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The Phillips Curve in Bulgaria: Is the Trade-Off between Inflation and Unemployment Possible?

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Abstract

The objective of this paper was to estimate the inflation-unemployment nexus and the opportunities for inflation-unemployment trade-off in Bulgaria. An ordinary least squares (OLS) regression of annual time series data for the period 2003-2022 was employed to test the Phillips curve hypothesis for Bulgaria. The results from the empirical analysis showed that: (i) a negative relationship (both linear and non-linear) exists between inflation and unemployment in Bulgaria; (ii) Bulgarian policy makers can decrease inflation by three percent at the cost of one percent increase in unemployment by implementing restrictive macroeconomic policies.

Keywords: Bulgaria, Inflation, Unemployment, Phillips curve.

JEL: E24, E31, J64

1. INTRODUCTION

In times of rising prices, harnessing inflation by macroeconomic restrictions may result in higher unemployment, therefore the nexus between inflation and unemployment a matter of utmost importance to policymakers. The Bulgarian currency board arrangement is a monetary system that was implemented in 1997 to stabilize the country's economy and bring about monetary discipline (Todorov et al., 2019). The Bulgarian lev (BGN) is pegged to the euro at a fixed exchange rate of 1.95583 BGN per euro. It remains constant and is guaranteed by the currency board arrangement. This stability helps promote confidence in the currency and facilitates trade and investment.

The Bulgarian currency board operates with full coverage, which means that the monetary base (the sum of currency in circulation and commercial bank reserves) is fully backed by foreign currency reserves. The currency board holds foreign exchange reserves in the same amount as the lev in circulation and commercial banks' reserve requirements. The currency board arrangement restricts the ability of the central bank to expand the money supply. The supply of lev in circulation can only increase if there is a corresponding increase in foreign exchange reserves. This mechanism helps to control inflation and maintain the stability of the currency.

The Bulgarian lev is fully convertible at the fixed exchange rate. Individuals and businesses

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can freely exchange levs for Euros or vice versa at any time. The currency board ensures the availability of foreign currency reserves to guarantee the convertibility of the lev. The currency board arrangement in Bulgaria is an independent institution separate from the central bank. It has a mandate to maintain the fixed exchange rate and ensure the stability of the currency. This independence helps to ensure the credibility and effectiveness of the arrangement. Under a CBA, the Bulgarian National Bank is deprived of two traditional monetary tools - the open market operations and the base interest rate, but can still use the minimum reserve requirements. As to the fiscal policy, its main instrument under a CBA is the fiscal reserve of the government (Todorov et al., 2020).

The object of the study is the nexus between inflation and unemployment in Bulgaria over the period 2003-2022. The subject of the study are the options for inflation-unemployment trade-off in Bulgaria.

The goal of this research was to investigate the inflation-unemployment relationship and the possibilities for inflation-unemployment substitution in Bulgaria. The objective of the study was achieved by fulfilling the following tasks:

- Systematize the theoretical views on the nexus between inflation and unemployment (section 1);
- Review the empirical studies on the inflation-unemployment relationship in Bulgaria (section 2);
- Outline the specificities of Bulgarian macroeconomic instruments under a currency board arrangement (section 3);
- Empirically analyze the nexus between inflation and unemployment in Bulgaria (section 4);
- Make recommendations on macroeconomic policies for taming inflation on the basis of the empirical results (conclusion).

The research methodology included an ordinary least squares (OLS) approach and yearly time series data for the period 2003-2022.

This research has important implications for academics, business circles and policy makers in Bulgaria since the studies on the Phillips curve for Bulgaria are few. It contributes to the existing literature by shedding additional light on the relationship between inflation and unemployment in Bulgaria and by making recommendations for inflation-unemployment trade-off during times of high inflationary pressures.

2. LITERATURE REVIEW

The Phillips curve is a theoretical concept in economics that explores the relationship between the rate of change in nominal wages and the rate of unemployment (original Phillips curve) or the nexus between the rate of inflation and the rate of unemployment (modified Phillips curve). It suggests an inverse relationship between these two variables, implying that as one increases, the other decreases. However, the interpretation and empirical evidence regarding the Phillips curve have evolved over time. Here, the different theoretical views on the relationship between inflation and unemployment as depicted by the Phillips curve will be outlined.

2.1. Theoretical studies on the Phillips Curve

The traditional Phillips curve, proposed by Phillips (1958), posits an inverse relationship between inflation and unemployment. According to this view, when unemployment is high, there is downward pressure on

wages, leading to lower production costs and ultimately lower inflation. Conversely, as the economy approaches full employment, the competition for labor increases, leading to wage pressures and higher inflation. This relationship is depicted as a downward-sloping curve (Tobin, 1972; Stiglitz, 1974; Akerlof & Dickens, 1982).

The expectations-augmented Phillips curve emerged in the 1970s and incorporates the role of inflation expectations (Phelps, 1967; Lucas, 1972; Fischer, 1977; Gordon, 1988). It recognizes that people's expectations of future inflation can influence their behavior in wage negotiations and price-setting. If individuals and firms expect higher inflation, they may demand higher wages and set higher prices, leading to an upward shift of the Phillips curve. Consequently, this view suggests that the Phillips curve is not a stable, long-run relationship.

The concept of the Non-Accelerating Inflation Rate of Unemployment (NAIRU) became prominent in the 1970s and 1980s. It suggests that there is a specific level of unemployment, known as the NAIRU, at which inflation remains stable. The NAIRU represents the lowest sustainable rate of unemployment that does not lead to accelerating inflation. When actual unemployment falls below the NAIRU, inflation tends to rise. Conversely, if unemployment exceeds the NAIRU, inflationary pressures diminish (Tobin, 1972; Stiglitz, 1974; Akerlof & Dickens, 1982; Calvo, 1983; Taylor, 1980).

The terms NAIRU (Non-Accelerating Inflation Rate of Unemployment) and NRU (Natural Rate of Unemployment) are related concepts in economics that describe different aspects of the unemployment-inflation relationship. While they are often used interchangeably, there is a subtle distinction between the two:

- The Natural Rate of Unemployment (NRU) refers to the level of unemployment that prevails in an economy when it is operating at its potential output or the long-run equilibrium. It represents the unemployment rate that occurs when labor markets are in a state of balance, with all available job vacancies being filled and workers moving between jobs or entering the labor force in search of employment. The NRU is influenced by structural factors such as labor market institutions, demographics, and technological changes. It is considered a stable rate of unemployment that is not affected by short-term fluctuations in the business cycle (Phelps, 1967 and 1968; Friedman, 1968).
- The Non-Accelerating Inflation Rate of Unemployment (NAIRU) is a concept that builds upon the NRU but incorporates the relationship between unemployment and inflation. It represents the lowest sustainable rate of unemployment that does not lead to accelerating inflation. When the actual unemployment rate falls below the NAIRU, labor markets become tight, leading to upward pressure on wages and subsequently higher inflation. Conversely, if unemployment exceeds the NAIRU, it is believed that there is slack in the labor market, reducing wage pressures and dampening inflationary pressures. The NAIRU takes into account the idea that inflation can be influenced by labor market conditions and the degree of slack in the economy (Tobin, 1972; Stiglitz, 1974; Akerlof & Dickens, 1982; Calvo, 1983; Taylor, 1980). The NAIRU analysis could be inaccurate and problematic in case of hysteresis (Velev, 2014).

The advent of rational expectations in the 1970s led to a re-evaluation of the Phillips curve. Economists argued that if individuals have rational expectations and understand the structure of the economy, they would anticipate policy changes and adjust their behavior accordingly. In this view, any trade-off between inflation and unemployment would be temporary and quickly eliminated as individuals adapt their expectations. As a result, the Phillips curve could become vertical in the long run, indicating that changes in aggregate demand only affect prices, not unemployment.

The NRU represents the natural or equilibrium rate of unemployment in an economy, unaffected by short-term economic fluctuations. On the other hand, the NAIRU incorporates the inflation-unemployment relationship, indicating the lowest unemployment rate that can be sustained without causing accelerating inflation. While related, these concepts provide different perspectives on the long-run and short-run dynamics of the labor market and its impact on inflation.

The New Keynesian perspective incorporates sticky prices and nominal rigidities into the Phillips curve analysis. It suggests that even with rational expectations, the presence of price and wage rigidities can generate short-run trade-offs between inflation and unemployment. In this view, changes in aggregate demand can lead to temporary deviations from the NAIRU and create a downward-sloping Phillips curve in the short run. Over time, however, expectations adjust, and the curve becomes steeper (Blanchard & Summers, 1986; Mankiw & Reis, 2002; Smith, Timmermann & Wright, 2023; Blanchard & Galí, 2007; Calvo, 1983; Taylor, 1980; Woodford, 2003; Rudd & Whelan, 2005; Gali, Gertler & Lopez-Salido, 2005; Rudd & Whelan, 2007; Nason & Smith, 2008).

Several equations are commonly used for estimating the Phillips curve, which represents the relationship between inflation and unemployment. Here is a list of equations that are frequently employed for estimating the Phillips curve.

In its simplest form, the traditional Phillips curve equation assumes a linear relationship between the inflation rate (π) and the unemployment rate (u). Here, π* represents the expected inflation rate, u* is the natural rate of unemployment or NAIRU, and α is a coefficient that measures the sensitivity of inflation to deviations from the natural rate (Phillips, 1958; Tobin, 1972; Stiglitz, 1974; Akerlof & Dickens, 1982):

$$\pi = \pi^* - \alpha(u - u^*) \quad (1)$$

The New Keynesian Phillips Curve incorporates the concept of inflation expectations (πe) and output gap (y), which represents the difference between actual output (Y) and potential output (Y*). Here, α measures the sensitivity of inflation to the output gap, and ε represents other factors influencing inflation not captured by the equation (Mankiw & Reis, 2002; Smith, Timmermann & Wright, 2023; Blanchard & Galí, 2007; Woodford, 2003; Rudd & Whelan, 2005; Gali, Gertler & Lopez-Salido, 2005; Rudd & Whelan, 2007; Nason & Smith, 2008):

$$\pi = \pi e + \alpha(y - y^*) + \varepsilon \quad (2)$$

The hybrid Phillips curve combines elements of both the traditional and New Keynesian Phillips curves, incorporating lagged inflation (π(t-1)) and an error-correction term (EC). The error-correction term captures the adjustment process and the speed at which inflation converges to its long-run level

(Blanchard & Summers, 1986; Calvo, 1983; Taylor, 1980):

$$\pi = \beta\pi(t-1) + \gamma(u - u^*) + EC \quad (3)$$

The expectations-augmented Phillips curve incorporates inflation expectations (πe) to capture the forward-looking behavior of economic agents. Here, β measures the responsiveness of inflation to expected inflation (Phelps, 1967; Lucas, 1972; Fischer, 1977; Gordon, 1972):

$$\pi = \beta\pi e + \gamma(u - u^*) \quad (4)$$

The parameter γ in Equations (3) and (4) indicates the impact of cyclical unemployment on inflation.

Some empirical studies employ a time-varying Phillips curve equation that allows for changes in the relationship between inflation and unemployment over time. This may involve incorporating additional variables, such as oil prices, exchange rates, or monetary policy indicators, to capture specific economic dynamics (Stock & Watson, 1999; Nakamura & Steinsson, 2008; Primiceri, 2009; Cecchetti & Debelle, 2006; Gali & Gambetti, 2009). It should also be borne in mind that sometimes the nexus between inflation and unemployment could be broken (Jeliazkova, 2010) and the Phillips curve should also account for productivity changes (Leonidov, 2003).

Using a New Keynesian Phillips curve, Crump et al. (2024) found out a fast and resilient rise in the natural rate of unemployment as a result of the COVID-19 pandemic and outlined its consequences for inflation dynamics. According to Haschka (2024), the relationship between inflation and unemployment has weakened since the 1980s and especially during the Covid-19 pandemic due to forces of globalization and better anchored inflation expectations resulting from more credible monetary policy. Conrad (2023) showed that inflation lowered unemployment in the short run, thus proving the Phillips hypothesis. As evidenced by Meraj and Shaikh (2024), Pakistan experienced a stable Phillips Curve from 1991 to 2019 contributing to understanding the inflation movements in the country. Rolin (2024) demonstrated the congruence of the inequality-augmented Phillips curve with the post-Keynesian standpoints. Krulicky et al. (2022) ascertained that the short-run Phillips curve for the Czech Republic did not match the original Phillips curve for the period of 2000-2022, and forecast a stronger nexus between inflation and unemployment in the future.

To summarize, the Phillips curve relationship is subject to various factors, such as supply shocks, structural changes in the economy, and shifts in inflation expectations. The theoretical views mentioned here provide a broad overview of the different perspectives on the relationship between inflation and unemployment, as depicted by the Phillips curve. However, it is worth mentioning that the empirical validity of the Phillips curve has been debated, and its predictive power has diminished in recent decades. The actual functional form of the Phillips curve may vary across studies, and researchers may employ different specifications based on their specific research questions and data availability. The equations provided here represent common forms used in empirical estimation but are not an exhaustive list.

2.2. Empirical Studies on the Phillips Curve for Bulgaria

Ovchinnikov (2014) found a statistically significant negative relationship between inflation and unemployment in Bulgaria,

consistent with the classic Phillips curve. The effect appeared with a four-month delay and was realized within the same period. The author examined the main theoretical concepts and econometric models describing dependence. The stages in modeling with transfer functions were outlined and a statistical analysis was carried out based on monthly data on inflation and unemployment in Bulgaria in the period January 2000 - July 2014. Within the analysis, a significant seasonal component was found - both in inflation and unemployment. After eliminating seasonality, a weak but statistically significant negative relationship between inflation and unemployment was highlighted, which is consistent with the hypotheses laid down in the classical Phillips curve. Changes in the unemployment rate lead to changes in the opposite direction of the inflation indicator. The effect appears with a delay of four months after the change in the unemployment rate, and is realized within four months.

Smith, Timmermann & Wright (2023) and Zivkovic (2023) observed a weak negative correlation between inflation and unemployment in Bulgaria. They also identified a break in the Phillips curve in 2009, leading to a flatter relationship between the two variables. The authors re-examined time variation in the Phillips curve by applying new Bayesian panel methods with breakpoints to disaggregated US and European Union data. Their approach allowed them to accurately estimate both the number and timing of discontinuities in the Phillips curve. They also concluded about the existence of clusters of industries, cities or countries whose Phillips curves show similar patterns of volatility. The authors ascertained evidence of a marked flattening in the Phillips curves for US sectoral data and among EU countries, especially the poorer ones. In contrast, the evidence for smoothing is weaker for MSA-level data and for the Phillips wage curve. The authors also inferred that US regional data and EU data point to an inflection in the Phillips price curve that remains relatively steep when the economy is hot.

Tsanov (1999) found that the interaction between unemployment and inflation in Bulgaria during 1991-1997 did not conform to a standard Phillips curve. The absence of a clear trade-off between inflation and unemployment suggested weak market mechanisms, with inflation primarily driven by cost factors. In the research, an attempt was made to evaluate and analyze the connections and interactions between the main elements and flows of the labor market in Bulgaria in the 1990s in their mutual dependence and conditioning. To achieve this purpose, the toolkit of econometric modeling and specifically co-integration analysis and the approach of modeling from the general to the particular were used. The statistical properties of the indicators were investigated and the possibilities for their modeling were analyzed. Econometric models describing the long-term and short-term dynamics of employment, vacancies, the matching of labor supply and demand, wages and prices were specified and empirically evaluated. A simultaneous short-term model of the labor market in Bulgaria was developed, which took into account adaptability to long-term equilibrium and represented a system of interdependent equations. An analysis of the properties and possibilities of the model for the analysis and simulation of labor policies was made.

Velev (2015) examined the causal and quantitative relationships between the unemployment rate and the inflation rate in Bulgaria. Statistical analysis of the relationship

between the two economic variables using monthly and annual data was implemented. A comparison of the results obtained for Bulgaria and the European Union (28 countries) was made. The equilibrium unemployment rate (NAIRU1) was estimated for the periods 2000-2013 (annual data) and January 2000-March 2014 (monthly data).

Velev (2018) concluded that the equilibrium level of unemployment in Bulgaria in 2000-2017 fluctuated around and above 6%. With a decrease in the unemployment rate by 1 percentage point from 6.2% to 5.2%, the inflation rate increased significantly - by 3.1 percentage points (from 6.0% to 9.1%). As unemployment rose from 6.2% to 7.2%, inflation fell by 2.1 percentage points (from 6.0% to 3.9%).

Kasabov et al. (2017) ascertained that core inflation in Bulgaria is stable and influenced by supply-side disturbances such as changes in prices of energy and raw materials. Although inflation is not highly responsive to economic slowdown, fluctuations in the output gap affect inflation dynamics. The authors evaluated the Phillips curve relationship for the Bulgarian economy in a setting that accounted for the simultaneous interaction between inflation, output, and unemployment. Using a state space model with Bayesian methods on quarterly data from 1999 to 2015, they found out the cyclical development of unemployment and output and identified the main drivers of inflation over the period.

Conclusions from different studies on the Phillips curve in Bulgaria revealed various findings. Ganchev, Nikolov & Avramov (2010) suggested that the Bulgarian Phillips curve had a non-linear nature, while still aligning with neoclassical views in the long run. They also concluded that anti-inflation policies aimed at fulfilling the Maastricht criteria should not have negative long-term employment consequences. However, short-term negative effects on unemployment may occur with restrictive monetary and fiscal policies.

The empirical investigations on the Phillips curve for Bulgaria are grouped by their conclusions in Table 1.

Table 1. Empirical Studies on the Phillips Curve in Bulgaria

Study	Conclusion
Ganchev, Nikolov & Avramov (2010)	Bulgarian Phillips curve had a non-linear nature, approaching neoclassical views in the long-run. Anti-inflation policies aligned with Maastricht criteria had no negative long-term employment consequences. Short-term negative effects on unemployment were possible with restrictive monetary and fiscal policies.
Ovchinnikov (2014)	There was a statistically significant negative relationship between inflation and unemployment, consistent with classic curve. Effect appeared with a four-month delay and was realized within four months.
Smith, Timmermann & Wright (2023)	Weak negative correlation between inflation and unemployment in Bulgaria. A break in the Phillips curve occurred in 2009, making it flatter.
Zivkovic (2023)	Weak negative correlation between inflation and unemployment in Bulgaria. A break in the Phillips curve occurred in 2009, making it flatter.
Tsanov (1999)	Unemployment and inflation during 1991-1997 did not follow a standard Phillips curve. Weak interaction or absence of trade-off between inflation and unemployment. Inflation primarily of the cost nature, with weak market mechanism effects.

Study	Conclusion
Velev (2015; 2018)	When unemployment rate was around or below 6%, inflation rose significantly. Equilibrium unemployment rate (NAIRU) in Bulgaria fluctuated around and above 6%.
Kasabov et al. (2017)	Core inflation in Bulgaria is relatively constant and responds rather to supply-side than to demand-side shocks.

Source: Own processing

Comparisons with other countries indicated that inflation-unemployment nexus in Bulgaria is the second strongest (after Greece) in EU member-states from Central and Eastern Europe (Smith, Timmermann & Wright, 2023; Zivkovic, 2023).

3. EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN INFLATION AND UNEMPLOYMENT IN BULGARIA

3.1. Methodology

The inflation-unemployment nexus in Bulgaria was investigated by an OLS regression, which included the following variables:

D(INFLATION) - first differences of annual Harmonized Index of Consumer Prices (HICP) inflation rate in Bulgaria;

D(UNEMPLOYMENT) - first differences of annual unemployment rate in Bulgaria;

D(UNEMPLOYMENT)^2 - square of the first differences of annual unemployment rate in Bulgaria;

D(UNEMPLOYMENT)^3 - cube of the first differences of annual unemployment rate in Bulgaria.

The variables in the OLS regression are differenced since they are integrated of order one (see Tables 2 and 3). The target (dependent) variable is **D(INFLATION)**. **D(UNEMPLOYMENT)** is an independent variable, which reflects the linear impact of unemployment on inflation. **D(UNEMPLOYMENT)^2** and **D(UNEMPLOYMENT)^3** are regressors, which account for possible non-linearity between inflation and unemployment.

3.2. Data

Yearly Eurostat data on HIPC inflation and unemployment in Bulgaria for the period 2003-2022 were used in the empirical analysis. The

Table 2. Unit root test on the level values of inflation and unemployment

Variable	Probability
D(Inflation)	1. 0.51
D(Unemployment)	2. 0.26

Source: Own processing

Table 3. Unit root test on the first differences of inflation and unemployment

Variable	Probability
D(Inflation)	3. 0.01
D(Unemployment)	4. 0.03

Source: Own processing

unit root tests (see Tables 2 and 3) indicated that both variables are integrated of the first order, which required that first differences be employed in the regression.

3.3. Results

The relationship between inflation and unemployment in Bulgaria during 2003-2022 was explored via the equation:

$$D(INFLATION) = C(1) + C(2)*D(UNEMPLOYMENT) + C(3)*D(UNEMPLOYMENT)^2 + C(4)*D(UNEMPLOYMENT)^3 + \sum, \quad (5)$$

where **C(1)** is a constant, **C(2)**, **C(3)** and **C(4)** are regression coefficients and $\sum$ is an error term.

The results from the econometric estimation of Equation (5) (see Table 4) showed that (i) the impact of unemployment on inflation in Bulgaria during 2003-2022 was both linear (significant coefficient before **D(UNEMPLOYMENT)** and non-linear (significant coefficient before **D(UNEMPLOYMENT)^3)**; (ii) the inflation-unemployment nexus was negative (one percent change in unemployment resulted in three percent change in inflation in the opposite direction).

The estimates in Table 4 can be considered accurate and reliable since: (i) the residuals in Equation (5) are normally distributed (see Figure 1), non-heteroskedastic (see Table 5) and serially uncorrelated (see Table 6); (ii) Equation (5) is dynamically stable (see Figure 2) and correctly specified (see Table 7).

Table 4. Results from the econometric estimation of Equation (5)

Variable	Coefficient	Standard Error	t-Statistic	Probability
C	1. 0.735811	2. 1.187785	3. 0.619482	4. 0.5449
D(UNEMPLOYMENT)	- -3.087441	5. 1.108782	- -2.784533	6. 0.0139
D(UNEMPLOYMENT)^2	- -0.668915	7. 0.464012	- -1.441589	8. 0.1700
D(UNEMPLOYMENT)^3	9. 0.451398	10. 0.199751	11. 2.259802	12. 0.0391

Source: Own processing

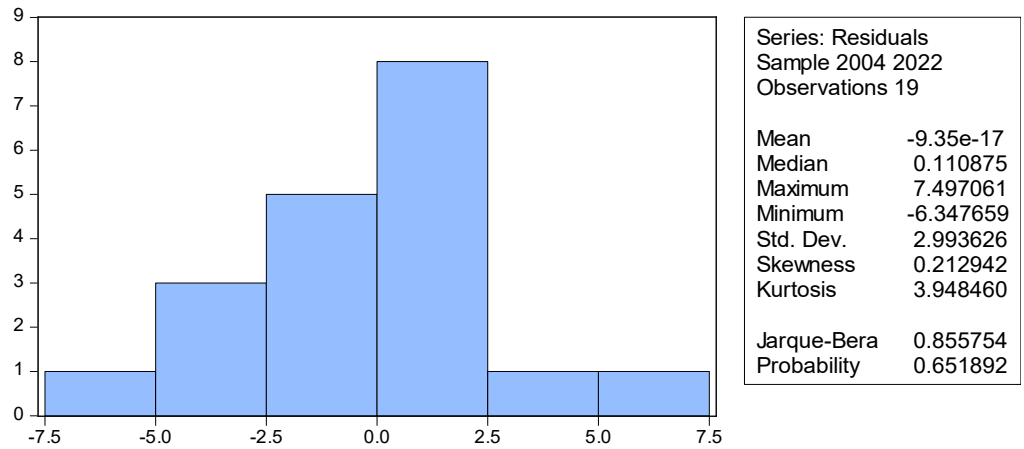

Figure 1. Normality test on the residuals in Equation (5)

Source: Own processing

Table 5. Heteroskedasticity test on the residuals in Equation (5)

F-statistic	0.302963	Probability F(3,15)	0.8228
Observations R-squared	1. 1.085486	Probability Chi-Square(3)	2. 0.7806
Scaled explained SS	3. 0.997390	Probability Chi-Square(3)	4. 0.8019

Source: Own processing

Table 6. Serial correlation test on the residuals in Equation (5)

F-statistic	0.019825	Probability F(1,14)	0.8900
Observations R-squared	5. 0.026868	Probability Chi-Square(1)	6. 0.8698

Source: Own processing

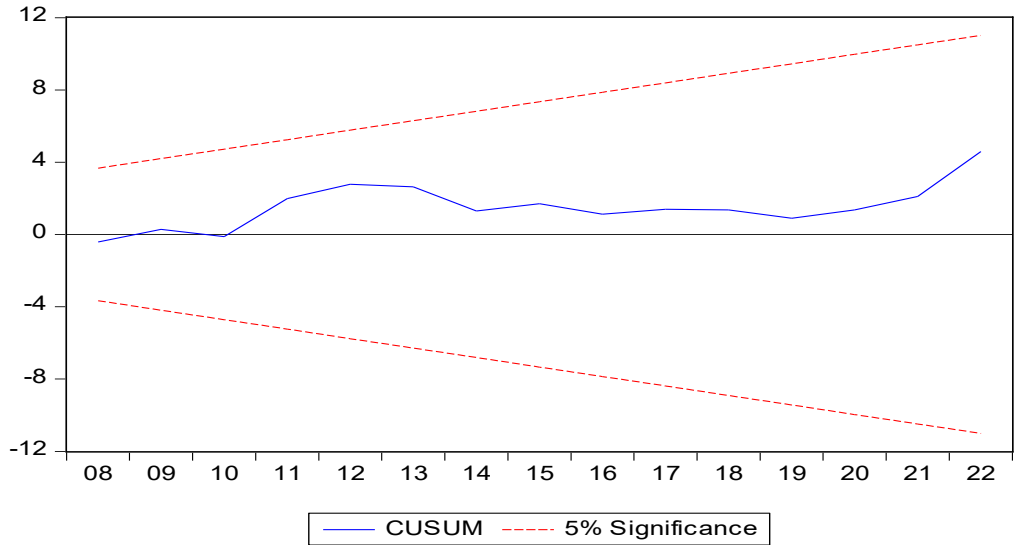

Figure 2. CUSUM test on Equation (5)

Source: Own processing

Table 7. Regression Error Specification Test (RESET) on Equation (5)

	Value	Degree of freedom	Probability
F-statistic	7. 0.930358	(2, 13)	8. 0.4192
Likelihood ratio	9. 2.541665	2	10. 0.2806

Source: Own processing

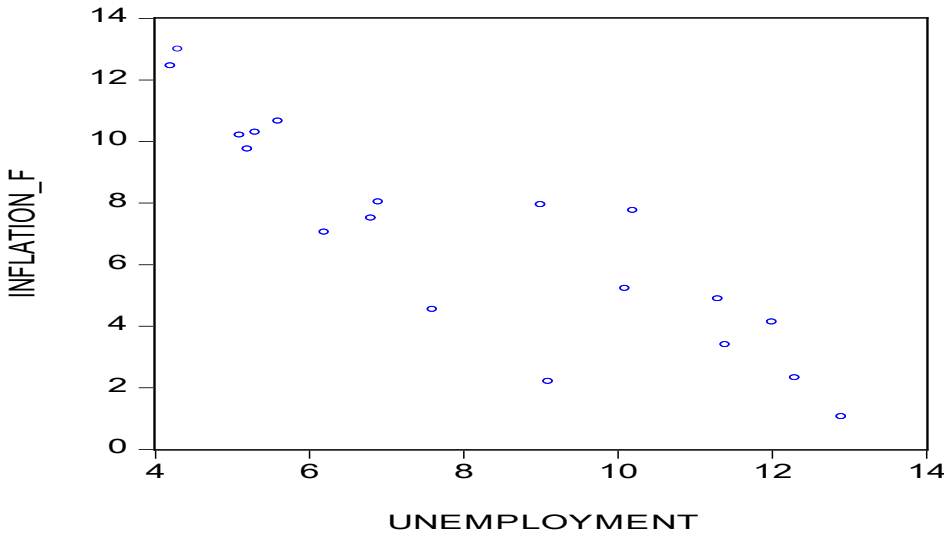

Figure 3. Phillips curve in Bulgaria during 2003-2022
Source: Own processing

Equation (5) was used to derive the Phillips curve for Bulgaria for the period 2003-2022 (see Figure 3).

Bulgaria's Phillips curve: (i) has a negative slope, which implies an opportunity for inflation-unemployment trade-off; (ii) steepens after unemployment falls below 6.2 percent, which suggests a probable non-accelerating inflation rate of unemployment (NAIRU) for Bulgaria of 6.2 percent. According to data of the National Statistical Institute, unemployment in Bulgaria in the first quarter of 2023 is 4.4 percent - 1.8 percent above NAIRU. This implies that Bulgarian policymakers can reduce inflation by 5.4 percent at the cost of 1.8 percent rise in unemployment through fiscal and monetary contraction.

The empirical results implied: (i) an inverse nexus (both linear and non-linear) between inflation and unemployment in Bulgaria; (ii) a possible trade-off of 3% decrease in inflation for 1% rise in unemployment through monetary and fiscal contraction.

4. CONCLUSION

This research has important implications for Bulgarian macroeconomic policy, especially in times of high inflationary pressures. It provides evidence that inflation-unemployment substitution is possible in a ratio of 1 to 3. The inferences from this study are similar to those of Velev (2015; 2018). Macroeconomic restrictions in Bulgaria under a CBA can be implemented by raising the amount of the government's fiscal reserve and/or the minimum reserve requirements of commercial banks. The use of the government fiscal reserve and the minimum reserve requirements as macroeconomic policy variables under the Bulgarian currency board arrangements was grounded and rationalized by Chobanov & Nenovsky (2004), Desquilbet & Nenovsky (2004), Nenovsky & Hristov (1998; 2002), Nenovsky, Hristov & Mihaylov (2001), Todorov, Tanchev & Yurukov (2019) and Todorov, Usheva, Tanchev & Yurukov (2020). The last two sources even

investigated the impact of the changes in the government fiscal reserve and the minimum reserve requirements on the rate of inflation in Bulgaria and found out weak but significant influence of these macroeconomic tools on changes in price level.

However, Bulgarian macroeconomic strategists should be cautious when implementing restrictive policies since they may result in contraction or recession.

A limitation of this research is that the number of annual observations is below 30. This problem could be solved by using monthly and quarterly data in the analysis. However, monthly and quarterly data are related to spillover effects, which might distort the results more than the insufficient number of observations. Therefore, annual data were preferred.

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