

Consumption Expenditures on Food, Non-food Products and Services in Romania*

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Abstract:

This paper aims to assess the relationship between income and consumption expenditures of households in Romania between 1997 and 2022. The chosen econometric methods are the Augmented Dickey-Fuller and Phillip-Perron unit root tests, Granger causality tests and the Johansen-Juselius test. Our study highlights the fact that together with the increase in the monetary income, there was a considerable reduction in the income in kind that ensured the coverage of the consumption needs at the household level. Additionally, the increase in the population's monetary income is essential for reducing the share of expenses on the consumption of food products and increasing the consumption of non-food products and services.

Keywords: monetary income, income in kind, consumption, expenditures

JEL Classification: A10, A13, Q11, Q18

1. Introduction

Economic literature proved that an increase in the household income generates an increase in the demand for goods and services (Fuchs, 1967; Ahn, 2019). Moreover, the increase in the household income generates structural changes in the consumption expenditures: as the income increases, the share of expenditures on food products decreases and the share

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of expenditures on non-food products and services increases (Fukase and Martin, 2020). Additionally, a higher income is associated with increased food security and often with land holdings (Tschirley and Weber, 1994). The amount and structure of the household expenditures by type are significantly influenced by the private sector (Nagyová et al., 2016). Kubicova et al. (2019) show that in Slovakia, the share of expenditure on food products and non-alcoholic beverages decreases by 5pp in five years' time span, yet remaining one of the highest in the European Union.

Cirera et al. (2010) illustrate the relationship between the distribution of income and the aggregate demand for food products, concluding that for households with an income below national average, the share of expenditures of food products is considerably higher compared to other households. The changes that occur in a household's income generate not only structural changes in expenditures but also changes in the expenditures on food products (Godfray, 2011). From a microeconomic perspective, Roux et al. (2000) concluded that income strongly influences one's strategy regarding food acquisition and preparation – poor individuals generally prefer to purchase fresh food in discount shops and prepare it themselves. From a macroeconomic perspective, Seale et al. (2003) revealed that households in low-income countries spend a considerably higher share of their income on food and are more responsive to price and income changes compared to those in middle and high-income countries. Moreover, Gerbens-Leens et al. (2010) explained that an increase in the GDP is followed by changes in the food consumption patterns, with large gaps between supply and actual consumption; also, periods of economic growth are accompanied by growth of food demand. Fukase and Martin (2020) consider that in determining the demand of food products, the increase in population should be considered together with the increase in income.

This paper aims to analyse the relationship between income and the consumption expenditures of households in Romania between 1997 and 2022. This period is characterised by radical social changes in the country due to the accession of Romania into the European Union.

2. Literature Review

Analysing consumption expenditure patterns in relationship to income is essential in order to make informed decisions about the most suitable ways of ensuring sustainable development as well as enhancing quality of life. Quality of life indicators reflect a philosophical approach to wellbeing, which is based on one's ability to select the desired goods and services (Diener et al., 1997), while sustainable development represents a more practical framework based on ensuring food security, ending poverty and utilizing resources cautiously. Moreover, final consumption

expenditures are proved to have a positive impact on economic growth in Romania in the short run as well as in the long run through both positive and negative shocks (Milin et al., 2023).

The share of food consumption expenditures in a household's total income is an important indicator of food security, as it reflects access to food (Feher et al., 2021). The analysis of the relationship between the consumption expenditures on food and income is particularly important for Romania because of its unique circumstances of the economic and social development path. Since the Romanian Revolution in 1989, high agricultural potential of the country was undermined by the lack of coherent agricultural policies, and for many years the output of this sector was reserved mainly for local consumption (Andrei et al., 2011). The accession of Romania to the EU caused significant changes in the imports and exports of food products, which caused another major change in food consumption patterns (Andrei et al., 2022b). After the EU accession, it is considered that on average, food security has been achieved in Romania, as the dietary energy supply is above the average dietary energy requirements (Istudor et al., 2014). However, consumers from rural areas of the country still experience a degree of food insecurity, strongly associated with food availability and moderately correlated to food access (Pastiu et al., 2024). By the beginning of the COVID-19 pandemic, Romania had one of the highest shares of food consumption expenditures in a household's total income in the EU and it was not expected to drop to the average EU level until at least 2040 (Feher et al., 2021). Moreover, the Russia-Ukraine conflict has deep repercussions on the food systems all over the EU with serious challenges to ensuring food security (Fazle Rabbi et al., 2023) and potential further changes in food consumption.

Consumption expenditures on non-food products (both durable and non-durable goods) in Romania after the Romanian Revolution in 1989 were severely affected by the economic crisis in 2008–2009 (Diaconu and Maxim, 2018) and the COVID-19 pandemic. For example, regarding clothing, during the transition period people bought fast-fashion, low-cost and often counterfeit garments (Crăciun, 2013 and 2015). Demand for fast-fashion accelerated due to low prices and higher supply variety so that in the advent of the COVID-19 pandemic, such pieces were the most popular choices among most generations (Dabija et al., 2022). The COVID-19 pandemic brought new trends in consumption behaviour of Romanians in this area due to the development of mobile apps, the strong presence of brands on social media and the hedonic rather than utilitarian motivation of consumers (Pop et al., 2023).

Demand for durable goods and consumption expenditures allocated by households for such purposes are key indicators when measuring quality of life (Dziechciarz et al., 2021). With respect to durable goods, during the transition period, Romanian households exhibited behaviour typical for a post-communist country: preference for foreign brands, acquisition of second-hand

products, high price sensitivity, purchasing goods with short term loans (Gabor et al., 2013). The 2008–2009 crisis made consumers extremely careful in regard to deciding when to replace durable goods (Prelipcean and Boscoianu, 2012). The COVID-19 pandemic brought a drastic change in consumers' behaviour in Romania: income was strongly and negatively correlated to the intention to buy durable goods and high-cost services such as vacation package trips; moreover, a strong anticipation of bankruptcies, high inflation and high unemployment led to a sharp decrease in expenditures on durable goods (Hrisanta et al., 2021). Overall uncertainty also contributed to the reduction in trade with such goods (Caporale et al., 2024). Furthermore, irrational behaviour was observed in the acquisition of electronics (Posedaru et al., 2022).

Regarding the consumption of services in Romania, Lazar and Litan (2023) pointed out that the market services diversified between 1990 and 2020, switching from low-skilled activities to high-skilled ones. Moreover, Lee et al. (2023) observed that consumption of café and restaurant services increased while that of private transportation services decreased, all with a substantial impact on carbon emissions. Also, internet-driven and media consumption are on the rise, with internet access having a strong impact on economic growth (Lee et al., 2023; Batrancea et al., 2023).

Just like consumption expenditures on non-food products, income trends in Romania were affected by the 2008–2009 economic crisis and the COVID-19 pandemic. Between 1997 and 2008, income level was generally low, inequality was relatively high and ascending, while societal polarization was elevated; most households' incomes were lowered by high inflation and recession (Molnar, 2010). After the 2008–2009 economic crisis, lower wages increased due to various social programs while higher wages were reduced, resulting in a slight reduction of income inequality. Moreover, private employers often paid workers the minimum wage and paid out wages in cash, which is illegal (Oancea et al., 2017). The level of education is an important contributor to income inequality, with higher level of education resulting in considerably higher wages (Petcu, 2022). The COVID-19 pandemic had a similar impact on income levels in Romania as the 2008–2009 crisis: households with low and middle incomes were most severely affected (Almeida et al., 2022; Gasior et al., 2023). However, the mean disposable income of the self-employed increased (Gasior et al., 2023).

After 1990, wages are the most important source of income in Romania: 70.5% of the total nominal income represent monetary income, of which 60% are wages (Rotariu and Popescu, 1999). It should be noted that immediately after 1990, there were high wage differences in Romania driven by political decisions: workers in the extractive industry, the production of electric and thermal energy, and transportation had the highest salaries while those in the service sector (education, healthcare and social assistance) – the lowest ones (Rotariu and Popescu, 1999).

Between 1995 and 2004, the average wage per worker from the first decile income household was three times higher compared to the average wage per worker from the tenth decile income household (Stanculescu and Pop, 2009). In regard to wages, as one of the most important sources of income, Dorjnyambuu and Galambosné Tiszberger (2024), analysing the post-crisis years up until the pandemic, pointed out some interesting facts about Romania: among the Central European Countries, Romania has one of the lowest mean hourly wages but registered the highest hourly wages increase between 2010 and 2019; in 2019, the minimum hourly wages were approximately 60% of the mean hourly wages; there are important sectorial differences and these differences increased in Romania between 2010 and 2019 compared to other countries; high-skilled sector service has a strong impact on the upper tale of the wage distribution while the low-skilled sector service has a strong impact in the middle of the wage distribution.

The COVID-19 pandemic had a deep impact on the Romanian labour market, resulting in the loss of jobs and closure of activities and with long term consequences (Mindrican and Matei, 2023). However, even if the number of employees decreased, the average net salary kept its upward trend. This happened due to the rigidity of wages characteristic of the Romanian labour market and the dismissal of low-skilled workers especially in 2020 (Gherghina, 2022). During the COVID-19 pandemic, the term “essential worker” was used for the first time in Romanian legal documents, labelling workers involved in key sectors such as national defence, police, justice, education, food industry, energy production and distribution, waste management, religious activities, journalism, and transportation (National Strategy of Vaccination against COVID-19 in Romania, 2020, subchapter 3C). Most of these workers are employees and are generally affected by low wages and gender pay gap (Vasilescu, 2022). Moreover, the COVID-19 pandemic imposed additional challenges on those entering the labour market for the first time due to the fact that many employers impose seniority and many candidates overestimate their deserved wage (Simionescu, 2022).

Given the complex relationship between income (overall and by type) and consumption expenditures (overall and by category) in Romania, we used econometric methods to assess the following research hypotheses:

H_1 . The increase in the monetary income per person within a household determines an increase of the consumption expenditures per person within a household overall and by category (food products; non-food products, and services).

H_2 . Positive dynamics of the monetary income per person within a household determine a higher increase in the consumption expenditures per person within a household on services compared to expenditures on food and non-food products.

H_3 . Income in kind per person within a household decreased during the analysed period so that its share in the total income per person within a household also decreased. Yet, this type of income is still significant in the share of income allocated to food purchasing compared to the share of income allocated to non-food and service purchases.

3. Materials and Methods

3.1 Materials and data

For this paper, primary data from the household budget survey 2006–2022 and the Integrated Household survey 1996–2006, both provided by the National Institute of Statistics of Romania, were utilized. We constructed the following time series in per capita terms within a household: total income (I) of two categories: monetary income (MI) and income in kind (IK); total expenditures (Ex) of two categories: monetary expenditures (MEx) and expenditures in kind (ExK); consumption expenditures (CEx) by categories: consumption expenditures on food products (CEx_1), consumption expenditures on non-food products (CEx_2), consumption expenditures on services (CEx_3). To ensure comparability, all the indicators were expressed in the mean prices of 2000 in RON.

The qualitative analysis of the data reveals an ascending trend, except for 2008–2013 when a decrease in the average expenditure per person within a household was observed. To illustrate whether or not there are significant differences in the evolution of total expenditures and total income per person within a household, two subperiods were defined. These subperiods were defined considering the fact Romania joined the EU in 2007 and that 2008 was a year of major global economic crisis. These subperiods are as follows:

- 1997–2008: in 1998, a massive decrease compared to 1997 in both the income and the expenditures per person within a household was observed; therefore, when computing the descriptive statistics for this period, the values for 1997 were ignored;
- 2009–2022: during the first years, all the indicators were marked by the effects of the 2008 crisis and the process of the accession of Romania to the European Union; between 2009 and 2014, the dynamics of the indicators were slow, but starting 2015, these values increased steadily each year.

Table 1 presents the descriptive statistics for the indicators used in characterizing the evolution of income and expenditures per person within a household, by subperiods. These results are further analysed in the following paragraphs through econometric models that aim to identify specific characteristics of the dynamic of income and expenditures.

Data in Table 1 allow for the following comments:

- In both subperiods, monetary income and monetary expenditures per person within a household increased by a higher average rate compared to the total income and total expenditures. This is not surprising considering that income in kind and expenditures in kind per person within a household decreased because of the structural transformation of the Romanian economy after the EU accession.
- During the first subperiod, the share of monetary income in the total income per person within a household was 76.9%, while in the second period, this indicator reached 92.7%. Similarly, the monetary expenditures per person within a household increased from 77.9% in the first period to 89.2% in the second period. In 2022, the ratio of monetary income to total income per person within a household was 93.2%, which is much higher compared to 67.3% in 1998. Similarly, the ratio of monetary expenditures to total expenditures per person within a household was 93.2% in 2022 and 68.2% in 1998.
- During the second subperiod, the share of disposable monetary income per person within a household was considerably higher compared to the first period. Thus, the ratio (monetary income – monetary expenditures)/monetary income raised from 3.2% in the first period to 12.9% in the second period.

Table 1: Descriptive statistics of total and monetary income and monetary expenditure per person within a household (expressed in the mean prices of 2000, in RON)

	Indicator	<i>I</i>	<i>MI</i>	<i>Ex</i>	<i>MEx</i>	<i>ExK</i>	<i>IK</i>
1998–2008	Mean	168.5	129.5	160.9	125.4	35.5	39.0
	Max	262.1	217.8	235.5	199.2	43.8	45.1
	Min	124.7	84.9	123.2	84.3	30.7	33
	Max/Min	2.1	2.6	1.9	2.4	1.4	1.4
	Average annual change (%)	5.7	7.5	4.8	6.8	–1.9	–0.2
2009–2022	Mean	358.1	319.4	311.6	278.3	33.3	38.6
	Max	542.3	502.7	470.7	438.7	41.7	46.4
	Min	251.9	207.4	227.7	187.6	27.8	33.5
	Max/Min	2.2	2.4	2.1	2.3	1.5	1.4
	Average annual change (%)	5.5	6.3	5.3	6.1	–1.1	–0.8

Source: authors' calculations

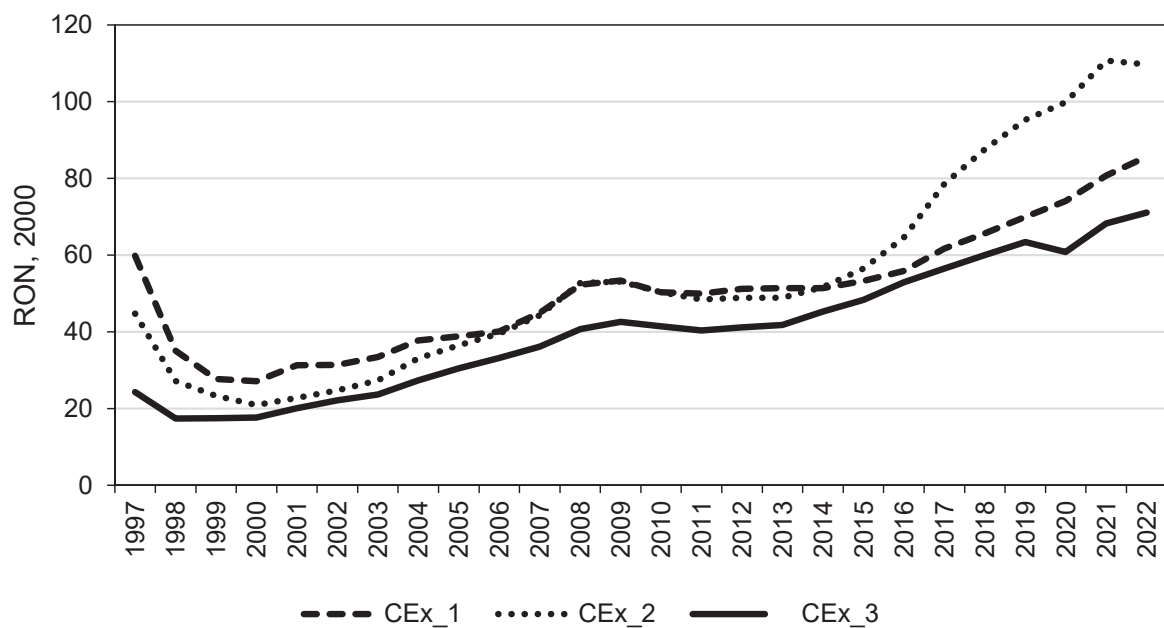
Important structural changes with respect to the type of consumption expenditures (food products, non-food products, and services) per person within a household occurred during the analysed time frame. In this regard, Figure 1 presents the evolution of consumption expenditures for food products, non-food products, and services per person within a household and Figure 2 presents the evolution of the structure of consumption expenditure per person within a household by these three types. Also, Table 2 contains the descriptive indicators for consumption expenditures per person within a household for food products, non-food products and services by subperiods. Figure 1, Figure 2 and Table 2 reveal some interesting characteristics of the analysed variables:

- All three categories of expenditures registered significant increases between 1998 and 2022. However, along with the increase in the monetary income per person within a household, the increase in the expenditures on services and non-food products per person within a household is higher compared to the increase in the expenditures on food products per person within a household. This trend could be observed for both sub-periods: the average annual change of expenditures on services per person within a household was 8.9% during the first period and 4% during the second period; the average annual change of expenditures on non-food products per person within a household was 6.9% during the first period and 5.7% during the second period; the average annual change of expenditures on food products per person within a household was 4.1% during the first period and 3.7% during the second period;
- The share of expenditure on food products in the total monetary expenditure per person within a household decreased from 30.1% in the first subperiod to 21.9% in the second subperiod;
- The share of expenditure on food products in the consumption expenditures per person within a household decreased from 39.3% in the first period to 32.9% in the second period. Even though the decrease is high, the value of this indicator is still among the highest in the European Union. Moreover, the value of this indicator has been lately stable, equal to approximately 30% for the 2018–2022;
- Between 2008–2022, the share of expenditure on non-food products in the consumption expenditures per person within a household increased by 5pp compared to the previous period. Also, the share of expenditure on services products in the consumption expenditures per person within a household increased by 5pp between 2008–2016 but decreased by 3pp between 2017 and 2022. This may be due to the decrease of annual average change rates of growth of the income per person within a household.

Table 2: Characteristics of consumption expenditures per person within a household by destination (expressed in the mean prices of 2000, in RON)

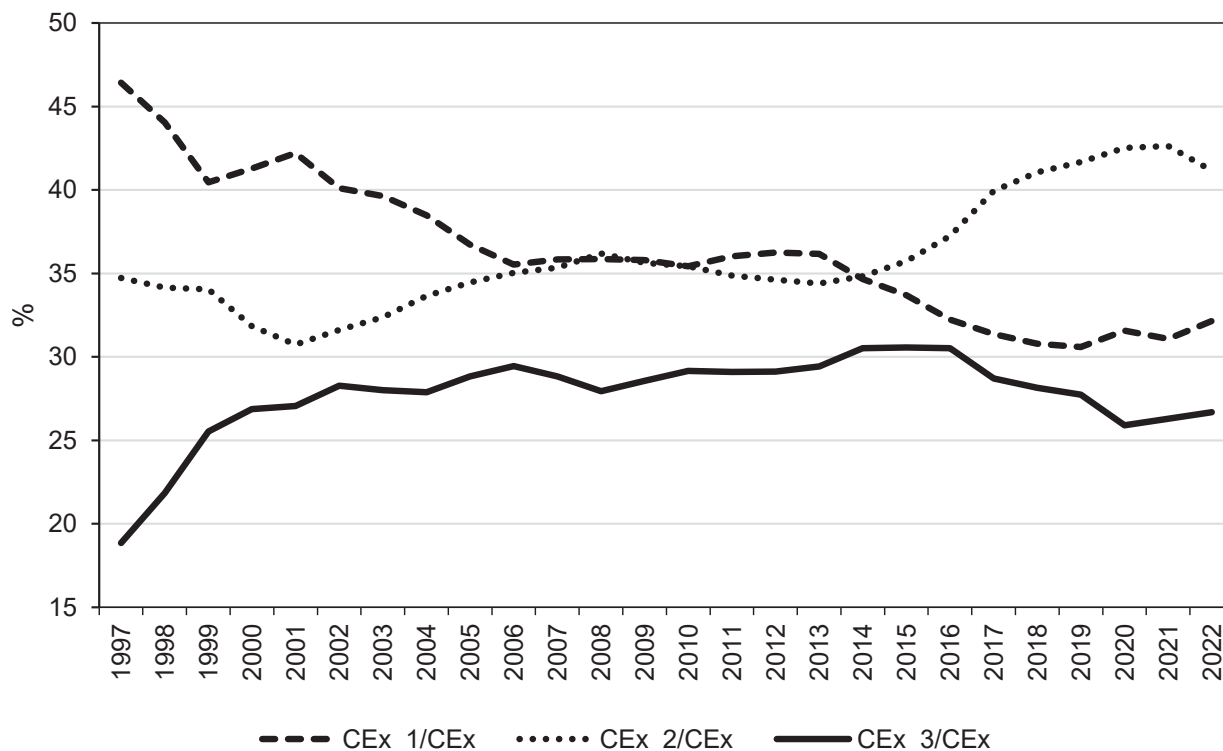
		<i>CEx</i>	<i>CEx_1</i>	<i>CEx_2</i>	<i>CEx_3</i>
1998 – 2008	Mean	97.3	38.3	33.1	25.9
	Max	145.8	59.8	52.7	40.7
	Min	65.7	27.1	20.9	17.4
	Max/Min	2.2	2.2	2.5	2.3
	Average annual change (%)	6.2	4.1	6.9	8.9
2009 – 2022	Mean	185.2	61.0	71.7	52.4
	Max	266.4	85.7	110.7	71.1
	Min	138.7	50.0	48.4	40.4
	Max/Min	1.9	1.7	2.3	1.8
	Average annual change (%)	4.6	3.7	5.7	4.0

Source: authors' calculations

Figure 1: The evolution of consumption expenditures for food products, non-food products, and services per person within a household between 1997 and 2022

Source: authors' processing

Figure 2: The evolution of the structure of consumption expenditure per person within a household by destination: food products, non-food products, and services between 1997 and 2022



Source: authors' processing

3.2 Methods

The chosen econometric methods are the unit root tests of Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP); Granger causality tests using VAR for stationary series or ECM for series integrated in first order.

First, we analysed the extent of consumption expenditures per person within a household for food products, non-food products, and services; and total income per person within a household; they have the same characteristics with respect to their dynamics during the entire period and the period after the accession of Romania to the European Union. For each series, the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root tests are used to assess stationarity (Wooldridge, 2012).

To evaluate the presence of the Granger causality for the stationary series, we used the following VAR:

$$y_t = a + b_1 y_{t-1} + \dots + b_p y_{t-p} + \varepsilon_t \quad (1)$$

while for the series with a unit root, an ECM model was used (Granger and Lin, 1995):

$$\Delta y_t = a_0 + \sum_{i=1}^p a_i \Delta y_{t-i} + c \cdot z_{t-1} + \varepsilon_t \quad (2)$$

where ε_t is normally distributed with $E(\varepsilon_t) = 0$, z_{t-1} is the residual of the cointegration equation and a , b_i , a_i , $i = 1, \dots, p$, a_0 , c are matrix.

In order to choose the p parameter in both cases (VAR and ECM), the AIC criterion was employed.

For the particular case of three variables (for instance, x , y and z), the ECM model is defined as follows. In such model, there are three equations and for y , the following occurs:

$$\Delta y_t = a_0 + \sum_{i=1}^p a_i \Delta y_{t-i} + \sum_{i=1}^p b_i \Delta x_{t-i} + \sum_{i=1}^p c_i \Delta z_{t-i} + d \cdot u_{t-1} + \varepsilon_t \quad (3)$$

where $u_{t-1} = y_{t-1} - \alpha \cdot x_{t-1} - \beta \cdot z_{t-1}$ is the cointegration equation residual. From Equation (3), it can be observed that there are two pathways of causality for y : through the lagged values of x and through the lagged value of the cointegrating vector (u_{t-1}). In this case, in order to test if x Granger-causes y , the null hypothesis is defined as follows: $H_0 : b_1 = \dots = b_p = d = 0$. So, in order to reject the null hypothesis, one of the following must occur: $b_1 = \dots = b_p = 0$ and $d \neq 0$; at least one of the $b_1, \dots, b_p$ parameters different from 0; and $d = 0$.

Second, we used the same methodology as above in order to assess the relationship between monetary income per person within a household and consumption expenditures on food, non-food products, and services per person within a household respectively. Also, the relationship between income in kind per person within a household and consumption expenditures on food, non-food products, and services per person within a household respectively was analysed. These estimations are extremely important because in the beginning of the transition process from centralised to market economy, the share of income in kind per person within a household in the total income was high. Moreover, we will assess to what extent monetary income per person within a household Granger-causes the level of expenditures on food products, non-food products, and services.

Next, a regression model is used to assess how the extent of the dynamics of consumption expenditures per person within a household by category is influenced by the evolution of monetary income and income in kind per person within a household. The index of the consumption expenditures per person within a household by destination is regressed against the index

of the monetary income per person within a household and the index of income in kind per person within a household:

$$\frac{CEx_i(t)}{CEx_i(t-1)} = c + a_m \frac{MI(t)}{MI(t-m)} + b_k \frac{IK(t)}{IK(t-k)} + d \cdot D_t + \varepsilon(t), \quad i=1,2,3$$

(4)

and $m, k \in N$

where m and k represent the delay for the evaluation of each category of income against each category of consumption expenditures, $D_t = \begin{cases} 1, t = 2007, \dots, 2022 \\ 0, t = 1997, \dots, 2006 \end{cases}$ and ε is normally distributed, $E(\varepsilon_t) = 0$.

4. Results

4.1. Granger causality analysis

For all the series, all three models of the unit root tests were used (presence of the trend, presence of the constant, and without trend and constant). The results for the presence of the constant model are displayed in Table 3. These results show us that all the series exhibited substantial increases during the analysed period. The series CEx_1 , CEx_2 , CEx_3 and MI , have a unit root and therefore, are non-stationary. When testing the differentiated series ($\Delta CEx_1, \Delta CEx_2, \Delta CEx_3, \Delta IK, \Delta MI$), the results show that they are stationary. In order to analyse the IK series, the 2000–2022 time frame was used as for this particular series, the values for 1997, 1998 and 1999 are outliers.

Table 3: Unit root tests for ΔCEx_1 , ΔCEx_2 , ΔCEx_3 , MI , IK variables

Variable	Series type	Augmented Dickey-Fuller test	Phillips-Perron test	Order of integration
CEx_1	Level	0.9372	−0.2075	I(1)
	1 st Difference (ΔCEx_1)	−3.3986*	−8.2362*	I(0)
CEx_2	Level	−0.034	0.9585	I(1)
	1 st Difference (ΔCEx_2)	−4.4309*	−4.4398*	I(0)
CEx_3	Level	1.2917	1.2301	I(1)
	1 st Difference (ΔCEx_3)	−5.4358*	−5.4350*	I(0)
MI	Level	−0.0749	0.8084	I(1)
	1 st Difference (ΔMI)	−5.8255*	−4.8255*	I(0)
IK	Level	−2.1348	−2.0745	I(1)
	1 st Difference (ΔIK)	−5.8246	−6.2091	I(0)

Notes: * H_0 of a unit root is rejected at the 1% level

Source: authors' calculations

Because the series Ex_1 , CEx_2 , CEx_3 and MI are non-stationary, two tests are used to check for possible cointegration: the Maximum Eigen value statistics and Trace Statistics. Testing for cointegration relationships was performed with help of Johansen and Juselius Cointegration test. The results presented in Table 4 indicate at most two cointegration relationships between the four variables at the 5% significance level. Under these conditions, an ECM representation is used to evaluate the Granger causality.

Table 4: Johansen and Juselius Cointegration test variables: CEx_1 , CEx_2 , CEx_3 , MI

H_0	H_1	Test statistics	95% critical values
Maximul Eigen value statistics			
$r = 0$	$r = 1$	30.72722	27.58434
$r \leq 1$	$r = 2$	24.29979	21.13162
$r \leq 2$	$r = 3$	7.134954	14.26460
$r \leq 3$	$r = 4$	1.423806	3.841466
Trace Statistics			
$r = 0$	$r \geq 1$	63.58577	47.85613
$r \leq 1$	$r \geq 2$	32.85855	29.79707
$r \leq 2$	$r \geq 3$	8.558760	15.49471
$r \leq 3$	$r \geq 4$	1.423806	3.841466

Source: authors' calculations

The ECM model is used to analyse the Granger causality between variables considering two possible sources: short-term changes in variables' behaviour (expressed by Δy_{t-i} , $i = 1, 2, \dots$) and long-term changes in variables' behaviour (expressed by the cointegration relationship between variables represented in the model by z_{t-1}).

Considering that data series consist of annual values, p equals 1 in the ECM model (Pesaran et al, 2000).

Table 5 presents the results for the long-term cointegrating vectors for CEx_2 . For this cointegration relationship, results in Table 6 are obtained, and they further permit the analysis of the behaviour of the non-food expenditures series (CEx_2).

Table 5: Estimates of long-term cointegrating vector for

CEx_2(-1)	CEx_1(-1)	CEx_3(-1)	MI(-1)	c
1.00	-0.4680 (0.1423)	-0.1827 (0.1073)	-0.1161 (0.0101)	4.1769

Notes: standard errors are indicated in brackets.

Source: authors' calculations

Table 6: Estimation of the ECM model (dependent variable:)

Regressors	Parameter estimates	t - statistics
$\Delta CEx_2(-1)$	1.4037*	2.5752
$\Delta CEx_1(-1)$	-0.6104**	-1.9416
$\Delta CEx_3(-1)$	-1.2663*	-2.5916
$\Delta EC(-1)$	-0.8750*	-2.1511

Adj. $R^2=0.52$

Jarque-Bera = 0.600 (0.741)

Vec Residual Heteroskedasticity Test: Chi-sq = 217.34 (0.191)

Vec Residual Serial Correlation LM test: LM – Stat = 21.959 (0.145)

Notes: P-values are indicated in brackets; * $\alpha < 0.05$; ** $\alpha < 0.1$.

Source: authors' calculations

The results above reveal that the coefficient of the error correction term (-0.8750) is significant at 5% and is negative. Therefore, the long-run equilibrium relationship between the four variables is confirmed. The statistical tests of normality, homoscedasticity and lack of serial correlation indicate that the function is specified correctly.

Table 7 reveals a long-term cointegration relationship between the consumption expenditures per person within a household for food products, non-food products, and services, and monetary income. Moreover, in the short term, there is a causal relationship between immediate changes that appear in the consumption expenditures per person within a household for food products, services, monetary income, and the consumption expenditures per person within a household for non-food products.

Table 7: Results of VAR Granger causality test for

Granger causality	Chi - sq	Prob
1997–2022		
<i>All</i> ($\Delta CEx_1, \Delta CEx_3, \Delta MI$) $\rightarrow \Delta CEx_2$	3.769	0.052
$\Delta CEx_3 \rightarrow \Delta CEx_2$	6.716	0.009
$\Delta MI \rightarrow \Delta CEx_3$	14.779	0.002
2007–2022		
$\Delta CEx_3 \rightarrow \Delta CEx_2$	9.686	0.021
$\Delta MI \rightarrow \Delta CEx_2$	7.191	0.066
$\Delta MI \rightarrow \Delta CEx_3$	13.910	0.003

Source: authors' calculations

The results show us that the increase in the total income per person within a household caused an increase in the consumption expenditures for food products, non-food products, and services.

Moreover, the results show that there is no causal relationship between *MI* and *CEx_1* for the period after the accession of Romania into the European Union. However, there is a significant Granger causality between *CEx_3e* and *CEx_2*. That may be because in Romania, monetary income per person within a household is lower compared to other EU countries, while prices for food are, in many instances, comparable. As consumption expenditures on food are non-elastic in respect to prices, households cover first and foremost these kind of expenditures with their income.

4.2 Evaluating consumption expenditures per person within a household against monetary income and income in kind per person within a household

Table 8 presents the results of the estimations of the regression models from Equation 4 and the diagnostic tests for checking the assumptions concerning normality, serial correlation, and heteroskedasticity. The diagnostics tests show that the equation is specified correctly. These results confirm that the income in kind per person within a household has a significant impact on consumption expenditures per person within a household on food; an increase in the monetary

income per person within a household determined an immediate increase in the consumption expenditures per person within a household on services; the increase in the monetary income per person within a household positively impacted the consumption expenditures per person within a household on non-food products with a lag of two years. Increase in monetary income per person within a household determines an increase in the consumption expenditures per person within a household on food products with a one-year lag. For services and food products, increases in income result in an immediate reallocation of resources. As the parameter of the dummy variable corresponding to services in the regression model is negative, the rate of increase of this consumption expenditure category is lower in Romania after the EU accession compared to the entire time frame. For consumption expenditures on food products and non-food products there are no such differences.

Table 8: Regression models estimation results based on Equation 4

	<i>CEx_1 / CEx_1(-1)</i>		<i>CEx_2 / CEx_2(-1)</i>		<i>CEx_3 / CEx_3(-1)</i>		
	1997–2022	2007–2022	1997–2022	2007–2022	1997–2022	2007–2022	1997–2022 with dummy variable
c	0.2681* (0.0874)	0.276* (0.1099)	0.628* (0.0461)	0.610* (0.0776)	0.439* (0.1246)	0.6147* (0.1093)	0.4121* (0.0736)
a₁	0.533* (0.1060)	0.533* (0.0808)			0.578* (0.1159)	0.4022* (0.1003)	0.6280* (0.0717)
a₂			0.383* (0.0436)	0.388* (0.0703)			
b₁							
b₂	0.205* (0.0409)	0.1964* (0.059)					
d							–0.0418* (0.0186)
R²	0.88	0.81	0.72	0.63	0.72	0.44	0.77
Normality Test Jarque – Bera Statistics (Probability)	0.9932 (0.6086)	0.4447 (0.8006)	0.1714 (0.9179)	0.2121 (0.8994)	1.0052 (0.6050)	0.3532 (0.8381)	1.1570 (0.5607)
Serial Correlation Breush – Godfrey Serial Correlation LM Test (Probability)	0.7398 (0.6908)	0.2188 (0.9213)	0.2358 (0.8888)	0.429 (0.6605)	1.2349 (0.5393)	1.1747 (0.3636)	1.0805 (0.3954)
Heteroskedasticity Test White Heteroskedasticity Test (Probability)	1.1293 (0.3825)	0.3549 (0.7078)	1.7584 (0.4151)	1.9511 (0.1842)	3.0843 (0.2139)	2.3673 (0.1328)	1.6617 (0.2128)

Notes: * significant at 1%; standard errors are reported in brackets.

Source: authors' calculations

4.3 An analysis of the average consumption propensity and average food consumption propensity

When evaluating the characteristics of households' income and expenditures, it is essential to compute two indicators: the average consumption propensity (ACP) and average food consumption propensity (AFCP). ACP is the ratio between households' expenditures and households' income while AFCP is the ratio between households' expenditures on food products and households' income. ACP is important when defining economic policies, as households' consumption is one of the factors that ensures sustainable economic growth. On the other hand, evaluating the dynamics of AFCP on a long time frame offers valuable insights for food market, especially in the case of countries where this indicator is high, such as Romania.

The ACP and AFCP series were tested for unit root using the ADF and the Phillip-Perron tests and the results show that they are stationary (Table 9). Therefore, for analysing the Granger causality, a VAR model was estimated based on Equation 1, where In order to assess the VAR model, the dummy variable from Equation 4 was introduced in order to highlight the main differences between the pre- and post- EU accession Romania. In order to capture the ascending trend of the two series, the trend component was introduced. Based on the AIC, it was determined that $p = 2$. The results of the VAR model are displayed in Table 10.

Table 9: Unit root tests results for ACP and AFCP

Variable	Augmented Dickey-Fuller test	Phillips-Perron test	Order of integration
<i>ACP</i>	−1.9888 (0.045)	−1.9888 (0.047)	I(0)
<i>AFCP</i>	−2.8207 (0.006)	−2.6335 (0.011)	I(0)

Notes: P-values are reported in brackets.

Source: authors' calculations

Table 10: VAR estimation results for *ACP* and *AFCP*

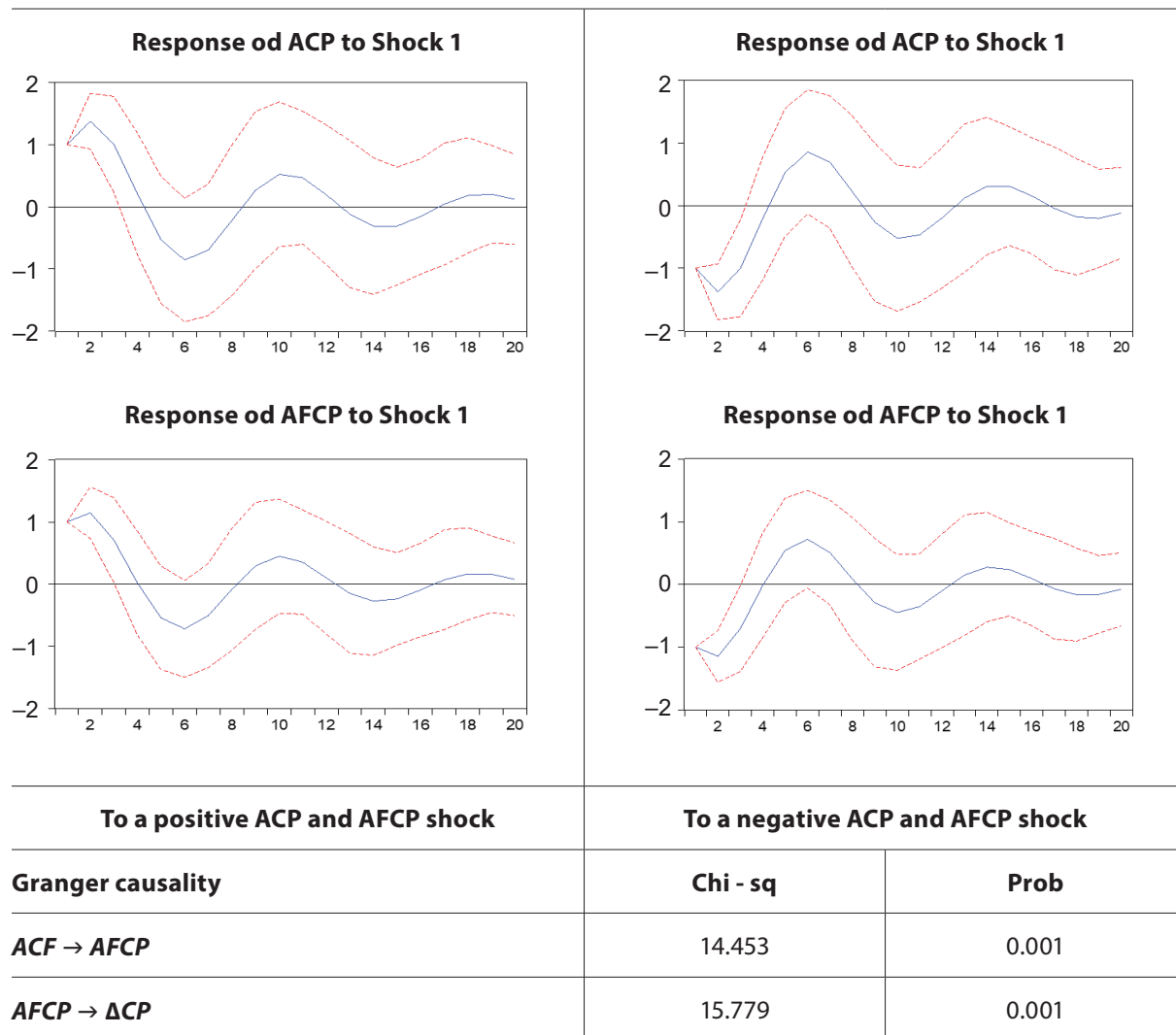
	<i>ACP_t</i>	<i>AFCP_t</i>
Constant	65.71 (4.33)*	24.90 (1.78)**
<i>ACP_{t-1}</i>	0.679 (4.45)*	0.473 (3.35)*
<i>ACP_{t-2}</i>	-0.551 (-3.75)*	-0.480 (-3.546)*
<i>AFCP_{t-1}</i>	0.698 (3.53)*	0.675 (3.70)*
<i>AFCP_{t-2}</i>	-0.184 (-1.071)	-0.239 (-1.511)
<i>D_t</i>	-2.974 (-3.802)*	0.361 (0.500)
trend	-0.177 (-1.680)	-0.287 (-2.946)*
R²	0.97	0.95

Notes: * significant at 1%. ** significant at 10%. T-statistics are reported in brackets.

Source: authors' calculations

The results show us a descending trend of the ACP, while the AFCP does not exhibit a clear downward trend, despite the fact that it decreased during the entire time frame. This is consistent with the VAR estimation, which shows a slow decrease in the ACFP resulting from low household income. During the analysed time frame, the average income at household level increased, yet not so much in relationship with the increase in consumption expenditures for food products, so that AFCP decreases on the level of the most EU countries.

Both time series are stationary; therefore, the Granger causality may be analysed directly using the VAR model. The results are displayed in Table 11, revealing a bi-directional Granger causality.

Table 11: Results of VAR Granger causality test for ACP and AFCP

Source: authors' calculations

Estimating the VAR models for ACP and AFCP allows for the evaluation of the response of these variables to positive or negative shocks. Both variables display similar responses for negative as well as positive shocks. Also, a relative symmetry can be observed in case of positive and negative shocks. Therefore, shocks are similarly perceived for ACP and AFCP. There is a significant influence of the EU accession in 2007 in both variable when applying either a positive or a negative shock.

5. Discussion

5.1 Economic perspectives of the results

The amount and the structure of the consumption expenditures of households are essential aspects of the living conditions of a country. That is why the share of consumption expenditures on food products in the total amount of consumption expenditures is a pillar of multiple public policies. For example, food subsidy programs implemented at national level (like the food stamps program in the US) permit a higher standard of food consumption for the poor; yet, they have a very small effect on the income elasticity of food consumption (Hymans and Shapiro, 1975).

The share of consumption expenditures on food products in the total amount of consumption expenditures together with the share of food production in the total production are two extremely useful measures for shaping economic strategies. The lack of capacity of transforming basic agrifood products into consumption goods that satisfy the demand of the consumers leads to food imports and, consequently, to a high deficit in the commercial balance. An increase in the share of semi-processed foods in the total food production in a country leads to a more dynamic agricultural trade and eventually to a competitive advantage in this area (Smutka et al., 2016). However, the production of agricultural raw materials is naturally resource intensive, while the production of semi-processed and processed food products is capital intensive (Lange, 1989). Even with a high agricultural potential, the reduced processing capacity in Romania leads to high amount of food imports (Andrei et al., 2022a). Moreover, as in most countries in the northern hemisphere, the population in Romania consumes fresh vegetables, seafood products and fish all year round, thus increasing the dependence on the trade with the Global South (Patnaik, 2015).

Equally, in an integrated European market of agrifood products, the massive import of agrifood products also influences the volatility of prices in the country that imports significant quantities of them. In the post-pandemic period, against the background of the increase in the prices of agrifood products in countries from which Romania imports high quantities of food products, there was also an important increase in the prices of basic agrifood products. Thus, in addition to the import of agrifood products, we are witnessing an import of inflation in these categories of products. It should be noted that food inflation globally affects the European Union member states differently, yet two common patterns emerge as revealed by the 2005–2013 world commodity price spikes: the average rates of inflation for food products is considerably higher compared to those for non-food products; inflation for food products is

highly volatile, making it difficult for monetary authorities to address it without aggravating output variability (Lloyd et al., 2015). Indeed, exogenous shocks in the global food prices have always accounted for approximately 30% of HICP volatility, yet the effects are transmitted to the final retail prices differently depending on the product (Peersmna, 2018). Thus, prices for different food categories in Romania might be affected differently by global price spikes, depending on the EU country in which the respective food products are manufactured. The increase in the prices of these products because of the developments on the European market implicitly led to the increase of expenditures for these products at the expense of non-food products and, to a significant extent, of services.

The 2020–2022 timeframe has some particularities from the perspective of consumption expenditures in the EU worth to be discussed. These issues are important because they affect Romania directly due to the close social and economic interconnectivity with other EU countries through several channels such as the intra-EU commerce and fund transfers from workers to their relatives. First, in 2020, the mean consumption expenditure per person for the 20% of households with the highest incomes was approximately two times higher compared to that of the 20% of households with the lowest incomes, suggesting high levels of inequality (Eurostat, 2023). Second, the COVID-19 pandemic led to significant supply chain disruptions severely affecting the EU countries, which, together with temperature abnormalities, geopolitical tensions, liquidity factors (the increase in M2 aggregate) and supply factors (oil and fertilisers prices) resulted in an increase in commodity prices that transmitted from producer to consumer in only six months (Algieri, 2024). Third, the median debt-income ratio decreased by 1.5pp in 2020–2021 reaching 72.8%, the highest decrease being registered among low-income households (European Central Bank 2023).

The present study highlights precisely the fact that together with the increase in monetary income, there was an important reduction in the income in kind that ensured the coverage of the consumption needs at the household level. Equally, the study highlights the importance of the increase in the population's monetary income in reducing the share of expenses for the consumption of food products and increase of the consumption of non-food products and market services. The increase in the minimum wage (as monetary income) together with the increase in the share of workers earning the minimum wage in the total number of workers between 2012–2016 in Romania had a significant impact upon the entire population, resulting in significant reduction of the share of people at risk of poverty and social exclusion (Heemskerk et al., 2018). The increase in the minimum wage reduces wage inequalities, especially among women, and increases households' disposable income (Militaru et al., 2019). Between 2021 and 2023, the minimum wage again increased rapidly, without being correlated to productivity,

which may have the opposite effect compared to the previous increase, as it leads to increased unemployment (European Central Bank, 2024). The obtained results reveal that income in kind still has a significant role in covering the consumption expenditures of food products and an insignificant role in covering the consumption expenditures of non-food products. Income in kind had a significant contribution to the total household income in 2022 (also increasing compared to 2021): 1.4% of the total household income consists of income in kind obtained by employees and receivers of social benefits and includes subsidies for utilities, while 5.9% represents the products from own resources (National Institute of Statistics, 2023). Moreover, the share of income in kind in the total household income is approximately three times higher in rural areas compared to urban areas (National Institute of Statistics, 2023). This is not surprising, as in rural areas, small and medium sized farms with rudimentary infrastructure that ensure only the basic needs of the households are the main sources of income (Dumitru et al., 2023). These farms have an important social role, yet produce little economic value (Alexandri, 2014) since land division is somewhat similar to the level of 1948 (Nemenyi, 2000).

5.2 Comparison with other studies and limitations

The key results of the present study are consistent with the existing literature. First, the paper evidenced that the rhythm of the consumption expenditures and income per person within a household in Romania are similar. Popescu et al. (2017) concluded that the average monthly expenditure per household and the average monthly income per household have a similar rate of increase, although a little lower for the former. Second, the paper revealed that immediately after the 2008 crisis, the income and expenditure per person within a household series present a level shift outlier. Similarly, Scutaru et al (2015) pointed out that after the 2009 crisis, consumption expenditures in Romania could not return to the same growth levels as before the crisis. Third, the study showed a strong Granger causality between income and consumption expenditures by type. This is in line with the conclusion provided by Jappelli and Pistaferri (2010), who performed an in-depth analysis of the existing literature on the relationship between income and consumption expenditures: consumption expenditures respond swiftly to anticipated income increases, but are less responsive to anticipated income declines and react promptly to permanent shocks in income. Fourth, the analysis indicates that an increase in income determines a high increase in food consumption. This is a characteristic of former socialist countries in Central and Eastern Europe (Jovanovic, 2016; Ivanova et al., 2006).

The present study is not without limitations. First, data for 1997 could not be included due to high volatility. Second, consumption expenditures could not be disaggregated into more

specific categories due to the lack of data. Third, when computing the Granger causality test for the selected variables for the 2007–2022 time frame, one might consider that this as a short time frame. Yet, this approach was used in order to illustrate the relationship between the variables after the accession of Romania to the EU. Fourth, this study uses annual data. Seasonally adjusted, quarterly data would better characterize consumption and income, yet such data are not available for the entire time frame.

6. Conclusions

This paper provided an analysis of the relationship between income and consumption expenditures of households in Romania between 1997 and 2022. All the three hypothesis formulated in the second section of the study were confirmed by the analysis, and several conclusions can be formulated: consumption expenditures per person within a household and income per person within a household have a similar trend; there is a causal relationship between the two variables; income in kind still plays an important role in ensuring food security of households, although after 2007 its contribution to the total income of households diminished; the accession of Romania to the European Union in 2007 and the global crisis in 2008 determined an important change in both income and consumption expenditures.

The study contributes to the existing literature in various ways. First, the data covers the 1997–2022 time frame, incorporating major events in the history of Romania: the transition period from a centralised economy to a market economy; the NATO and the EU accession; the impact of the 2008 global crisis; the COVID-19 pandemic; and the outbreak of the conflict in Ukraine. Second, the analysis covers the 2007–2022 separately, allowing for a better understanding of the Romanian economic and social context after the EU accession.

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