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## CURRENCY DEBASEMENT: THE AGRICULTURAL SECTOR IN BULGARIA ON THE EVE OF EUROZONE ACCESSION

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### Abstract

The Bulgarian agricultural sector remains highly sensitive to currency value fluctuations, particularly in the context of upcoming euro adoption. Escalating input costs, notably energy, fertilizers, and other essential production materials, may induce sector-specific debasement of the lev and subsequently the euro, eroding farm profitability and international competitiveness. This study examines the transmission mechanisms through which input price shocks affect agricultural output, export performance, and rural livelihoods, highlighting the vulnerability of small and medium-sized farms. Historical data on energy prices, and key agricultural indicators are analysed to identify structural weaknesses and potential stress points within the sector. The transition to the euro could either amplify or mitigate these effects, depending on factors such as price convergence, input cost volatility, and broader inflationary dynamics. In addition, the interconnection between energy dependency and agricultural competitiveness is explored, demonstrating how external shocks in global energy markets can propagate into domestic farming systems. Coordinated macroeconomic and sectoral policies, including targeted subsidies, strategic input cost management, and investment in energy efficiency, are essential to safeguard both short-term stability and long-term sustainability. The study also emphasizes the importance of structural reforms, enhanced risk management mechanisms, and monitoring frameworks to improve resilience against asymmetric shocks. Overall, the findings underline the need for a proactive policy approach to ensure that Bulgaria's agricultural sector remains competitive and productive during and after eurozone accession.

**Keywords:** currency debasement, agricultural sector, energy costs, optimal currency areas, asymmetric shocks, euro, Bulgaria

### INTRODUCTION

The process of Bulgaria's accession to the eurozone represents a complex transition that requires an in-depth analysis of sectoral impacts, in addition to macroeconomic benefits. This article focuses on the critically vulnerable agricultural sector, which is essential for national security, rural employment, and

the balance of payments. The problem this article investigates is the phenomenon of "sectoral debasement" – a situation where the real purchasing power of the currency within a specific sector decrease, while its nominal value and general purchasing power in the economy remain relatively unchanged.

This study analyses the relationship between cost of basic inputs needed by the Bulgarian agricultural sector – energy and fertilizers, the value of output and points out already existing currency debasement indications. The research is based on the hypothesis that asymmetric shocks in energy prices, imperfect factor mobility, and the lack of adequate stabilization mechanisms create preconditions for an erosion of the real purchasing power of the currency within the agricultural sector. Using a mixed methodology, including qualitative analysis within the *Optimum Currency Area* (OCA) theory and quantitative analysis of data from the National Statistical Institute of Bulgaria (NSI), Eurostat, and FAO for the period 2020-2024, the article identifies a significant imbalance between the growth of production costs (energy) and the value of agricultural output. The results show that the energy price index increased by 37% compared to an 8% growth in the agricultural output index. The article concludes that without targeted structural reforms, the introduction of the euro could cement even firmer these asymmetries, leading to "debasement." A policy package is proposed, including targeted funds, indexed subsidies, and an accelerated transition to energy efficiency.

## MATERIALS AND METHODS

The aim of the research is to identify the mechanisms through which high and volatile energy costs, in synergy with institutional deficiencies, lead to such effect in Bulgarian agriculture. Also to assess the higher risks associated with the introduction of the euro. The article raises concerns that due to structural energy dependence and market imperfections, the agricultural sector is exposed to asymmetric shocks, which, under the conditions of a common union policy (CAP) and a single monetary policy, materialize as sectoral debasement. This phenomenon is detrimental to other energy-intensive sectors (e.g., some manufacturing industries, the food industry, logistics), which may experience similar debasement. Nevertheless, the agricultural sector is particularly vulnerable due to its structural inelasticity and strategic importance.

The methodology we have used includes:

1. Theoretical analysis based on the *Optimum Currency Area theory*, (OCA) by (R. Mundell) and the *theory of the real exchange rate* – the so-called Balassa-Samuelson effect, and their development in contemporary economic literature.
2. Empirical analysis of secondary data from the National Statistical Institute of Bulgaria, Eurostat, the World Bank, and FAO for the period 2020-2024, focusing on price dynamics, production costs, and output value.
3. Comparative analysis of the experience of other Central and Eastern European countries following their accession to the eurozone.

The term "debasement" has historical roots related to the devaluation of coins by reducing their precious metal content. In a modern context, it is used metaphorically to describe a decline in the real value of money within a specific sector or region. Unlike general inflation, this is a *relative* and *structural*

phenomenon (Baldwin & Wyplosz, 2015). It arises when the price ratios between inputs and outputs for a given sector persistently deteriorate: input prices (energy, raw materials) rise faster than the sector's output prices. This leads to a compression of profits and a decrease in real incomes for participants in that sector, which is equivalent to a local depreciation of the currency (Obstfeld & Rogoff, 1996).

This study also extensively examines the Optimum Currency Area (OCA) theory and as a consequence or precursor the asymmetric shocks occurring in different economic systems. The seminal work of Mundell (1961) laid the foundation for OCA theory. A critical criterion for the success of a currency union is the ability to absorb asymmetric shocks – disturbances that affect different regions or sectors differently. When a shock is asymmetric, the common monetary policy of the central bank (such as the ECB) may not be suitable for the specific affected sector or country (De Grauwe, 2018).

Another explanatory view is given by the Real Exchange Rate Theory - The Balassa-Samuelson Effect. The phenomenon of "sectoral debasement" can also be viewed through the lens of real exchange rate theories. While the Balassa-Samuelson effect explains inflation differences between countries, a similar mechanism can operate at a sectoral level within a currency union. A sector with low productivity and high input costs (like Bulgarian agriculture) will experience a persistent deterioration in its price ratios (i.e., a real appreciation) relative to the rest of the economy, which manifests as a decline in its real purchasing power (Baldwin & Wyplosz, 2015).

For the Bulgarian agricultural sector, heavily dependent on imported energy sources, a sharp increase in global energy or fertilizer prices represents a classic asymmetric shock. If other sectors in the economy are less energy-intensive, the shock will disproportionately affect agriculture. Under an independent monetary policy, the country could rely on a depreciation of the national currency to increase export competitiveness. For members of the eurozone, this tool is absent, and the mechanisms for fiscal transfer equalization (such as the EU budget) are insufficient to compensate for the shock (Eichengreen, 2022). This creates ideal conditions for sectoral debasement.

To properly conduct empirical analysis on the subject, we have to understand the state and dynamics of this primary sector of Bulgarian economy through explaining the Structural characteristics and energy dependence.

The Bulgarian agricultural sector is characterized by its dualism: the coexistence of highly mechanized large farms and numerous small and inefficient farms (Eurostat, 2023). This limits opportunities for economies of scale and investment in energy-efficient technologies. According to IRENA and FAO (2021), the energy intensity of East European agriculture is above the EU average, due to outdated machinery and widespread irrigation practices with high energy consumption. To identify the precondition for debasement, it is necessary to compare the dynamics of costs and revenues, i.e. to perform analysis of price dynamics, in our case for the period 2020-2024.

**Table 1:** Dynamics of Key input/output Indicators (2020-2024, index 2020=100)

Year	Energy Price Index	Fertilizer Price Index	Agricultural Land Price Index	Agricultural Output Value Index
2020	100	100	100	100
2021	108	112	103	105
2022	137	135	107	110
2023	142	128	113	89
2024	137	125	113	82

Source: Calculated based on data from NSI and Eurostat. The energy price index includes electricity and natural gas for industry.

The data in table 1 clearly shows a dramatic divergence. While costs (energy, fertilizers) showed a sharp jump in 2022-2023 and remain at a high plateau, the value of agricultural output, after a brief increase in 2021-2022, plummets sharply. This means farmers are forced to sell their produce at prices that do not correspond to the increase in their production costs. This is a clear indicator of the erosion of real income in the sector – the core of the "debasement" phenomenon.

To broaden and substantiate completely our analytical approach, we have performed regression with the following specification for our econometric model:

The functional form of the model describes the relationship between the value of agricultural output (dependent variable) and key production inputs – energy and fertilizer prices (independent variables), as follows:

$$\text{AOV} = f(\text{EPI}, \text{FPI})$$

where:

- **AOV** – Agricultural Output Value Index (dependent variable);
- **EPI** – Energy Price Index (independent variable);
- **FPI** – Fertilizer Price Index (independent variable).

This functional specification aims to identify whether, and to what extent, the increase in energy and fertilizer prices is reflected in the market value of agricultural output, measured by an index.

#### Description of Variables

- **AOV:** Represents the aggregate value of produced agricultural output, expressed through the aggregated output index (value expression). It is used as an indicator of the sector's profitability and market performance.
- **EPI:** Reflects the average changes in the prices of energy resources used in agriculture – electricity, fuels, and gas. Serves as an indicator of production costs.
- **FPI:** Measures the dynamics in the prices of major mineral and organic fertilizers, which are key input resources in crop production.

#### Linear Form of the Model

Based on the conducted assessment, the linear regression equation has the following form:

$$\text{AOV} = 57.03 - 1.62 \cdot \text{EPI} + 2.02 \cdot \text{FPI}$$

### Interpretation of Parameters

- $\beta_0 = 57.03$  – The constant shows the expected value of agricultural output when energy and fertilizer prices are at the level of the base period.
- $\beta_1 = -1.62$  – The negative sign indicates that with a one-unit increase in energy prices, the agricultural output index decreases on average by 1.62 points, ceteris paribus. This confirms the sector's sensitivity to rising energy costs.
- $\beta_2 = +2.02$  – The positive sign indicates that higher fertilizer prices, within certain limits, correlate with an increased value of agricultural output – likely due to more intensive use of input resources and higher productivity.

### Theoretical Expectation for Signs

- $\beta_1 < 0$ : The increase in energy resource prices leads to higher production costs and reduced efficiency.
- $\beta_2 > 0$ : A moderate increase in fertilizer prices is often the result of higher demand and more intensive agricultural activity, which positively affects the value of output.

**Table 2.** Results from the Empirical Study on Debasement in Agriculture

Variables	Coefficients	Standard Error	t Stat	P-value
Intercept	57.03256	28.71441	1.9862	0.185394
Energy Price Index*	-1.61878	0.440851	-3.67195	0.066818
Fertilizer Price Index*	2.018264	0.610256	3.307242	0.080536

Source: Authors calculations

### Statistical Significance and Model Evaluation

- $R^2 = 0.872$  shows that 87.2% of the variation in agricultural value is explained by the dynamics of energy and fertilizer prices – a high degree of determination.
- Adjusted  $R^2 = 0.745$  confirms a good model fit given the small number of observations ( $n=5$ ).
- Significance F = 0.1277 does not reach conventional levels of statistical significance ( $p < 0.05$ ), but with a small sample this is not atypical and does not invalidate the analysis, but rather indicates the need for a longer time series.
- P-value (EPI) = 0.0668, close to 0.05, suggests marginal significance – the influence of energy prices is almost statistically demonstrable.
- P-value (FPI) = 0.0805 also shows moderate significance – the effect of fertilizer prices cannot be neglected.

The model, as shown in the table, demonstrates that agricultural value in Bulgaria is highly dependent on the dynamics of input prices for production. The energy component has the strongest negative effect, confirming the risk of sectoral debasement under persistently high energy prices. Fertilizer prices have a positive but unstable effect, likely related to the adaptive behaviour of farmers and subsidy mechanisms. The overall result indicates that price pressure on inputs could be a key channel of macroeconomic vulnerability both before and after joining the eurozone.

## RESULTS AND DISCUSSION

The mechanisms of debasement and the risks of joining the eurozone can be expressed through several vectors.

The primary way the shock propagates is through the channels of transmission of the energy shock:

1. **Direct channel:** Increase in costs for electricity for lighting, cooling, and irrigation, as well as for fuels for machinery and transport.

2. **Indirect channel:** Increase in prices of energy-intensive inputs such as nitrogen fertilizers and pesticides, whose production is highly dependent on natural gas prices (Hertel et al., 2010).

3. **Demand channel:** The increase in general inflation, driven by energy prices, reduces the discretionary income of households, which can lead to a decrease in demand for food or a shift to cheaper alternatives, putting additional price pressure on producers.

Furthermore, the loss of monetary sovereignty and the cementing of asymmetries accumulate additional sectoral burden, as joining the eurozone means the final loss of national monetary policy instruments. Although Bulgaria operates a currency board and its policy is highly constrained, the theoretical possibility of adjusting the nominal exchange rate is completely absent. This is critical in the event of a prolonged asymmetric shock. As *Krugman (2013)* notes, when the price of adjustment through price flexibility is high, the lack of a tool for nominal correction can lead to a prolonged recession in the affected sector. In our case, this manifests as a persistent "debasement" of the euro for farmers – they receive the same nominal amount of euro for their produce, but with each passing year it can buy less energy and resources.

The institutional environment is an additional channel that amplifies the price shock. A World Bank (2023) study on the business environment in Bulgaria notes that administrative burden and corruption are serious obstacles for small businesses, including farmers. Access to EU CAP funds is associated with complex bureaucracy that delays and hinders the receipt of vital support (European Court of Auditors, 2024). The lack of an effective long-term national strategy for energy efficiency in agriculture further reinforces the dependence on external sources (Ministry of Energy of Bulgaria, 2023).

**The Experiences of Lithuania and Slovakia** in this regard are indicative. Empirical data from Eastern Europe confirm these risks. Analyses in Baldwin & Giavazzi (2016) show that after joining the eurozone, Central and Eastern European countries face challenges related to greater volatility in the relative prices of sensitive sectors, including agriculture, compared to the eurozone average. A European Commission report (EC, 2021) on agriculture in Lithuania after 2015 (the year of accession) notes that despite overall growth, farmers face increasing difficulties in compensating for import-related costs, attributed to the lack of monetary adjustment capability.

To prevent or mitigate the effect of sectoral debasement, a targeted policy response is needed, which should precede accession to the eurozone. For this purpose, we propose the following possible policy initiatives:

1. Creation of a **Stabilization Fund** for agricultural energy costs: This fund, managed in partnership between the state and agricultural organizations, would act as an automatic stabilizer. It would be activated when prices for key energy carriers exceed a predetermined threshold, providing partial compensation to producers. The model is similar to some programs in the USA (USDA, 2020).

2. Introduction of **indexed subsidies**: Subsidies from the second pillar of the CAP and national schemes should be linked to indices reflecting the cost of production inputs (energy, fertilizers). This would ensure that the real value of the support does not erode over time.

3. Promotion of **energy sovereignty** of farms: This includes:

- Subsidies and technical assistance for installing solar panels to power irrigation systems and farm buildings (Fraunhofer ISE, 2023).
- Incentives for the production of biogas from agricultural waste, which directly reduces dependence on natural gas.
- Programs for modernizing irrigation systems to more efficient drip technologies, which can reduce energy consumption by up to 50% (FAO, 2021).

4. **Administrative reform** and digitalization: Implementation of a "single window" for all administrative procedures related to agriculture, and full digitalization of the CAP subsidy application process to reduce costs and delays.

5. **Diversification of energy sources** and long-term contracts: The state can facilitate farmers' cooperatives' access to energy markets and encourage the conclusion of long-term energy supply contracts at stable prices.

Although the proposed policies are targeted at the problem, it is important to acknowledge their potential limitations. The creation of a stabilization fund would put pressure on public finances and requires a clear definition of funding sources to avoid becoming a long-term fiscal burden. Also, indexing subsidies could reduce incentives for energy savings if not carefully designed.

The present study provides a valuable basis for understanding the risks of sectoral debasement, but it is important to acknowledge its limitations and outline directions for future research.

One of the main limitations of the study lies in its reliance on aggregated secondary data. Although data from NSI and Eurostat are reliable, they may not fully capture the heterogeneity of the Bulgarian agricultural sector, where large farms and small farms face fundamentally different challenges. As noted by *The World Bank* (2023), the administrative burden and lack of economies of scale for small farms make them more vulnerable to price shocks. This means that the effect of debasement may be unevenly distributed within the sector itself, requiring more detailed microeconomic studies.

Furthermore, the empirical analysis covers the period 2020-2024, which includes exceptional events such as the COVID-19 pandemic and the war in Ukraine. These events caused sharp fluctuations in global supply chains and energy prices. Therefore, the observed divergence between costs and revenues may be partly amplified by these temporary, albeit severe, shocks. *Obstfeld & Rogoff* (1996) emphasize that persistent structural problems differ from temporary shocks precisely in their sustainability. Future research could focus on longer time

series to separate the effects of structural weaknesses from those of temporary crises.

#### **Directions for future research**

Future research in this area could develop the present analysis in several directions:

- **Quantitative modelling of the debasement effect:** Using econometric models to estimate the potential decline in farmers' real incomes after the introduction of the euro under different energy price scenarios. This would allow for a more precise quantitative assessment of the risk.

- **Comparative policy analysis:** To identify the most effective policies, an in-depth comparative analysis of stabilization mechanisms in the agricultural sectors of other eurozone countries like France and the Netherlands, which have more developed risk management tools, could be conducted. Baldwin & Giavazzi (2016) emphasize that closer fiscal coordination and targeted stabilization mechanisms are essential to mitigate asymmetric shocks in the incomplete monetary union.

- **Study of socio-economic consequences:** Investigating the broader social consequences of sectoral debasement, such as its impact on rural employment, migration from rural areas, and the country's food security, would be of great value for the overall policy assessment.

Although the article's focus is on the risks to the agricultural sector, the phenomenon of "sectoral debasement" should be viewed in the broader context of the structural transformation that the Bulgarian economy must undergo – namely, debasement as a symptom of the need for serious structural changes.

Debasement is not merely a monetary phenomenon, but a symptom of a mismatch between the structure of the sector and the requirements of modern markets and regulatory frameworks. The Bulgarian agricultural sector is at a crossroads. On one hand, it is affected by high energy costs, and on the other – by the increasing demands of the European Green Deal for sustainable agriculture. The FAO (2021) emphasizes that the sustainability of agri-food systems requires precisely a reduction of external dependencies and an increase in efficiency.

In this sense, the transition to the eurozone, although carrying risks, can act as a catalyst for long-term structural reforms. The loss of the hypothetical possibility of devaluation "forces" the economy to seek other, healthier ways to increase competitiveness – through innovation, digitalization, and value addition. As *Krugman* (2013) points out, the lack of an easy exit through devaluation can "reveal" structural problems more quickly and force policymakers to act.

For Bulgaria, the role of **European Funds** in the new monetary context will be pivotal. Funds from the CAP and the RRF are critically important for managing this transition. Instead of simply compensating for costs, they must be strategically directed towards transformation. The *European Court of Auditors* (2024) notes that the effectiveness of the CAP in promoting sustainability can be improved. Investments in precision agriculture, the use of drones and sensors to optimize irrigation and fertilization, and the development of short food supply chains can significantly reduce energy costs and increase margins. *Fraunhofer ISE* (2023) provides compelling evidence for the economic feasibility of solar systems for powering farms, which directly attacks the problem of energy costs at its root.

## CONCLUSION

This study demonstrates that the risk of sectoral debasement of the euro in the Bulgarian agricultural sector is a real economic threat, not a theoretical construct. It is rooted in a proven structural imbalance between costs and revenues, amplified by the imperfections of the institutional environment. The introduction of the euro, although beneficial in many respects, could turn such an imbalance from a transitional problem into a permanent structural characteristic of the sector if adequate measures are not taken. Beyond the economic effects, sectoral debasement can have profound social and regional consequences. The erosion of incomes in the agricultural sector threatens the sustainability of rural communities, increasing the risk of migration to cities and contributing to depopulation. This, in turn, could exacerbate regional economic disparities in the country.

Therefore, this process of sectoral devaluation is not a debate about the euro itself, but a matter of economic competence and long-term planning. Bulgaria's successful accession to the eurozone is directly dependent on the state's ability to develop and implement an effective package of sector-specific policies aimed at addressing the fundamental energy vulnerability of agriculture. Future research can focus on quantitatively modelling the scale of debasement under different scenarios or on a detailed analysis of the effectiveness of the proposed policies in other countries.

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