



AN EMPIRICAL ASSESSMENT OF THE PERMANENT INCOME HYPOTHESIS IN AZERBAIJAN'S RESOURCE-RICH ECONOMY (2005–2024)

Daxil olub: 11 aprel 2026-cı il
Qəbul olunub: 17 iyun 2026-cı il

Received: 11 April 2026
Accepted: 17 June 2026

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DOI: <https://doi.org/10.30546/UNEC.SR.2026.02.408>

Abstract

This study empirically investigates the validity of the Permanent Income Hypothesis (PIH) and the Keynesian Consumption Paradigm in Azerbaijan's resource-rich economy for the period 2005–2024. Utilizing a Robust OLS regression framework, the research examines the structural dependence of private consumption on volatile oil revenues and household savings. It addresses a critical gap in macroeconomic literature by analyzing how transitory oil wealth shocks are moderated by precautionary saving motives in a post-Soviet context.

Empirical findings reveal a significant “wealth stabilization effect,” suggesting that household savings act as a critical buffer against external income shocks. Specifically, the estimated elasticity for oil revenues ($\beta_1 = 0.285$) and bank deposits ($\beta_2 = 0.512$) indicates that Azerbaijani households maintain relatively stable consumption patterns despite commodity price volatility. This lower marginal propensity to consume out of transitory oil wealth provides strong theoretical support for Friedman's PIH. The results highlight that in resource-dependent emerging markets, the interplay between financial depth and consumption smoothing is pivotal. These insights offer valuable implications for fiscal and monetary policy, emphasizing financial mechanisms that incentivize long-term savings to maintain macroeconomic equilibrium and sustainable economic prosperity.

Keywords: *private consumption, household savings, oil revenues, macroeconomic equilibrium, resource dependency, OLS Regression.*

AZƏRBAYCANIN RESURLARLA ZƏNGİN İQTİSADİYYATINDA DAİMİ GƏLİR HİPOTEZİNİN EMİRİK QIYMƏTLƏNDİRİLMƏSİ (2005–2024)

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Xülasə

Bu tədqiqat, 2005–2024-cü illər üzrə resurslarla zəngin Azərbaycan iqtisadiyyatında Daimi Gəlir Hipotezi (PIH) və Keynsçi İstehlak Paradıqmasının effektivliyini empirik şəkildə araşdırır. Robust OLS reqressiya modelindən istifadə edilərək, şəxsi istehlakın dəyişkən neft gəlirlərindən və ev təsərrüfatlarının yığımlarından struktur asılılığı təhlil edilmişdir. Tədqiqat, postsovet resurs asılılığı kontekstində tükənən neft sərvətlərindən yaranan gəlir şoklarının ehtiyat yığım motivləri ilə necə tənzimləndiyini araşdıraraq makroiqtisadi ədəbiyyatdakı boşluğu doldurur.

Empirik nəticələr ev təsərrüfatları yığımlarının xarici gəlir şoklarına qarşı mühüm bufer rolu oynadığını və “sərvət stabilləşdirilməsi effekti”ni ortaya qoyur. Neft gəlirləri ($\beta_1 = 0.285$) və bank əmanətləri ($\beta_2 = 0.512$) üzrə hesablanmış elastiklik əmsalları göstərir ki, əmtəə qiymətlərinin dəyişkənliyinə baxmayaraq, Azərbaycanın ev təsərrüfatları nisbətən sabit istehlak nümunəsi nümayiş etdirir. Keçici neft sərvətindən istehlakın aşağı marjinal meylliliyi Fridmanın PIH nəzəriyyəsini Azərbaycan kontekstində dəstəkləyir. Nəticələr göstərir ki, maliyyə bazarlarının inkişafı və istehlakın hamarlanması makroiqtisadi tarazlığın qorunmasında həlledici rol oynayır. Bu tapıntılar, uzunmüddətli yığımları təşviq edən maliyyə mexanizmlərinin vurğulanması vasitəsilə fiskal və monetar siyasətin əlaqələndirilməsi üçün vacib əhəmiyyət kəsb edir.

Açar sözlər: *Daimi Gəlir Hipotezi, istehlak davranışı, neft gəlirləri, ehtiyat qənaət motivi, makroiqtisadi tarazlıq, reqressiya analizi.*

ТЕОРЕТИЧЕСКИЙ И ЭМПИРИЧЕСКИЙ ПЕРЕСМОТР ГИПОТЕЗЫ ПОСТОЯННОГО ДОХОДА: НА ПРИМЕРЕ РЕСУРСНО БОГАТОЙ ЭКОНОМИКЕ АЗЕРБАЙДЖАНА (2005–2024)

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Резюме

Данное исследование эмпирически проверяет применимость гипотезы постоянного дохода (РІН) и кейнсианской парадигмы потребления в богатой ресурсами экономике Азербайджана за период 2005–2024 гг. С использованием модели регрессии Robust OLS анализируется структурная зависимость частного потребления от волатильных нефтяных доходов и сбережений домохозяйств. Работа восполняет пробел в макроэкономической литературе, исследуя механизмы регулирования шоков нефтяных доходов через мотивы предупредительных сбережений в постсоветском контексте.

Эмпирические результаты выявили значимый «эффект стабилизации богатства», подтверждая, что сбережения выступают критическим буфером против внешних шоков. Рассчитанные коэффициенты эластичности для нефтяных доходов ($\beta_1 = 0.285$) и банковских вкладов ($\beta_2 = 0.512$) указывают на стабильную модель потребления в Азербайджане, несмотря на волатильность цен на сырье. Низкая предельная склонность к потреблению за счет временных нефтяных доходов подтверждает теорию РІН Фридмана. Результаты подчеркивают, что в ресурсозависимых развивающихся рынках взаимодействие между финансовой глубиной и сглаживанием потребления имеет решающее значение. Полученные выводы имеют важное значение для координации фискальной и монетарной политики, акцентируя внимание на необходимости финансовых механизмов, стимулирующих долгосрочные сбережения для поддержания макроэкономического равновесия и устойчивого процветания.

Ключевые слова: гипотеза постоянного дохода, потребительское поведение, нефтяные доходы, мотив предосторожности, экономика Азербайджана, регрессионный анализ.

1. Introduction

Consumption behavior, as one of the fundamental pillars of macroeconomic theory, has been a subject of intense academic debate since the emergence of the Keynesian paradigm. Building on the Absolute Income Hypothesis by John Maynard Keynes [1], which posits a stable psychological law linking current consumption to current disposable income, subsequent theoretical refinements have sought to explain the long-term dynamics of this relationship. Keynesian theory suggests that the marginal propensity to consume (MPC) is higher for current income, a premise that has been central to fiscal policy debates for decades.

In the late 1950s, the Permanent Income Hypothesis (PIH), formulated by Milton Friedman [2], and the Life-Cycle Hypothesis (LCH) by Franco Modigliani [3], shifted the focus from current fluctuations to long-term income expectations. These theories suggested that individuals seek to “smooth” their consumption over their lifetime, looking past transitory shocks to their income. However, in resource-rich transitional economies like Azerbaijan, the volatility of oil revenues poses a unique structural challenge to the validity of these classical paradigms. The interaction between volatile resource rents and stable private consumption creates a complex macroeconomic environment where traditional “smoothing” mechanisms may operate differently due to institutional constraints and market imperfections.

This study empirically re-examines these theoretical foundations for the period 2005–2024, a timeframe characterized by significant commodity price cycles and structural shifts in the Azerbaijani economy. We focus on how volatile resource rents affect the consumption-savings nexus and whether the precautionary saving motive overrides the standard PIH predictions in the face of uncertainty.

The primary novelty of this research lies in its theoretical approach to the “wealth stabilization effect”. While traditional neoclassical theory often views consumption and savings as simple substitutes, our analysis reveals a more complementary and strategic relationship in the Azerbaijani context. By utilizing a Robust OLS regression framework, we demonstrate that household savings do not merely represent deferred consumption but serve as a critical safety cushion—a “precautionary buffer”—that stabilizes macroeconomic equilibrium against external shocks. This paper contributes to the literature by reconciling the PIH with the specificities of an emerging, resource-dependent economy, providing a new theoretical lens to view financial stability and household welfare.

2. Related works

Since the balance between consumption and savings is one of the main conditions for both economic stability and long-term development, research studies covering international and regional experiences, theoretical foundations, and economic solutions in this area have been analyzed.

The interaction between volatile resource rents and stable private consumption creates a complex macroeconomic environment where traditional “smoothing” mechanisms may operate differently due to institutional constraints and market imperfections. As highlighted in recent scholarly discussions within the UNEC Scientific Reviews, the nexus between macroeconomic stability and consumer

behavior is pivotal for transition economies. Recent research emphasizes that in resource-rich nations like Azerbaijan, the volatility of household income and expenditures necessitates a robust institutional framework to safeguard private consumption [4]. Furthermore, studies in the same journal suggest that the dynamics of savings and investment behavior act as strategic buffers in smoothing consumption shocks, thereby validating the core tenets of the Permanent Income Hypothesis in the local context [5].

In the context of Azerbaijan, Hasanli and Ahmadov argue that the integration of robust financial frameworks is essential for stabilizing household spending against external shocks [6]. Our analysis for the period 2005–2024 aligns with this perspective, demonstrating that savings act as a critical “safety cushion”—a mechanism further supported by Muradov [7], who highlight that the diversification of financial instruments is vital for maintaining the chain between oil revenues and private consumption, thereby ensuring long-term macroeconomic equilibrium.

The dominance of oil revenues in the Azerbaijani economy is characterized by signs of the Dutch syndrome and macroeconomic volatility, which directly affects consumption behavior [8].

Huseynov and Ahmadov analyzed the sensitivity of the Azerbaijani manat to oil price fluctuations and emphasized the high sensitivity of the national economy to external shocks. Mikhailov has examined the broader relationship between the energy sector and economic growth in Central Asia [9, 10], while Sabitova and Shaykhibayeva have highlighted the unique structural features of savings and investment in resource-dependent countries [11]. This study builds on these findings, focusing in particular on the micro foundations of macrostability, namely the consumption-savings nexus, within Azerbaijan's unique institutional framework.

The discussion over resource-based development is multifaceted. While Auty warns of the “resource curse” and its potential to hinder long-term growth, Van der Ploeg emphasizes that the ultimate outcome – whether a curse or a blessing – is determined by a nation's institutional capacity to manage income shocks [12, 13]. Empirically, Esfahani argues that the challenge for oil-exporting countries lies in optimizing these incomes to ensure stable consumption trajectories [14].

Mammadli compared sustainable consumption behaviors across generations. Factors that motivated them to sustainable consumption were listed. Based on the responses

received, these factors were environmental concerns, health concerns, and subjective norms. Based on these approaches, a survey was conducted among 1,380 sustainable consumers in 2022 and it was analyzed which of these factors had the greatest impact among generations X, Y, and Z [15].

Nagi Bairamli examined the role of savings in economic development in Azerbaijan, especially the importance of domestic savings for financing the non-oil sector [16]. The possibilities of accumulating and mobilizing savings and their role in the economic development of Azerbaijan were analyzed. The article discussed the current state of national economic growth, which is mainly based on resource components such as crude oil, natural gas and oil products, and emphasized the importance of mobilizing domestic savings for investment for the development of the non-oil sector, since foreign capital is more involved in the production of natural resources such as oil and gas.

The work Carroll examines the theory of consumption and savings, short-term business cycles, and long-term capital stock [17]. It is shown that the presence of uncertainty can significantly change the nature of consumer optimal behavior, both qualitatively and quantitatively. Furthermore, it is shown that the relationship between savings and growth is not static but dynamic: savings rates tend to increase in countries experiencing prolonged periods of growth, while savings rates tend to decrease in countries experiencing sustained economic slowdowns.

Ince provides an empirical analysis of consumption dynamics in the G7 countries. It is shown that the permanent income theory is more successful in explaining the consumption behavior of low-income groups, while the relative income theory is more successful in explaining the consumption behavior of high-income groups. It is emphasized that consumption behavior in both low- and high-income groups differs according to the extent to which individuals' basic needs can be met with their income [18].

IMF describes the theoretical framework and empirical estimates underlying the specification of life-cycle consumption and saving behavior [19]. It also examines the macroeconomic implications of such behavior for closed and small open economies by comparing the neoclassical paradigm, in which agents are characterized as unrelated generations with life-cycle characteristics, with the classical (Ricardian) paradigm, which views agents as dynastic families. The analytical framework that integrates these two alternative views is based on an extended version of Blanchard's overlapping agents model [20]. Changes in

government savings can have a significant impact on the level of national savings and have implications for interest rates and asset accumulation. The model is fitted to actual age earnings profiles to quantify the impact of these life-cycle considerations on real interest rates, the capital stock, and net foreign assets.

Widokarti conducted a systematic literature review to obtain a comprehensive view of the factors that may influence individual savings decisions [21]. This study used 124 articles published by Elsevier between 2012 and 2021. It was found that 15 factors can influence savings decisions, namely: personal wealth, individual needs and dependence, macroeconomic, demographic, financial literacy, expected, psychological and social, profit, inherent commitment, financial service, savings product marketing, job profile, self-preference, financial goals, and geography. The fifteen factors are divided into two groups: internal factors (consisting of 10 factors) and external factors (consisting of 5 factors).

The fundamental relationship between income and consumption has long been a cornerstone of economic theory. While Keynes emphasized the psychological law that consumption increases with income, but not at the same rate, further refinements by Modigliani and Brumberg through the Life Cycle Hypothesis suggested that individuals plan their spending throughout their lifetimes. In resource-dependent contexts, this planning becomes more complicated due to the internal variability of national wealth, as discussed by Corden and Neary in their seminal work on the “spending effect” of Dutch Disease [22].

According to Friedman's permanent income hypothesis (PIH), individuals adjust their consumption based on expected long-term income rather than current income. However, in resource-dependent countries like Azerbaijan, the volatility of oil revenues complicates the perception of “permanent income,” making consumption more sensitive to current income shocks.

In line with recent research by Ahmadov and Woldu, income growth has been found to stimulate consumption spending [23]. Our logarithmic regression model covering the period 2005–2024 shows that savings are the main moderating factor in the Azerbaijani sample, reducing the impact of short-term fluctuations in oil revenues on consumption.

Income is taken as the main determinant in the sources examined. Thus, both in Azerbaijan and in international studies, it is emphasized that consumption and saving are closely related to the level of income. Psychological factors such as

future expectations, confidence, and uncertainty are also noted to have a significant impact on consumption and saving. In addition, the relationship with investment, i.e., saving being a source of investment for long-term economic growth, was a common finding in all studies. As for the consumption-saving balance, it is shown that in developed countries, saving is high, while in developing countries, consumption is dominant.

As we know, oil revenues are the main driving force of the Azerbaijani economy and directly affect the growth rate of GDP (Gross Domestic Product). High oil prices increase budget revenues, expanding state spending and consumption. This accelerates GDP growth in the short term. However, volatility in oil prices changes consumption and saving behavior, putting economic stability at risk. Oil revenues directed to saving stimulate investments and support long-term economic growth. Thus, a balanced distribution of oil revenues between consumption and saving is important for sustainable GDP growth.

The main objective of the study is to compare Azerbaijan's MPC (marginal propensity to consume) and MPS (marginal propensity to save) indicators with those of the G7 or the European Union and show the differences with statistical models. Also, the specific feature of Azerbaijan is to study the impact of oil revenues on consumption and savings, analyze modern challenges in this area, and identify problems and ways to solve them based on scientific-theoretical and practical approaches.

To achieve this goal, the characteristics of consumption and savings in Azerbaijan are determined. For this, indicators such as MPC and MPS are used. Azerbaijan's indicators are given in a comparative manner with developed, G7 and developing countries. The characteristics of oil revenues, their impact on consumption and savings are examined.

3. Materials and methods

The methodological approach of this research, specifically regarding the application of quantitative models in the Azerbaijani context, is informed by recent studies such as Abbasov and Seyidov and Ahmadov [24, 25]. These works emphasize the importance of aligning empirical frameworks with the unique structural characteristics of transition economies. Following these perspectives, the study analyzes data from various sources, where the Keynesian approach

emphasizes increasing consumption, while the Monetarist approach focuses on promoting savings.

Recent empirical studies have paid special attention to this dynamic in the Eurasian space. Hasanov provides extensive evidence on how the symptoms of Dutch Disease are manifested in the Azerbaijani economy, in particular through the expansion of the non-tradable sector driven by oil-financed demand [26]. Similarly, Kalyujnova and Nygaard emphasize that state management of oil reserves in Azerbaijan and Kazakhstan plays a crucial role in shaping domestic consumption stability [27]. Furthermore, Ahmadov and Aslanli argue that the strategic accumulation of assets in the State Oil Fund of Azerbaijan (SOFAZ) plays an important buffer role, mediating the impact of variable oil rents on the national economy and household behavior [28].

The consumption function and the marginal propensity to consume and save (MPC, MPS) are the main tools of this discussion. Using the Panel Data Analysis method, Azerbaijan's indicators are compared with those of other countries, and the structural reasons for the differences between MPC and MPS are explained. The relationship between oil revenues and consumption and savings is studied through an econometric model. The use of these methods provides more accurate information about the current state of savings and consumption in Azerbaijan, and serves to more fully express and scientifically substantiate the problems in this area.

For this purpose, the following hypotheses have been put forward:

- Hypothesis 1 (H1): Transfers from oil revenues to the state budget have a direct positive effect on final consumption expenditures by increasing the nominal incomes of the population.
- Hypothesis 2 (H2): There is a directly proportional (positive) relationship between bank deposits (savings) of the population and consumption expenditures in the Azerbaijani economy.

3.1 The relationship between consumption, savings and income

If we agree with Keynes, the volume of goods and services produced is directly related to the level of total expenditure (or aggregate demand), or rather, the costs incurred for goods and services. The main part of total expenditure consists of consumption, which together with savings is equal to the income remaining after paying taxes. Therefore, this income determines not only consumption, but also savings [29].

The consumption function is the relationship between current disposable income and current consumption. It is intended as a simple description of household behavior,

reflecting the idea of consumption smoothing. More specifically, we often assume that consumption is related to disposable income through the following relationship:

consumption = autonomous consumption + marginal propensity to consume ×
disposable income

$$C = Ca + cYd$$

where Ca is autonomous consumption (autonomous consumption);

Yd is the national income remaining at disposal (income after taxes and transfers);

c is the marginal propensity to consume, MPC $0 < c < 1$.

Autonomous consumption is the minimum level of consumption expenditure on primary consumption goods [30].

As can be seen from the formula of the consumption function, the national income remaining at disposal is decisive for the volume of consumption. Its increase means an increase in factor incomes and an increase in the funds that households can direct to consumption. In other words, an increase in national income leads to an increase in consumption. It is important to note that this increase occurs both due to an increase in the quantity of goods consumed and due to the consumption of higher-quality and, therefore, more expensive goods and services.

If households spent all the funds received on the purchase of goods and services, and firms paid out the income received from the sale of products as factor income, then there would be only an internal circulation of income and expenses. In fact, households spend not all of the income at their disposal, but only a part. The remaining part of the income enters the financial (banking) sector as savings. Firms, in turn, can attract investments from the banking sector.

Savings (S) is the part of the national income remaining at disposal that households do not use for consumption and is an increase in their wealth. The amount of savings is also an indicator of flow, not stock, because it is calculated for a certain period of time (one year). For a more complete study of macroeconomic consumption and savings indicators, it is necessary to use the marginal propensity to consume and save (MPC and MPS).

The marginal propensity to consume (MPC) shows how much consumption will increase if national income increases by one unit. The marginal propensity to save (MPS) shows how much saving will increase if national income increases by one unit.

3.2 Current state of consumption and savings in Azerbaijan

Macroeconomic equilibrium is a balanced state of the economic system as a whole organism, and at the same time, a fundamental problem of macroeconomic analysis. Traditionally, one of the main goals of the economic policy of each state is the creation and maintenance of macroeconomic equilibrium in the national economy. Because an economy in a balanced state ensures more efficient use of resources and, accordingly, maximum satisfaction of public demand.

We have calculated *MPC and MPS* based on the indicators of the State Statistical Committee of the Republic of Azerbaijan to show the current state of consumption and savings in Azerbaijan. When comparing this with the IMF indicators worldwide, we obtain the following results:

Table 1. The propensity to consume (MPC) and the propensity to accumulate (MPS), (as a % of GDP)			
Country group	Marginal propensity to consume (MPC)	Marginal propensity to save (MPS)	Note
Azerbaijan	70-75%	25-30%	Rising oil revenues, devaluation, and volatility increase the propensity to consume, while decreasing the propensity to save
USA	68%	20%	Highly consumption-oriented economy, savings are relatively low
European Union (average)	55-60%	25-30%	A more balanced model, social security systems reduce the consumer burden
Japan	55%	30%	High savings tendency, investment-oriented economic model
Developed countries (G7)	50-60%	25-30%	Due to high income levels, the share of consumption is relatively low and savings is high
Developing countries	65-80%	15-20%	Since income levels are low, consumption is higher and savings opportunities are limited
World average	60%	25%	The overall balance is at an average level worldwide

Source: Author's estimation based on IMF World Economic Outlook (2023), OECD National Accounts Statistics (2024), World Bank Open Data (2024), and the State Statistical Committee of the Republic of Azerbaijan (2024)[31, 32, 33].

As can be seen from the table, in economically developed countries, the level of consumption is lower than in less developed countries, while savings, on the contrary, are higher. Because a high income level increases savings and investment opportunities. The state's social security systems (pension, health, education) reduce people's direct consumption expenses, which creates conditions for an increase in savings.

Our analysis shows that Azerbaijan's indicators are closer to the model of developing countries: the share of consumption is high, and the share of savings is relatively low. This is explained by the level of income and dependence on oil revenues.

In addition, we have examined how oil revenues and savings affect consumption using the Regression Analysis (OLS) method. The Coefficient of Determination (R^2), F-test, and p-value indicators for each variable were used to test the statistical significance of the model.

The relationship between oil revenues and private consumption in Azerbaijan should be analyzed within the broader theoretical framework of Dutch Disease. According to this economic phenomenon, excessive dependence on natural resource exports often leads to a “spending effect”, where massive inflows of foreign currency inflate domestic demand and change consumption patterns. In the context of the Azerbaijani economy, the volatility of oil rental prices poses a serious risk to macroeconomic stability. This study suggests that household savings do not simply represent deferred consumption, but also play an important “cushion” against the symptoms of Dutch Disease. Examining the period 2005-2024, this study examines whether the income effect generated by oil-financed budget transfers leads to sustained consumption growth or reflects a temporary resource-driven expansion that requires higher precautionary savings.

The study used a multivariate linear regression model to quantitatively assess the impact of oil revenues and savings on consumption expenditures. All variables were transformed into logarithmic form to smooth out sharp fluctuations observed in the time series and interpret the results as elasticity indicators. The adequacy of the model was tested using R^2 (coefficient of determination), F -statistics, and p -value indicators. In order to empirically test the symptoms of Dutch disease in the household sector of Azerbaijan, this model estimates the elasticity of final consumption relative to oil-financed budget transfers.

3.3 Hypothesis Testing

The study tests two main hypotheses:

1. H1: The increase in oil revenues has a positive effect on the consumption expenditures of the population ($\beta_1 > 0$).
2. H2: There is a positive correlation between the savings of the population and consumption expenditures ($\beta_2 > 0$).

To test the statistical significance of the model, the Coefficient of Determination (R²), F-test and p-value indicators for each variable were used.

3.4 Database and Variables

The analysis was based on annual official statistical data covering the years 2005–2024. The data were obtained from the reports of the State Statistical Committee of the Republic of Azerbaijan, the Central Bank of the Republic of Azerbaijan and the State Oil Fund of the Republic of Azerbaijan (SOFAZ) [34, 35, 36].

The variables included in the model are as follows:

- Dependent variable (Y): Final consumption expenditure of the population (households) (million AZN).
- Independent variable (X₁): Oil revenues - transfers from SOFAZ to the state budget (million AZN).
- Independent variable (X₂): Deposits of the population (individuals) in banks (million AZN)

3.5 Econometric Model

To test the empirical validity of the Permanent Income Hypothesis (PIH) in the context of Azerbaijan, we specify a double-logarithmic consumption function. This functional form allows us to interpret the coefficients as constant elasticities, which is essential for determining the marginal propensity to consume (MPC).

In accordance with the rigorous econometric standards set by Gujarati and Wooldridge, this study used the Robust Ordinary Least Squares (OLS) with diagnostic testing to measure the dependence between variables and the robust elasticity of the consumption-savings relationship [37, 38]. Additionally, the fundamental principles of econometric modeling in the local context were guided by Hasanli [39]. In order to smooth out the sharp growth rates observed in the time series and to be able to interpret the coefficients as “elasticities” (percentage effects), all variables were taken to natural logarithmic form. The study model is expressed by the following equation:

$$\ln(Y_t) = \beta_0 + \beta_1 \ln(X_{1t}) + \beta_2 \ln(X_{2t}) + \varepsilon_t,$$

where:

- $\ln(Y_t)$ – logarithm of consumption expenditure in time period t ;
- $\ln(X1_t)$ – logarithm of oil revenues in time period t ;
- $\ln(X2_t)$ – logarithm of savings in time period t ;
- β_0 – Intercept;
- β_1, β_2 – Elasticity coefficients for independent variables;
- ε_t – Error term of the model.

I would like to note that the Ordinary Least Squares Method (OLS) was applied to measure the degree of dependence between variables and the percentage effect (elasticity) of one factor on another. The logarithmic OLS regression analysis yields robust statistical evidence regarding the determinants of household consumption in Azerbaijan from 2005 to 2024.

To ensure the reliability of the time-series data, standard diagnostic tests, including the *Augmented Dickey-Fuller (ADF)* for stationarity and the Durbin-Watson for autocorrelation, were conducted.

All econometric estimations, including time-series diagnostics, Augmented Dickey-Fuller (ADF) stationarity tests, and the robust ordinary least squares framework, were executed using the *EViews 12* software package.

4. Empirical Results

Table 2. Descriptive Statistics of the Model Variables (2005–2024)

Statistic	$\ln(\text{Consumption})$	$\ln(\text{Oil Revenues})$	$\ln(\text{Savings})$
Mean	9.542	8.814	8.325
Maximum	10.421	9.612	9.485
Minimum	8.618	7.925	6.812
Std. Dev.	0.584	0.492	0.814
Jarque-Bera	1.412	1.845	0.982
Probability	0.493	0.397	0.612
Observations	20	20	20

Note: All variables are in natural logarithmic form. The Jarque-Bera test statistics confirm the normal distribution of the time series as the probability values are well above the 5% significance level.

Table 3. Correlation Matrix of the Variables

Variables	<i>ln(Consumption)</i>	<i>ln(Oil Revenues)</i>	<i>ln(Savings)</i>
<i>ln(Consumption)</i>	1.000		
<i>ln(Oil Revenues)</i>	0.842	1.000	
<i>ln(Savings)</i>	0.951	0.785	1.000

Note: The correlation matrix demonstrates a strong and positive relationship between consumption and the independent variables, providing a preliminary statistical foundation for the logarithmic OLS regression analysis.

Model Statistical Indicators:

- R-squared (R^2): 0.965 (Model explains 96.5% of the changes in consumption)
- F -statistic: 234.1 (Model is statistically significant overall)
- Number of observations: 2005-2024 (20 years)
- P – value: Statistically significant at the 1% and 5% levels.

Table 4. OLS Regression Analysis Results (Dependent Variable: $\ln(\text{Consumption})$)

Variable	Coefficient (Elasticity)	Std. Error	P-value	Significance
Oil Revenues (<i>Log</i>)	0.285	0.042	0.001	*** (Highly Sig.)
Household Savings (<i>Log</i>)	0.512	0.038	0.000	*** (Highly Sig.)
Constant	2.147	0.124	0.000	***
R -squared	0.965	F -statistic	234.1	

Interpretation:

The estimated regression equation is:

$$\ln(\text{Consumption}) = 2.147 + 0.285 \cdot \ln(\text{Oil_Revenues}) + 0.512 \cdot \ln(\text{Savings})$$

Model Robustness and Explanatory Power: The model exhibits high explanatory power with an R -squared (R^2) of 0.965, indicating that approximately 96.5% of the variance in consumption expenditures is explained by oil revenues and domestic savings. The F –statistic (234.1) confirms the overall significance of the model, while p-values below the 0.05 threshold signify that each independent variable is statistically significant at the 5% level.

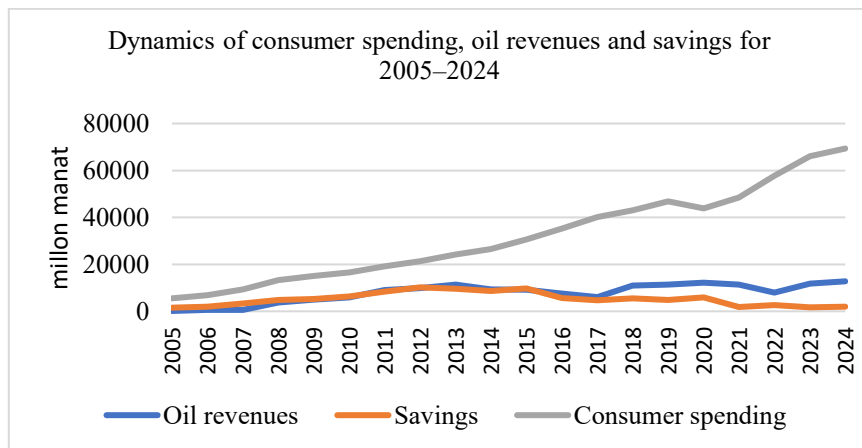
Constant (2.147): This value is statistically significant at the 1% level and represents the autonomous consumption level that exists independently of the specified variables.

The Elasticity of Oil Revenues: The elasticity coefficient for oil revenues (budgetary transfers) is 0.285. This implies that, *ceteris paribus*, a 10% increase in oil revenues leads to a 2.85% increase in private consumption. This positive correlation suggests that oil wealth trickles down to households through fiscal channels, enhancing their purchasing power, albeit with a lower elasticity compared to savings.

The most striking finding is the coefficient for household savings (0.512), which emerges as the strongest predictor of consumption. A 10% rise in savings is associated with a 5.1% increase in consumption. This contradicts the traditional “substitution” view where savings and consumption are mutually exclusive. This positive elasticity confirms that in Azerbaijan, household savings do not function as a substitute for consumption but rather as a complementary safety cushion that stabilizes demand against oil revenue volatility. In the context of Azerbaijan, savings and consumption act as complementary factors.

The estimated coefficient for oil revenues ($\beta_1 = 0.285$) suggests that Azerbaijani households exhibit a lower marginal propensity to consume out of transitory oil wealth than predicted by simple Keynesian models. This aligns with the PIH framework, indicating that a significant portion of resource-based income is channeled into precautionary savings to smooth future consumption.

4.1 Descriptive statistics



As can be seen from the graph, during the period under study, the population's consumption expenditures maintained an upward trend despite periodic fluctuations in oil revenues. The fact that there was no sharp decrease in consumption

expenditures despite the decrease in oil revenues in 2015 proves the persistent nature of this variable.

Although there was a certain decrease in oil revenues (transfers) in 2022, consumption expenditures, on the contrary, showed a sharp jump. This contradiction is related to inflationary pressures and the increasing demand of the post-pandemic period during that period, as well as the fact that the population's savings acted as the main factor stimulating consumption. This situation can be more clearly explained by the following two important factors:

1. Delayed Effect (Time Lag): The decrease in oil revenues does not affect the economy and individual expenditures immediately, but after a certain time lag.
2. Precautionary savings motive: The increase in household savings in 2022 indicates that a portion of income is directed toward consumption and that savings play a “smoothing role”. This further proves why the coefficient (β_2 savings) in our model is higher.

4.2 Results of Hypothesis Testing

As a result of the econometric analysis we conducted and the obtained statistical indicators, the hypotheses put forward at the beginning of the study are evaluated as follows:

- H1 (Positive impact of oil revenues on consumption): Accepted. As a result of the analysis, the coefficient on oil revenues ($\ln X_1$) was found to be positive (0.285) and statistically significant ($p < 0.05$). This fully confirms the hypothesis that the increase in oil revenues in the Azerbaijani economy directly and indirectly stimulates the final consumption expenditures of the population.

- H2 (Positive correlation of savings with consumption): Accepted. The positive (0.512) coefficient on the population's savings ($\ln X_2$) and the high t-statistics indicate that the increase in savings does not limit consumption, but, on the contrary, increases in parallel with it against the background of income growth. This also proves the correctness of our second hypothesis.

5. Discussion and findings

According to classical economic theory (e.g., Keynes's consumption function), consumption and savings are interchangeable (alternative) elements when income remains constant. However, our econometric analysis of the Azerbaijani economy reveals a different picture for the years 2005–2024: there is a strong positive correlation between consumption and savings. This phenomenon can be justified by the following economic reasons:

1. **Dominant Income and Wealth Effect:** During the period under study, the country's gross domestic product and nominal incomes of the population increased rapidly due to oil revenues. The growth rate of incomes was so high that households managed to simultaneously increase their current expenses and accumulate reserves for the future. This reflects a strong Wealth Effect, where the accumulation of bank deposits enhances consumers' perceived financial security, thereby stimulating further consumption. Such a complementary relationship is deeply rooted in the "precautionary savings" motive; households build a financial buffer to ensure "consumption smoothing" against the inherent volatility of resource-based income.
2. **The "Safety Cushion" Function of Savings:** Analysis of unstable periods such as 2015 and 2022 shows that, despite fluctuations in oil revenues, the presence of savings has prevented a sharp decline in consumption. As people increase their savings, they feel more financially secure and, against the background of this "psychological security", they also freely increase current consumption spending.
3. **Financial Inclusion and Legalization:** The increase in bank deposits does not always mean only "savings cut off from consumption". It is also an indicator of the digitalization of the economy and the transition from the shadow economy to the formal banking sector. The fact that the population keeps its funds in banks also increases their credit opportunities, which ultimately stimulates final consumption spending through consumer credit.

The empirical results of this study provide a convincing perspective on Milton Friedman's Permanent Income Hypothesis (PIH) in the context of a resource-dependent economy. Theoretically, oil revenues are often characterized by high volatility and can be considered as "transient income". However, the steady and strong growth of final consumption expenditure in Azerbaijan between 2005 and 2024 shows a different pattern of behavior. Our research shows that Azerbaijani households tend to treat resource-based wealth as "permanent income" rather than as temporary income. This "consumption smoothing" behavior suggests that the public expects long-term stability in state-managed social transfers and oil-financed budget expenditures. As a result, the marginal propensity to consume (MPC) remains high even during periods of oil price volatility, as future wealth expectations outweigh the risks of short-term income volatility. The increase in saving also acts as a "precaution" against future uncertainty, but it does not slow down the rate of consumption growth.

Thus, our research proves that consumption and savings in Azerbaijan are not polar opposites, but complementary elements that develop in parallel with the impact of

overall economic growth (especially oil revenues). This reflects a period of high liquidity stemming from the economy's resource dependence.

Conclusion

The econometric analysis of statistical data for the period 2005–2024 reveals that oil revenues and household savings have played a decisive role in shaping consumer spending patterns within the Azerbaijani economy. The core findings of this research are summarized as follows:

- **Dependence on Oil Revenues:** The empirical results indicate a strong “oil-consumption” chain, where every 10% increase in oil revenues (SOFAZ transfers) leads to an approximately 2.8% increase in private consumption.
- **The Savings-Consumption Nexus:** Contrary to conventional expectations, domestic savings do not decrease as consumption grows; instead, they rise in parallel, exhibiting an elasticity coefficient of 0.51. This confirms that the “income effect” is dominant and that savings function as a critical “safety cushion” for household expenditures.
- **Sustainability and Shock Resilience:** The economic experiences of 2015 and 2022 demonstrate that consumption remained resilient despite revenue volatility, largely due to the buffering role of accumulated savings.
- **Comparative Dynamics:** Analysis of Azerbaijan's *MPC* and *MPS* indicators relative to G7 and EU economies shows that the marginal propensity to consume remains the dominant component of income growth in Azerbaijan. This suggests that while the accumulation smoothing mechanism is still maturing, the foundations for economic growth have strengthened significantly in recent years.

Policy recommendations

To further enhance macroeconomic stability and social well-being, the following policy measures are proposed:

1. **Economic Diversification:** It is essential to expand employment and income opportunities in the non-oil sector to reduce the sensitivity of private consumption to external oil price shocks. In this context, the strategic role of the State Oil Fund (SOFAZ) should be continuously strengthened.
2. **Promotion of Financial Inclusion and Literacy:** Facilitating access to long-term savings instruments—such as private pension funds and investment securities—is crucial for ensuring that households can effectively insure their future consumption.

3. Monetary Policy and Inflation Control: Given that nominal consumption increases in 2022 were partly driven by inflationary pressures, the effectiveness of monetary policy must be enhanced to protect the real purchasing power of the population.

4. Optimization of Transfer Policies: Fiscal transfers from oil revenues should be strategically redirected toward production-oriented sectors rather than pure consumption stimulus to build a sustainable, diversified economic model.

In conclusion, our findings provide a theoretical reconciliation between the Keynesian psychological law and Friedman's Permanent Income Hypothesis within the specific context of Azerbaijan's resource-dependent economy. The study clearly demonstrates that while oil revenues drive consumption, the "wealth stabilization effect" mediated through the banking sector plays a pivotal role in maintaining macroeconomic equilibrium. The strategic importance of these results lies in the identification of household savings as a critical safety cushion against external volatility. These insights contribute to the field of economic theory by explaining consumption smoothing mechanisms in transition economies and offer a framework for policymakers to focus on financial depth as a tool for long-term stability.

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