of consumer spendings had dominated, thus contributing to the inflation dynamics more than any other category. Similar to the rural areas, cities had a downward trend in inflationary trends from 2012 until 2016. The picture is not remarkably different in relative contributions of the consumption patterns: the food category was the biggest expenditure; however, urban households spend more on clothing and shoes, meanwhile, water, electricity, and gas expenditures also were higher in rural areas.

Inflation trends in Azerbaijan are hand in hand with oil revenue inflow from the international commodity markets and differ between urban and rural parts. The government's economic policy should aim to the geographically differentiated spending categories which might abnormally react to the oil booming, in turn, damaging long-term household consumption and saving habits.

1. Introduction

Inflation studies pose undeniable importance to understand the resource-rich countries around the world. Over time, with the increasing awareness of the monetary policy's importance (e.g. inflation targeting) in the extractive industry-led economies, there is a higher demand for the decisionmakers and policymakers to evaluate inflation in a gradual and systematic manner. Dependence on a specific commodity highlights the macroeconomic challenges resulting from the price shocks (Venables, 2016). The main reason for this is related to the resource-rich countries' uncertain management capabilities of the cumulative effects that huge mineral revenue influx brings into the economy in a short time period. Especially, when the international commodity markets experience boom periods, the export revenue peaks, and the consumption patterns of both government and household gets stimulated, meanwhile weak institutional endowments and exchange rate pressures unleash news risks and threats to macroprudential governance (Drechsel and Tenreyro, 2018). Consequently, understanding the key drivers and main sources of the inflation, based on the Consumer Price Index (CPI) or Gross Domestic Product (GDP) deflator, in relation to the mineral revenue can shed light on the strength of the mineral earnings and monetary policy responses as an economic reflex to manage the unwanted outcomes to achieve long-term sustainable economic development and growth. In this regard, Azerbaijan fits this framework as a small, oil-rich, and post-soviet country to exhibit interesting trends and policy examples about the anatomy of inflation as it is among the most oil-dependent countries in the world (Czech, 2018).

The Azerbaijan economy is highly cyclical in relation to oil prices (Niftiyev and Namazova, 2020). This puts the economy of Azerbaijan in a vulnerable position to the macroeconomic shocks sourcing from the international commodity markets as the commodity prices fluctuate sharply up and down (Niftiyev, 2020). The volatility of oil prices and its effects on the Azerbaijan economy has been the major concern among scholars since the beginning of the 2000s. That is why Gahramanov and Fan (2002), Hasanov (2013), Bayramov and Conway (2010) analyzed the Dutch disease theory in the Azerbaijan economy to follow the international theoretical experience to explain open and small systems that experience booming economy. The other studies from Mahnovski (2003), Gojayev (2010), Gasimov (2014), Zulfigarov and Neuenkirch (2019), Meissner et al. (2019), and etc. covered Resource Curse Theory to conceptualize the multiplier effect of the oil and gas industry in Azerbaijan to check if it has a wealth-enhancing or growth-declining effects in the national economy. Despite a lack of a unanimous conclusion about the existence of Dutch disease or the Resource Curse phenomenon, the high probability of its existence was well-documented. All in all, according to the rich body of literature related to the role of oil prices and revenue in the Azerbaijan economy is clear as an open and small system; however, countrywide inflationary dynamics indicate no lower importance for government actions against market failures.

Yet, the body of literature related to the Azerbaijan economy which investigated inflationary effects heavily focus on the link among the exchange rate, international trade, and oil prices during the last twenty years. Nevertheless, the dynamics of the main drivers and key

components of the CPI-based countrywide inflation in the economy has not been covered at the desired level among the international publications despite its importance for both local policymakers and international experts. Therefore, absolute and relative contributions of the changes in CPI on inflation, as well as its decomposition in terms of urban and rural spending patterns are unclear among the recent studies related to Azerbaijan's inflation studies. Hence, the main purpose of this study was to calculate the CPI index-based inflation via the Laspeyres and Paasche price indices and investigate the decomposition of the inflation identifying the main drivers of the urban and rural household spendings.

2. Topic Discussion

Oil prices determine the main macroeconomic realities and economic cyclicity in Azerbaijan since the late 1990s (Niftiyev and Namazova, 2020). Inflation dynamics are not an exception. In fact, extensive research efforts have been put to analyze the associations between inflation, oil prices, and exchange rate. For instance, Mukhtarov et al. (2019) concluded that a 1% increase in the oil prices leads to a 1.81% increase in inflation and a 0.58% increase in exchange rate by applying the Vector Error Correction Model (VECM) over the period of 1995–2017. Another study from Hajiyev and Rustamov (2019) investigated both short- and long-term VECM and Vector Autoregression (VAR) models based on the quarterly data for the period of 2001–2018. The results suggested that decreased oil prices created higher inflation, lower output growth, and more signals of Dutch disease syndrome (which is a theory by Corden and Neary 1982 that depicts how a booming sector takes the other sectors' resources through mechanisms like real appreciation, de-industrialization, and increased non-tradable sectors).

The solid relationship between oil prices, oil revenue, and the national currency in Azerbaijan showed a significant source of concern since the late 1990s (Singh and Lauria, 1999). Mahnovski (2003), Auty (2001), and Kaser (2003) compared the international experience of the resource-rich countries in the world economy and indicated economic policy, as well as political economy challenges to Azerbaijan to correct the market failures that overwhelmed oil revenue usually creates in the national economies. The authors emphasized that Azerbaijan should carefully manage oil revenue and redirect the government spendings to the non-oil sectors to diversify the export structure and provide stable national income channels to secure the long-term Gross Domestic Product (GDP) growth. Empirical investigations also identified that oil prices impact export diversification (Bahmani-Oskooee and Jamilov, 2014), fiscal policy, and non-oil GDP (Aliyev et al., 2016), international competitiveness (Falkowski, 2018), and non-oil exports (Hasanov and Samadova, 2010). The dominant position of extractive industries in the economy creates de-industrialization patterns (Niftiyev, 2020) and lures all foreign directed investments (FDI) into the oil tradable sectors (Mehtiyev, 2019).

All in all, Azerbaijan's resource deposits and wealth are a clear-cut identifier of the macroeconomic stability. However, more country-specific or local realities such as household consumption patterns and their sensitivity to the oil revenue should be checked to have a real perception of the inflation trends and dynamics in Azerbaijan. So, non-oil exports, non-oil GDP,

etc. are aggregated and highly general economic points to conceptualize the resource-rich country. That is why this paper aims to analyze the key drivers and main determinants of countrywide inflation by calculating price indices, CPI, and their significance to the oil prices.

3. Data and Methods

Laspeyres (or base weighted index) and Paasche (or current weighted index) methods – described in the formulas of (1) and (2) have been utilized to measure the CPI-based and GDP-based inflation dynamics respectively in the urban and rural areas of Azerbaijan between 2001 and 2020 (for Paasche Index the period is 1990–2020). The CPI at period t is the weighted average of the prices of goods and services at period t , where the weight of each item represents its share in the total basket at the base year (which is 2014). Figure 1 depicts the consumption patterns of the base year which identified the weights for the calculation of the CPI in urban (panel *a*) and in rural areas (panel *b*).

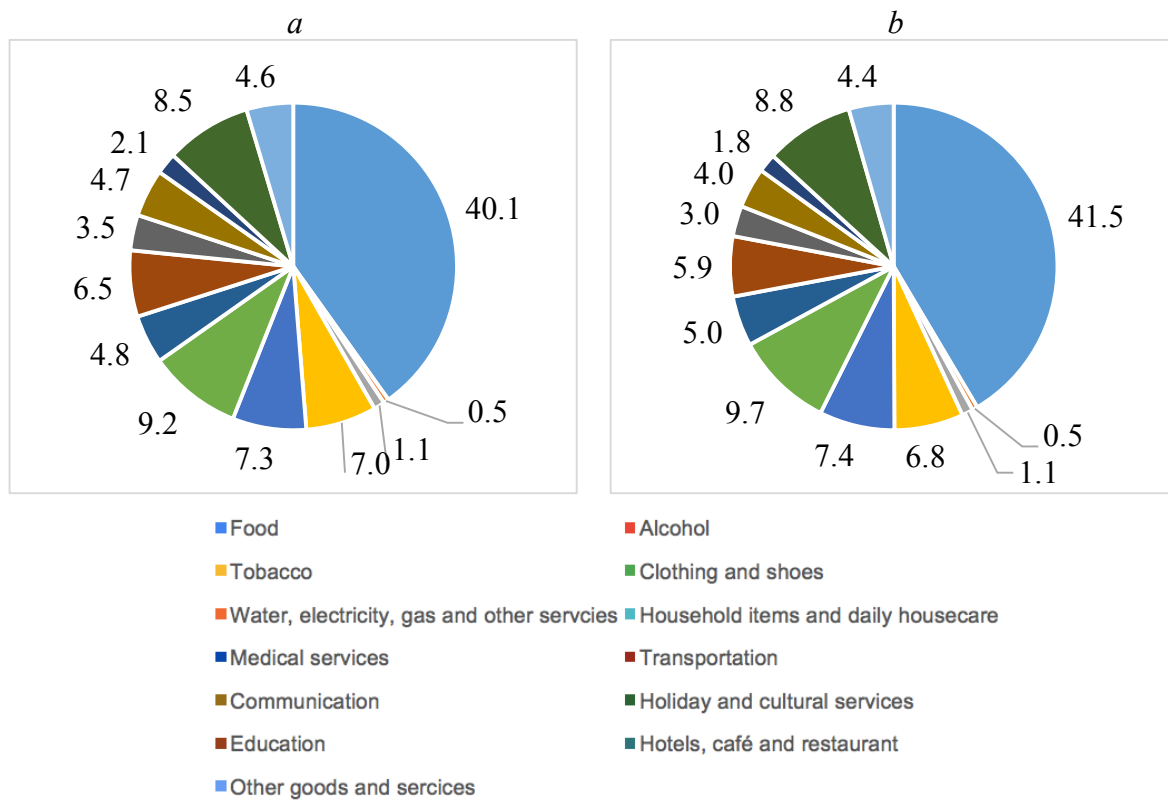


Figure 1. Azerbaijan's Main Categories of Goods and Services Consumption of urban (panel *a*) and rural parts (panel *b*) in 2014.

These two methods allow us to differentiate between the price effects of both domestically produced and imported products (Laspeyres method of CPI calculation) and only domestically produced and consumed goods and services (GDP deflator).

$$CPI_t = w_0^1 p_t^1 + w_0^2 p_t^2 + \dots + w_0^n p_t^n = \sum_1^n w_0^i p_t^i \quad (1)$$

$$GDP \text{ deflator} = \frac{GDP \text{ at current prices}}{GDP \text{ at constant prices}} \times 100 \quad (2)$$

To carry a detailed analysis of the inflation in Azerbaijan, component-based evaluation has been done to decompose the inflation. It has been fulfilled by the formula described in (3) where w_i is the weight of the base year for an item i is multiplied by the share of the price index in the CPI at the $t-1$ period, also multiplied by the price change.

$$\text{Contribution of an item } i = w_i \times \frac{P_{t-1}^i}{CPI_{t-1}} \times \frac{P_t^i - P_{t-1}^i}{P_{t-1}^i} \quad (3)$$

The last part of the analysis covers the correlation analysis based on Pearson's R and Spearman's Rho coefficients. The correlation coefficients range between -1 and 1, with a closer value to -1 indicating a strong negative correlation, meanwhile a value approaching +1 demonstrates a strong and positive correlation. Furthermore, the reason for the two correlation methods can be explained as follows: usually, Pearson's R is insensitive to the outliers in the dataset. If so, outliers might easily distort the real magnitude of the correlation. That is why Spearman's Rho shows a clearer correlation focusing on the rankings of the values and decreasing the distorting power of the outlier data points in the time series. Thus, the obtained differences between the two correlation coefficients reveal background information about the role of the outliers in the dataset and decrease the bias.

State Statistical Committee of the Republic of Azerbaijan (SSCRA, 2020a) provides a limited yet useful data set to operationalize this research. Therefore, the per capita household consumption data between 2010–2020 was derived from the SSCRA (2020a) data set. The missing values for 2011 and 2020 in the components of CPI and inflation have been calculated via the TREND function of Microsoft Excel software. Then, in order to capture the contributions of the components without breaks in time series regarding the Paasche Index, it was necessary to fill the missing values in the inflation rate that were not calculated with the help of official data. Thus, the indicators of 2001, 2005, and 2010 are ready numbers provided by World Bank (2020). Then, the additional variables such as annual Real Effective Exchange Rate (REER) and oil prices that have been used in the correlation analysis were taken from Bruegel (2020) and U.S. Energy Information Administration - EIA (2020) respectively. Oil revenue variable data comes from the export revenue from oil and gas as a percentage share of total export revenue provided by SSCRA (2020b). The correlation analysis has been applied on IBM SPSS Statistics software version 23. Lastly, all missing values for the correlation analysis have been replaced by the TREND function of Microsoft Excel software following the linear relationship among the variables as well.

4. Results

Similar to the other post-soviet economies, during the early years of independence, Azerbaijan experienced sky-high inflation rates, economic backwardness, distrust in the national currency, banking crises, political instability, etc. The government's efforts stabilized the inflation rate around the year 2000; however, the oil booming period which was 2008–2011 brought new policy challenges that were hard to tame. As Figure 1 indicates, right after the oil booming

period ended in 2011, 2012 showed the highest inflation by 29.28% in urban areas, and 24.93% in rural places. In both the food category was the most prominent category that attracted the highest share from consumption. Another sharp spike in inflation was in 2016, right after the commodity price slumps in the international commodity markets and two national currency devaluations.

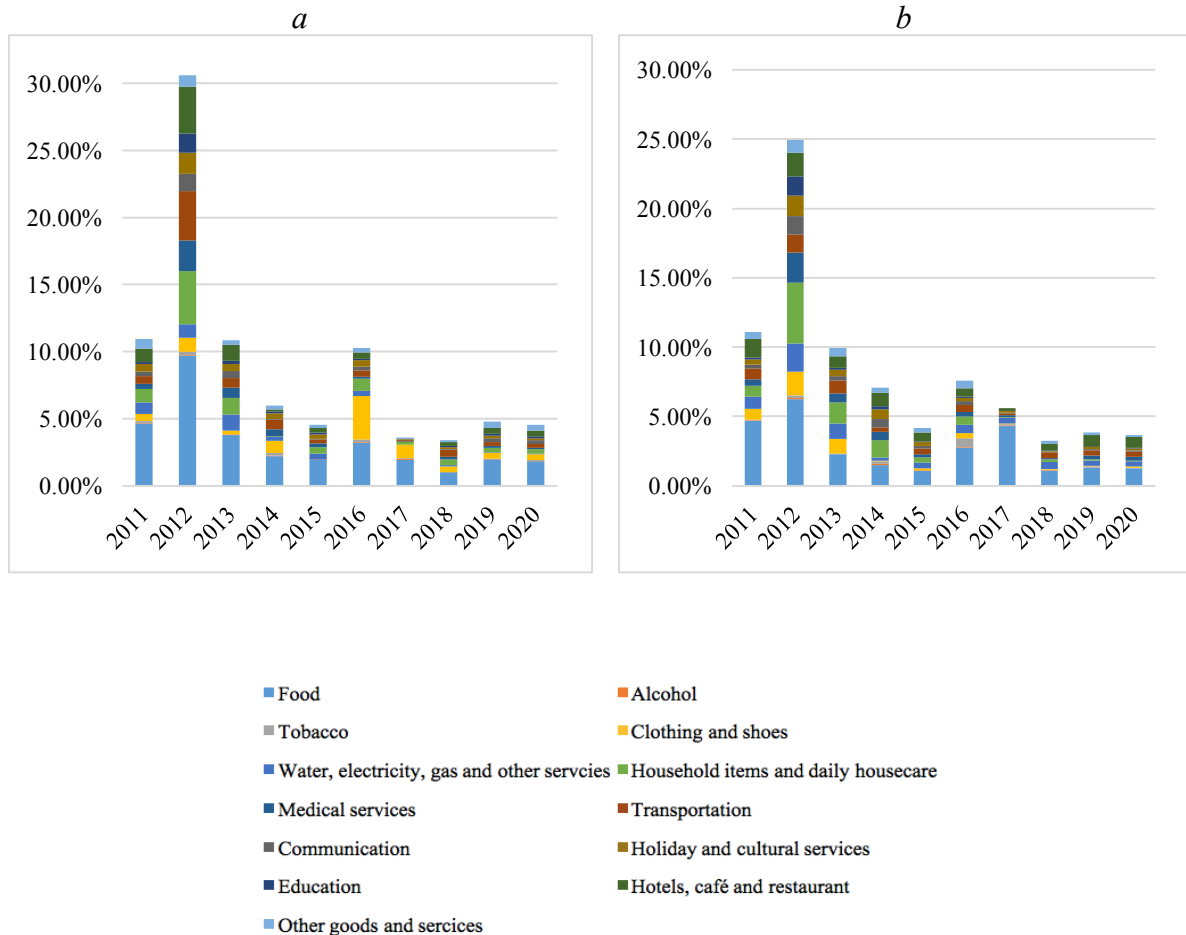


Figure 2. Absolute contribution of different goods and service categories to overall inflation in urban (panel a) and rural areas (panel b) of the Republic of Azerbaijan.

More specifically, besides the food category as Figure 1 indicates, in urban areas the contribution of alcohol and tobacco was volatile but only in rural areas. During recent years (the period of 2014–2020) both alcohol and tobacco categories had a contribution that approached 0%. The other category which is clothing and shoes had more or less stable (between 0 and 0.07%) contribution to the inflation in rural areas but urban areas had higher indicators (the peak in 2016 by 3.25%, and 0.58% on average in 2017–2020). Without too many specific numbers, it should be noted that the categories like water, electricity, gas, and other services; household items and daily houseware; transportation, and medical services had a stable trend in the inflation dynamics since the year 2013 in both urban and rural areas. Before 2013, a peak indicator has been observed in 2012 which is not surprising after the oil revenue booming that created increased government spendings and supply shocks. Compared to the rural regions, urban areas spend more in per capita terms when it came to education, and especially between 2017–2020, there is an upward trend in the contribution of the education category into overall

inflation. Similar patterns were shared in holiday and cultural services both by urban and rural areas in Azerbaijan between 2001–2020 but in rural places the category of hotels, café, and restaurant contributed to inflation more than urban areas since 2017 (by average 0.55% in rural areas, by 0.31% in urban areas).

In terms of relative contributions, Figure 3, panel a demonstrates that urban consumer spendings such as food, alcohol, tobacco, household items, and daily housecare, transportation, and hotels, café, and restaurants had stable fluctuations. Meanwhile, communication and education categories contributed to inflation more since 2017. It can be speculated that national currency devaluations, as well as increasing demand for communication and education services, has boosted the inflationary effects of the particular categories. The price levels in communication had a similar trend in rural areas (Fig. 3, panel b) but alcohol's relative contribution almost approached 0% in 2019 and 2020. Noteworthy changes had happened in hotels, café, and restaurants in 2019 and 2020 by 21.14% and 21.03% respectively that are the highest contributions since 2011 in rural areas. Again, it can be speculated that rural regions prioritized internal and external tourism to diversify the income sources after the sharp commodity prices slumps which in turn created higher relative contributions to inflation.

It has been suggested that the Central Bank of the Republic of Azerbaijan (CBAR) should calculate the cost and benefits of the alternative monetary policy scenarios to manage the exchange rate and inflation dynamics more efficiently (Huseynov, 2009). Moreover, inflation sourced by oil booming and non-oil sectors differs in Azerbaijan creating additional challenges to CBAR to manage the monetary policy risks (Hasanov, 2011). CBAR applied the fixed exchange rate since the oil and gas projects started to prohibit the further appreciation of Azerbaijani Manat; however, in 2015 two national currency devaluations were inescapable as the international commodity markets experienced a drastic bust (Statement of the Central Bank of the Republic of Azerbaijan, 2015a; 2015b). Despite the announcement of the floating exchange rate, still, a stable exchange rate policy remains. Thus, oil revenue, oil prices, and REER keep being an important determinant of the inflationary pressures that are also being translated into the increased price levels among the consumer markets.

Figure 4, panel a demonstrates Paasche Index, while panel b of illuminates the visual results of the correlation against oil prices, oil revenue, and REER in the period of 1990–2020. Oil prices vary strongly, significantly, and positively correlated with the Paasche Index. Despite the difference between the Pearson's R and Spearman's Rho correlation coefficients are small in oil prices, the difference is big in oil revenue, indicating a more positive, strong, and significant correlation between the Paasche Index and oil revenue, as well as distorting power of Pearson's R correlation methods. REER also shows similar patterns, encompassing strong, positive, and significant correlation with Paasche Index. In other words, the Paasche Index rises as oil prices and REER as a result of oil revenue increase. These findings are in line with more sophisticated investigations about the Azerbaijan economy regarding oil prices, oil revenue, and REER which were discussed in the "Topic Discussion" section of this paper.

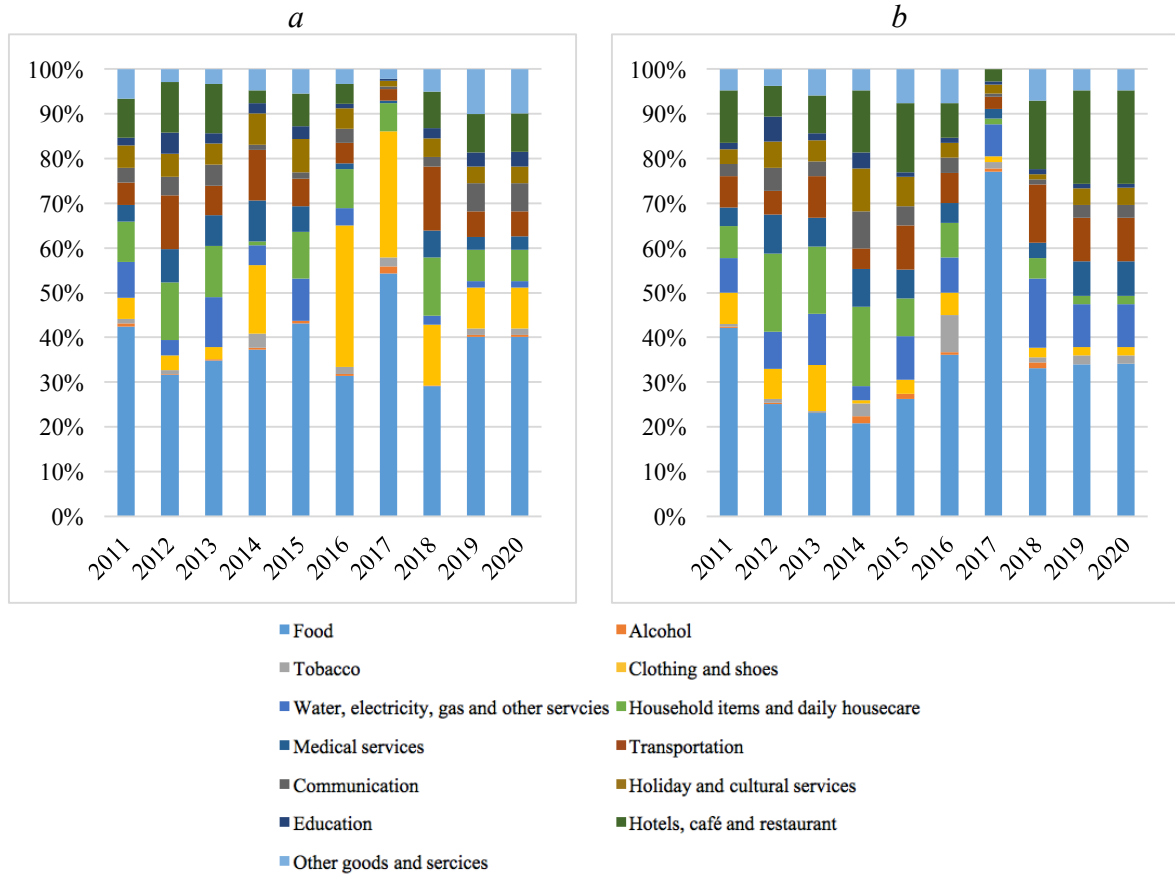


Figure 3. Relative Contribution of different goods and service categories to overall inflation in urban (panel a) and rural areas (panel b) of the Republic of Azerbaijan.

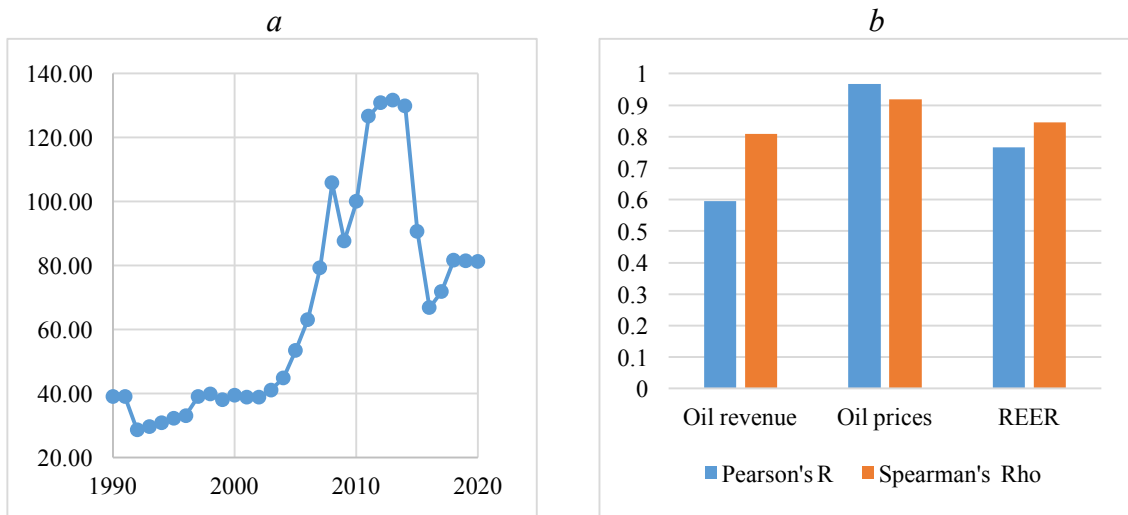


Figure 4. Countrywide Paasche index or GDP deflator (panel a) and correlation analysis among the variables of interest against Paasche Index (panel b).

Notes: The base year for the GDP constant prices is 2010; all correlation coefficients are statistically significant at the level 0.005; the period for the correlation analysis is 1990–2020.

5. Conclusion and Limitations

Since 2004, higher price levels are more associated with oil wealth (Hasanov, 2011a). The efforts of the Central Bank of Azerbaijan to regulate the exchange rate failed to smoothen the inflation dynamics that are mainly sourced by the huge oil revenue from 2008–2011 (Ağayev, 2012). From the current analysis, we can conclude that Azerbaijan experienced volatile inflation trends after the oil booming period but the components like water, electricity, gas, and other services; household items and daily housecare; transportation, and medical services were relatively stable. In terms of relative contributions to the inflation, food category dominated both in urban and rural areas. Clothing and shoes contributed more in relative terms among urban areas than rural areas, while in rural places water, gas, electricity, and other services increased its role in the inflation. Shortly, there is no much stable trend in both absolute and relative contributions of predetermined goods and service categories to inflation; however, certainly, particular categories are more visible in their influence than the others.

Hasanov (2011a) summarizes the policy implementations that this study also recommends: monetary policy implementations should cover the development of the financial markets (to stabilize the price levels) and increasing the independence of the central bank (to prevent the opportunistic behaviors of the government to consume unlimited converted foreign exchange) in Azerbaijan. This also will increase the absorption capacity of the national economy against oil price shocks. In terms of fiscal policy, decreasing the government spendings towards non-tradable sectors, supporting non-oil export-oriented sectors which also creates Dutch disease effects in the economy. Between 2011 and 2020, double-digit inflation rates were rarely observed but lowering the inflation rate below 13% is good for economic growth according to Hasanov (2011b), and should be a policy target for further economic periods.

Certain well-known biases limit the usefulness of CPI-based inflation calculations. As Hausman (2003) summarized, the effect of new goods and services, the effects of quality change, the effect of lower prices stores: outlet bias, substitution bias play an integral role among the calculations of welfare-based price indices. That is why, this paper's calculations are subject to such biases (for more details, have a look at Hausman's (2003) paper). Nevertheless, aggregated, general and guiding calculations are necessary starting points to conceptualize the current trends and dynamics. Future research is needed to complete the proposed research direction of this paper.

A set of limitations also should be noted. In addition to the above-mentioned listed biases, the methodological aspect of this research also poses a limited range of scientific flexibility. More specifically, only correlational analysis cannot be enough. Supplementary research should be done to draw causal relations between individual categories of CPI and oil-related macroeconomic variables. Furthermore, more decomposed data is needed to visualize a higher horizon of the inflation trends and dynamics. To do so, historical data related to the urban and rural household spendings and consumption should be compiled to allow the researchers a more

detailed analysis. The responsibility of the last aspect should be delivered to the State Statistical Committee of the Republic of Azerbaijan or related institutions and state organizations.

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