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# Principal Component Analysis of Economic Factors Affecting Food Consumption and Labor Market Performance in the European Union

**Narcis Paris Bacaințan***

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ABSTRACT

The study analyzes the structure of the relationships between the economic determinants of food consumption and labor market performance in the European Union, using an exploratory approach based on principal component analysis. The motivation for this research comes from the growing importance of food price dynamics and labor market transformations in the recent economic context, characterized by inflationary pressures and persistent structural differences among member states. The empirical analysis is based on secondary data extracted from Eurostat for the year 2024, covering a sample of 29 European countries. The set of variables used reflects the economic conditions of food consumption, through the harmonized food price index, as well as labor market performance, through indicators such as the economic activity rate, labor costs, and labor productivity. The adopted methodology, principal component analysis, allows for the reduction of data dimensionality and the identification of latent dimensions that structure the relationships between these variables, without imposing causality assumptions. The results highlight the existence of two principal components that explain 78.02% of the total variation in the data. The first component reflects a dimension of economic efficiency, characterized by the relationship between productivity, labor costs, and food price levels, suggesting the interdependence between the economic conditions of consumption and labor market performance. The second component is dominated by the economic activity rate and highlights the intensity of labor force participation, indicating the existence of a distinct dimension of the labor market, relatively independent of economic performance. The interpretation of the results indicates the presence of structural patterns and regional differences among European Union economies, in which more developed countries are characterized by high levels of productivity and prices, as well as by more intense labor market participation, while less developed economies exhibit less favorable combinations of these indicators. From a methodological point of view, the results confirm the relevance of principal component analysis in investigating the complex relationships between macroeconomic variables, although the exploratory nature of the method requires cautious interpretation of the conclusions. The study contributes to the literature by integrating the economic determinants of food consumption and labor market performance into a common analytical framework, offering a synthetic perspective on their interdependence in the European context. The results may serve as a starting point for future research that explores these relationships in greater depth using complementary econometric methods or by expanding the set of variables analyzed.



## 1. Introduction

In the context of recent economic transformations in the European Union, characterized by inflationary pressures, structural changes in the labor market, and rising living costs, the relationship between the economic conditions of food consumption and labor market performance is becoming increasingly relevant from both an academic and a public policy perspective. Rising food prices directly affect the well-being of the population and households' consumption capacity, while labor market dynamics—reflected in productivity, costs, and participation—fundamentally influence income levels and the sustainability of economic growth.

In the literature, food consumption is often analyzed from a behavioral or nutritional perspective, while labor market performance is studied separately, within the framework of macroeconomic or productivity analyses. However, the interdependence between these two dimensions is evident, as the economic conditions of consumption—particularly price levels—are closely linked to overall economic performance and the ability

* Ovidius University of Constanta, Constanta Romania. E-mail address: narcis.bacaintan@365.univ-ovidius.ro (N. P. Bacaintan).

of economies to generate value added. In this regard, an integrated approach that simultaneously captures these relationships is necessary for a deeper understanding of the differences among European economies.

This study aims to contribute to this line of research by investigating the structure of the economic determinants of food consumption and labor market performance in the European Union, using an exploratory approach based on principal component analysis. Rather than a causal analysis, the study aims to identify the latent dimensions underlying the relationships between the analyzed variables, thereby offering a synthetic perspective on how these phenomena are interconnected at the European level.

The analysis is conducted for the year 2024 and considers a set of relevant indicators, selected from the Eurostat database, which reflect both the economic conditions of food consumption, through the food price index, and labor market performance, through indicators such as labor productivity, labor costs, and the economic activity rate. This selection allows for the simultaneous capture of the economic dimension of consumption and the structural characteristics of the labor market within a comparative framework among Member States.

By using principal component analysis, the study aims to reduce the dimensionality of the data and identify structural patterns that characterize the economies of the European Union. The results obtained help highlight regional differences and distinct patterns of economic development, while also providing a useful conceptual framework for interpreting the relationships between food consumption and labor market performance. Thus, this paper contributes to the existing literature by integrating these two dimensions into a unified analysis and by highlighting the structural mechanisms that link them in the context of contemporary European economies.

## 2. Literature review

The analysis of the relationship between the economic determinants of food consumption and labor market performance has been a subject of constant interest in the economic literature, having been addressed from both theoretical and empirical perspectives. In the context of the European Union economies, these relationships take on relevance, given the structural diversity of member states and the simultaneous influence of economic, social, and institutional factors on consumer behavior and labor market dynamics. Thus, the use of multivariate methods, such as principal component analysis, allows for an integrated approach to these complex phenomena.

Principal component analysis is recognized in the literature as an effective statistical technique for reducing the dimensionality of complex datasets while maintaining most of the initial variability. This facilitates the identification of latent patterns and relationships between variables and is frequently used in economic and social studies to synthesize multiple pieces of information into a small number of interpretable dimensions (Mesa et al., 2018). In this regard, the method is particularly useful in the simultaneous analysis of indicators describing both the economic conditions of food consumption and labor market performance, contributing to a better understanding of the interdependencies between these domains.

Regarding the economic factors of food consumption, the literature highlights the central role of income and food prices in determining the level and structure of consumption. Income levels directly influence households' ability to access food, while rising prices can lead to significant adjustments in consumption, particularly among vulnerable groups (Makutėnas et al., 2025). At the same time, empirical studies show that economic development leads to a convergence of dietary patterns at the European level, with member states tending to adopt similar consumption patterns as income levels rise (Gil et al., 1995). This convergence reflects not only changes in consumer preferences but also market integration and the standardization of access to food products.

Another important aspect analyzed in the literature is food security, for the assessment of which composite indicators have been developed and are used, including in principal component analyses. Thus, Matějková et al. (2024) highlight the role of prices and incomes in determining the level of food security across the European Union, emphasizing the existence of significant disparities among member states. The use of principal component analysis in this context allows for the synthesis of several relevant indicators and the identification of common dimensions that characterize access to food.

At the same time, labor market performance is analyzed in the literature through indicators such as the employment rate, unemployment, productivity, and labor costs, which reflect both the efficiency of human resource utilization and the operating conditions of economies. Principal component analysis was used to classify labor markets in the European Union based on these indicators, facilitating the identification of structural patterns and differences among member states (Mirea & Aivaz, 2016a; Mirea & Aivaz, 2016b). Furthermore, the method has been applied in studies on optimizing resource allocation in the labor market, highlighting the importance of indicators such as the contribution of employment and market structure to supporting economic development (Liu, 2022).

The use of principal component analysis in economic studies is also supported by research highlighting this method's ability to simultaneously integrate and interpret many economic and social indicators (Vancea et al., 2021). Thus, factor analysis allows not only for reducing data complexity but also for identifying relevant relationships between variables, facilitating the interpretation of economic phenomena in a synthetic and

coherent manner (Mesa et al., 2018). Similarly, studies such as those conducted by Mirea and Aivaz (2016a; 2016b) demonstrate the utility of this method in analyzing labor costs and incomes, highlighting latent structures relevant to understanding the labor market.

In a broader context, recent literature emphasizes the importance of institutional and socio-economic factors in determining economic performance and living standards. For example, Jula et al. (2025) highlights the role of economic and institutional influences on poverty in Europe, while studies on labor market integration (Teodorescu et al., 2025) or the impact of technological transformations on it (Aivaz et al., 2026) show that labor market dynamics are influenced by a wide range of factors that go beyond the strictly economic dimension. In a broader context, recent literature emphasizes the importance of institutional, social, and cultural factors in determining economic performance and economic behavior. Thus, in addition to strictly economic variables, elements such as individual values, educational attainment, or the socio-cultural context can influence decision-making processes and the functioning of organizations and markets. In this regard, studies by Petre and Aivaz (2025), as well as Petre (2025), highlight the role of religiosity and education in shaping managerial decisions, suggesting the existence of non-economic determinants relevant to economic performance. Although these contributions primarily focus on the microeconomic level, they provide a useful conceptual framework for understanding the complexity of factors that can indirectly influence labor market dynamics and aggregate economic behavior. Although these contributions do not directly employ principal component analysis, they offer a relevant context for understanding the complexity of the relationships analyzed in this study.

Despite its advantages, the literature also highlights the limitations of principal component analysis, particularly regarding its exploratory nature and dependence on the quality of the data used. The results obtained are sensitive to variable selection and data structure, and the interpretation of the components requires an adequate theoretical foundation. Furthermore, external factors, such as public policies or global economic conditions, can influence the relationships between variables, which necessitates an integrated approach to the analysis of economic phenomena.

In this context, the present study contributes to the existing literature by using principal component analysis to integrate the economic factors of food consumption and labor market performance in the European Union into a common analytical framework. Through this approach, the research helps highlight the latent dimensions that structure these relationships and offers a comprehensive perspective on the differences among European economies.

## 3. Methodology

The empirical analysis is based on data provided by Eurostat, which ensures a high degree of comparability across countries and methodological consistency, given the standardization of indicators at the European level. The analysis is conducted for the year 2024 and includes a sample of 29 statistical units, corresponding to the member states of the European Union where complete information was available for all selected variables. Choosing this year allows for capturing a current picture of the economic structure and labor market dynamics, while avoiding the limitations associated with the use of non-homogeneous time series (Teodorescu et al., 2026).

The set of variables was constructed to reflect on the one hand, the economic dimension of food consumption and, on the other hand, labor market performance, in line with the paper's objective of highlighting the latent structure of these relationships. In this regard, the Harmonized Index of Consumer Prices for food (HICP) was used as a proxy for the economic conditions of food consumption, expressed as an index (2015 = 100), which allows for the comparison of relative price levels across member states. Labor market performance was captured through the economic activity rate (EmplActiv), expressed as a percentage (%) of the total population, which reflects the degree of population participation in the labor market, labor costs (LabourCost), measured by the labour cost index (2016 = 100 or equivalent base), as well as labour productivity (LabourProd), defined as real productivity per hour worked and expressed as an index (2015 = 100), thus ensuring comparability across economies regardless of differences in working hours.

The variables were selected to ensure conceptual consistency and statistical compatibility, being expressed in comparable units (indices and percentages), which facilitates their use in multivariate analysis. Furthermore, all variables were reported for the same sectory aggregate, corresponding to the market economy (industry, construction, and services, excluding public administration, defense, and social security), to avoid distortions caused by the specific characteristics of the public sector.

The empirical analysis is based on the use of Principal Component Analysis (PCA), a multivariate dimensionality reduction technique suitable for identifying the latent dimensions that structure the relationships among the analyzed variables. The choice of method is justified by the exploratory nature of the study, as it allows for the synthesis of information contained in a set of correlated variables into a small number of uncorrelated components, without assuming the existence of causal relationships.

The application of PCA was performed based on the correlation matrix, which implies the implicit standardization of the variables and the elimination of the influence of different units of measurement. The number of components retained was determined based on the criterion of eigenvalues greater than one,

supplemented by a graphical analysis of the eigenvalues. The appropriateness of the method was assessed using the Kaiser-Meyer-Olkin coefficient and Bartlett's sphericity test, and the communalities were analyzed to verify the degree to which the variables were represented within the extracted components.
Overall, the methodological framework adopted is appropriate for the objective of this study, allowing for the identification of the structure of the economic factors of food consumption and labor market performance in the European Union.

## 4.Results and Discussions

The analysis of the results is preceded by an examination of the descriptive statistics of the variables included in the model, in order to highlight the general characteristics of the sample (Table 1). The mean values indicate that the Harmonized Index of Consumer Prices (HICP) stands at 133.14 (2015=100), suggesting a significant increase in prices relative to the base year. The economic activity rate (EmplActiv) averages 77.76%, reflecting a relatively high level of labor force participation across the European Union.

Labor costs (LabourCost) average 30.14 (index), with a relatively high standard deviation (14.88), indicate a considerable difference among Member States regarding the level of costs borne by employers. Similarly, labor productivity (LabourProd) has an average value of 109.13 (2015=100), suggesting an aggregate level above the base year, though variation across countries remains significant.

This structural heterogeneity suggests the existence of systematic differences between economies, which justifies the use of principal component analysis to identify the latent dimensions that structure the economic factors of food consumption and labor market performance.

**Table 1 Statistical description of the variables**

| | Mean | Std. Deviation | Analysis N |
|---|---|---|---|
| HICP | 133.1379 | 13.06382 | 29 |
| EmplActiv | 77.7586 | 4.65115 | 29 |
| LabourCost | 30.1414 | 14.87554 | 29 |
| LabourProd | 109.1285 | 9.99161 | 29 |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

Principal component analysis was used to highlight the latent structure of the relationships between the food price index (HICP), the economic activity rate (EmplActiv), labor costs (LabourCost), and labor productivity (LabourProd) across European Union countries for the year 2024. The method was applied to a sample of 29 observations using the correlation matrix, which allows for the comparability of variables and eliminates the influence of different units of measurement (Table 2).

**Table 2 Correlation matrix**

| | | HICP | EmplActiv | LabourCost | LabourProd |
|---|---|---|---|---|---|
| Correlation | HICP | 1.000 | .181 | -.474 | .447 |
| | EmplActiv | .181 | 1.000 | .194 | .048 |
| | LabourCost | -.474 | .194 | 1.000 | -.578 |
| | LabourProd | .447 | .048 | -.578 | 1.000 |
| Sig. (1-tailed) | HICP | | .173 | .005 | .008 |
| | EmplActiv | .173 | | .156 | .401 |
| | LabourCost | .005 | .156 | | .001 |
| | LabourProd | .008 | .401 | .001 | |
| a. Determinant = .413 | | | | | |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

The adequacy of using factor analysis is supported by the results of preliminary statistical tests (Table 3). The Kaiser-Meyer-Olkin coefficient is 0.574, indicating an acceptable level of sample adequacy for exploratory analysis, suggesting sufficient correlations among variables, though not indicating a very strong structure. At the same time, Bartlett's sphericity test is statistically significant ($\chi^2 = 22.823$, $p < 0.001$), which allows us to reject the hypothesis of independence among the variables and confirms that the correlation matrix is suitable for dimensionality reduction. Consequently, the application of principal component analysis is methodologically justified.

**Table 3 Suitability of using factor analysis**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .574 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 22.823 |
| | df | 6 |
| | Sig. | <.001 |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

The results indicate the extraction of two principal components, based on the criterion of eigenvalues greater than one (Table 4). The first component has an eigenvalue of 2.002 and explains 50.04% of the total variation in the data, while the second component has an eigenvalue of 1.119 and accounts for 27.98%. Together, the two components account for 78.02% of the total variance, which reflects a very good ability to synthesize the initial information and indicates that the resulting model is robust and relevant for interpreting the analyzed phenomena. The graphical representation of the eigenvalues, via the scree plot, confirms this choice, highlighting a clear inflection point after the second component.

**Table 4 Explained variances**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 2.002 | 50.043 | 50.043 | 2.002 | 50.043 | 50.043 |
| 2 | 1.119 | 27.976 | 78.019 | 1.119 | 27.976 | 78.019 |
| 3 | .533 | 13.327 | 91.346 | | | |
| 4 | .346 | 8.654 | 100.000 | | | |
| Extraction Method: Principal Component Analysis. | | | | | | |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

According to the results presented in Table 5, the factor loadings analysis reveals a well-defined structure of the first component, characterized by strong positive correlations with labor productivity (0.832) and the food price index (0.773), as well as a significant negative correlation with labor costs (-0.843). This configuration suggests the existence of a fundamental economic dimension that reflects the efficiency of economic systems in terms of the relationship between costs and outcomes.

Economies characterized by high values of this component are those that manage to generate higher levels of productivity while maintaining relative control over labor costs, and are, at the same time, associated with higher price levels. This positive association between productivity and price levels can be interpreted in the context of structural differences among European economies, where more developed countries tend to have both higher productivity and higher living costs. In this sense, the first component reflects the interdependence between the economic conditions of food consumption and labor market performance, highlighting the fact that economies with high levels of productivity are associated with higher prices and a specific structure of labor costs.

**Table 5 Analysis of factor loadings**

| | Component | |
|---|---|---|
| | 1 | 2 |
| HICP | .773 | .299 |
| EmplActiv | .017 | .966 |
| LabourCost | -.843 | .309 |
| LabourProd | .832 | .016 |
| Extraction Method: Principal Component Analysis. | | |
| a. 2 components extracted. | | |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

The second component exhibits a much more concentrated structure, being dominated almost exclusively by the economic activity rate, with a very high factor loading (0.966). This indicates that this variable virtually defines the entire dimension, allowing the component to be interpreted as a measure of the intensity of the population's participation in the labor market. Unlike the first component, this dimension is not significantly influenced by economic performance variables, suggesting that labor force participation represents a distinct phenomenon, relatively independent of productivity levels or cost structures. This distinction highlights the fact that European economies can be differentiated not only by economic efficiency but also by their capacity to mobilize human resources.

The quality of the variables' representation within the model is confirmed by the communality values, which are high for all analyzed variables, ranging from 0.688 for the food price index to 0.934 for the economic activity rate (Table 6).

These results indicate that the two extracted components succeed in capturing a significant proportion of the variation in each variable, which contributes to the model's stability and interpretability. In particular, the economic activity rate is almost entirely explained by the second component, while the other variables are distributed mainly along the first dimension, reinforcing the dual interpretation of the identified structure.

**Table 6 Quality of variable representation**

| | Initial | Extraction |
|---|---|---|
| HICP | 1.000 | .688 |
| EmplActiv | 1.000 | .934 |
| LabourCost | 1.000 | .806 |
| LabourProd | 1.000 | .693 |
| Extraction Method: Principal Component Analysis. | | |

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

The correlations between variables also provide relevant information for interpreting the results. The negative relationship between labor costs and productivity suggests the existence of structural imbalances in certain economies, where rising costs are not accompanied by a proportional increase in efficiency. At the same time, the positive correlation between productivity and the food price index reflects differences in economic development among Member States, where higher levels of productivity are associated with more advanced economies and, implicitly, with higher price levels.

Overall, the results highlight the existence of two fundamental dimensions that structure the relationships among the analyzed variables. The first dimension is associated with economic performance and resource efficiency, being determined by the interaction between productivity, costs, and price levels. The second dimension reflects labor force participation and the ability of economies to integrate the working-age population into productive processes. The separation of these two dimensions suggests that economic performance and labor market participation are complementary yet distinct phenomena, each contributing differently to the characterization of European economies.

The results obtained are consistent with the directions highlighted in the literature, which emphasizes the role of prices and economic conditions in shaping food consumption. The association between the food price index and labor productivity can be interpreted in line with Gil et al. (1995), who showed that economic development is associated with changes and convergences in food consumption patterns within the European Union. At the same time, the importance of food prices in the structure of the first component confirms the observations made by Makutėnas et al. (2025) and the study on food demand in EU countries during an economic slowdown (2019), according to which access to food and consumption behavior are strongly influenced by price levels and general economic conditions. In the same vein, the results are consistent with Matějková et al. (2024), who highlight that food security at the European level is influenced by differences in income, prices, and the economic capacity of member states.

From a labor market perspective, the identification of a distinct component dominated by the economic activity rate supports the conclusions of studies that treat European labor markets as heterogeneous systems characterized by significant structural differences. The results are consistent with the perspective proposed by Kaba (2010), which shows that European countries can be differentiated based on labor market indicators, such as employment and unemployment. Furthermore, the role of productivity and labor costs in shaping the first component is consistent with approaches that use principal component analysis to examine the labor market and wage costs, such as Mirea and Aivaz (2016a; 2016b), as well as with Liu's (2022) study, which highlights the relevance of PCA in analyzing resource allocation in the labor market. Thus, the results of this study confirm the usefulness of the PCA method not only as a tool for dimensionality reduction but also as a means of identifying structural patterns relevant at the macroeconomic level, a point also emphasized by Mesa et al. (2018).

At the same time, the regional differences observed in the biplot can be discussed in relation to the literature highlighting the role of institutional, social, and economic factors in explaining differences among European countries. The persistence of cleavages between the economies of Northern and Western Europe, on the one hand, and the economies of Central, Eastern, or Southern Europe, on the other, is consistent with the idea that economic performance and labor market functioning are influenced by a broader framework of structural factors. In this regard, the results can be linked to Jula et al. (2025), who highlight the role of institutional and economic factors in explaining European socio-economic vulnerabilities. At the same time, studies on labor market integration (Teodorescu et al., 2025) and the transformations brought about by new technologies on the labor market (Aivaz et al., 2026) support the idea that the dynamics of employment and economic participation cannot be explained exclusively through direct economic indicators but must be understood within a broader framework that includes social, institutional, and technological factors.

To provide an adequate visual representation of the results, a biplot was created for the first two components, allowing for the simultaneous visualization of the countries' positions and the variables' contributions to the model's structure (Figure 1). This graphical representation facilitated the interpretation of differences among member states and allows for the identification of regional or structural patterns within the European Union.

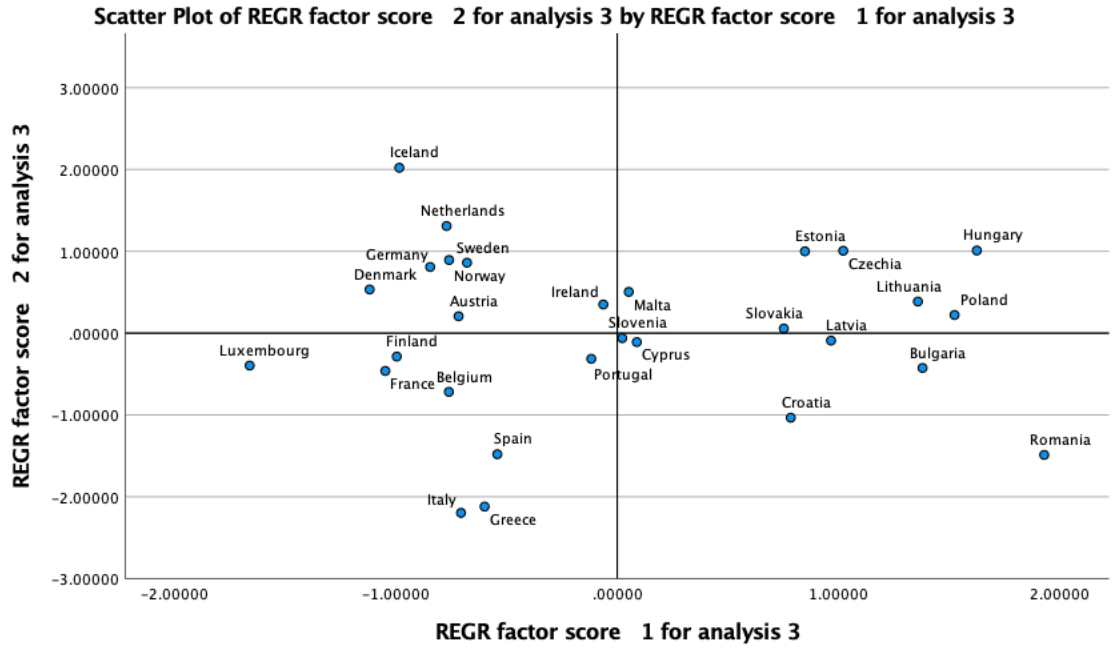


**Figure 1 Simultaneous visualization of countries' positions and the contribution of variables to the model's structure**

*Note: Author's own processing using IBM SPSS Statistics, version 28.*

The graphical interpretation of the distribution of countries within the plane defined by the first two principal components provides a concise overview of the structural differences among the economies of the European Union. The representation in the coordinate system formed by Component 1 and Component 2 allows for the identification of relatively clear geographical and economic patterns, in which the positioning of countries reflects the combination of economic efficiency and the intensity of labor market participation.

On the horizontal axis, corresponding to the first component, economies characterized by high levels of productivity and relatively efficient labor cost management are clearly distinguished. This area typically includes countries in Northern and Western Europe, such as Germany, the Netherlands, Sweden, Denmark, and Austria. These economies are characterized by a favorable balance between costs and outcomes, which allows them to sustain high levels of productivity despite relatively high labor costs in absolute terms. Their positioning on the positive side of the first component thus reflects a high degree of economic efficiency and a mature labor market structure.

In contrast, the negative side of the same axis is generally occupied by economies in Central and Eastern Europe, such as Romania, Bulgaria, Poland, or Hungary. These countries face, relatively speaking, a less favorable combination of productivity and labor costs, which is reflected in lower scores on the first component. Although labor costs are, in many cases, lower in absolute terms, the level of productivity does not always offset this advantage, suggesting the existence of structural constraints related to human capital, technology, or production organization. In this sense, the positioning of these countries indicates a different stage of economic development and lower efficiency in resource utilization.

The vertical axis, corresponding to the second component, differentiates economies based on the intensity of labor market participation. At the top of the graph are countries characterized by high rates of economic activity, reflecting better integration of the population into productive processes. Countries such as Sweden, the Netherlands, or Germany tend to be positioned in this area, benefiting from flexible labor markets and active employment policies that encourage participation.

At the bottom of the graph are countries where the economic activity rate is lower, such as Italy, Greece, or, in certain cases, Romania. This positioning indicates difficulties in mobilizing the labor force, which may be associated with factors such as population aging, migration, institutional rigidities, or lower participation rates among certain social groups. Thus, Component 2 captures significant differences in labor market functioning, independent of economic performance itself.

By combining the two dimensions, the graph allows for the identification of groups of countries with similar profiles. Economies in Northern and Western Europe tend to cluster in the upper-right quadrant, characterized by high economic efficiency and strong labor market participation. These represent the most structurally sound model. In contrast, Southern European economies are frequently found in the lower part of the chart, where lower levels of labor market participation are sometimes combined with moderate economic performance. Central and Eastern European countries tend to occupy intermediate positions or the left side of

the chart, reflecting lower levels of economic efficiency but, in some cases, relatively high labor force participation.

This distribution indicates the existence of distinct regional models within the European Union, determined by historical, institutional, and economic factors. At the same time, the relatively dispersed positioning of some countries indicates that these patterns are not rigid, with significant variations existing within each region.

Overall, the graphical representation of the principal components highlights the fact that differences among European economies can be understood through the lens of two fundamental dimensions: economic efficiency and labor market participation. This approach allows for an integrated interpretation of the relationships among the analyzed variables and provides a useful framework for identifying structural patterns at the regional level.

## 5.Conclusion

The application of principal component analysis to the selected indicators revealed the latent structure of the relationships between the economic factors of food consumption and labor market performance in the European Union for the year 2024. The results indicate that the analyzed variables do not act in isolation but are organized around fundamental dimensions that reflect structural differences between the economies of member states.

The first identified component synthesizes the relationship between labor productivity, labor costs, and food price levels, forming a dimension of economic efficiency. This highlights the fact that economies characterized by high productivity tend to be associated with higher price levels and a specific structure of labor costs, suggesting the existence of a balance between costs and outcomes. In this regard, the economic conditions of food consumption, reflected in price levels, are closely linked to overall economic performance, which confirms the interdependence between these two dimensions.

The second component is dominated by the economic activity rate and reflects the intensity of labor force participation in the labor market. This dimension highlights that the mobilization of human resources is a distinct factor from economic efficiency itself, suggesting that economies may exhibit different levels of labor market participation, independent of productive performance or cost structure.

The results highlight the existence of structural patterns at the European Union level, where more developed economies are characterized by high levels of productivity and prices, but also by better labor market integration, while less developed economies tend to exhibit less favorable combinations of these indicators. This distribution suggests the persistence of significant regional differences, driven by economic, institutional, and social factors.

From a methodological standpoint, the use of principal component analysis proved appropriate for the study's objective, allowing for the reduction of dimensionality and the identification of dimensions relevant to the interpretation of the analyzed phenomena. However, the moderate value of the KMO statistic indicates that the results should be interpreted with caution, as they are specific to an exploratory framework.

In relation to the literature, the results confirm the relevance of an integrated approach to food consumption and the labor market. Previous studies have highlighted separately the influence of income and prices on food consumption (Gil et al., 1995; Makutėnas et al., 2025; Matějková et al., 2024), as well as the importance of employment, productivity, and cost indicators in characterizing European labor markets (Kaba, 2010; Liu, 2022; Vancea et al., 2021). This study complements these contributions by integrating the two dimensions into a common analytical framework, highlighting that the economic factors of food consumption and labor market performance are connected through common structural dimensions. At the same time, the results support the utility of principal component analysis as an exploratory tool in comparative economic studies, in line with the observations made by Mesa et al. (2018).

Overall, the study highlights that the economic determinants of food consumption and labor market performance are interconnected through complex structural mechanisms, and understanding these relationships requires integrated approaches capable of simultaneously capturing multiple dimensions of economic development. The results provide a starting point for future analyses, which could expand the empirical framework by including additional variables or by using complementary econometric methods to further explore the identified relationships.

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