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Research Article

PHILLIPS CURVE STRUCTURAL BREAKS IN CONTEMPORARY BOSNIA-HERZEGOVINA: EVIDENCE OF REGIME TRANSFORMATION

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Abstract

The study provides the first comprehensive evidence of Phillips curve structural breaks in a post-war Bosnia and Herzegovina, documenting a fundamental economic transformation that challenges conventional understanding of unemployment-inflation dynamics in transition economies. The Phillips curve in BiH is state-dependent, meaning that it varies with economic conditions rather than representing the permanent structural features. Our findings show that during the relatively stable period of 2018-2021, BiH showed a weak negative unemployment-inflation relationship. However, following the 2022-Q1 structural break, the relationship reverted to a positive pattern. Our work suggests that the crisis periods trigger the anomalous relationships while the stable periods restore traditional dynamics.

Keywords: Carbon black market, Waste valorization, System dynamics, Group model building, LCCB.

INTRODUCTION

One of the most fundamental concepts in macroeconomics that posits an inverse relationship between the unemployment and inflation, the Phillips curve has gone through a significant change in recent years. The Phillips curve has been challenged by many economists arguing the Phillips curve does not hold true in developing countries or can hold true only for a certain period of time. However the COVID-19 pandemic and resulting economic disruptions have shown dramatic structural changes that challenge the "death of Phillips curve" (Gudmundsson *et al.,* 2024). Our study examines the structural transformations in Bosnia-Herzegovina's (BiH) unemployment-inflation relationship during the contemporary period. Our findings reveal complex dynamics in BiH's macroeconomic relationships. A study done by Omercevic and Nuroglu (2014) reveals no evidence for a conventional short-term Phillips curve in the country during the 2008-2012 period. Instead the study shows a positive relationship between inflation and unemployment, contrary to the traditional inverse relationship economic theory posits. Our work builds upon this foundation by showing that Phillips curve in BiH are state-dependent, meaning it varies with economic conditions rather than representing permanent structural features. Our findings show that during the relatively stable period of 2018-2021, BiH showed a weak negative unemployment-inflation relationship. However, following the 2022-Q1 structural break, the relationship reverted to a positive pattern similar to that found by Omercevic and Nuroglu. Our work suggests that the crisis periods trigger anomalous relationships while the stable periods restore traditional dynamics. The study of Phillips curve in BiH offers unique insights into macroeconomic relationships in transition economies. BiH operates under unique institutional constraints that require unique monetary policy tools, as its currency Convertible Mark is pegged to the Euro at a fixed rate of 1.95583.

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The Central Bank of BiH cannot adjust interest rates or conduct quantitative easing, which makes unemployment-inflation relationship more important for understanding macroeconomic adjustment mechanisms. Moreover, unemployment rates peaked at 45% in 2012, and remained above 30% for most of the post-war period which makes the country an extreme case for testing the Phillips curve. Recent economic developments have created a natural experiment condition for examining structural stability in macroeconomic relationship. The COVID-19 caused inflation to surge from a stable 2% in 2021 to a record 16.7% by July 2022. Unemployment dramatically declined from over 32% to approximately 12% by 2024. Moreover, the country faced with multiple external shocks including the Ukraine war's commodity price effects, devastating floods in October 2024, and ongoing EU integration pressures in December 2022. Despite these developments, the literature lacks a comprehensive analysis whether anomalous Phillips curve persisted or evolved over the subsequent decade. Our research addresses this gap by investigating how the Phillips curve relationship evolved in the contemporary BiH, and what structural breaks characterize this evolution. Our research addresses this gap in the literature by conducting a comprehensive analysis in Phillips curve structural breaks in contemporary BiH using advanced econometric techniques. Here, we employ Gregory-Hansen (1996) cointegration test which allows for structural breaks in long-run relationships. Then we incorporate Vector Error Correction Model (VECM) framework. While existing literature relies on standard cointegration test, our approach represents a significant methodological advancement by forgoing parameter stability over a period of time. Our empirical analysis yields several striking findings that challenge existing understanding of Phillips curve dynamics. Our econometric analysis identifies a significant structural break that fundamentally altered the underlying unemployment-inflation dynamics in ways that challenge conventional economic theory. This study makes several important contributions to the existing literature. First, it provides the first empirical evidence of Phillips curve

structural breaks in a post-conflict transition economy. Second, it shows that currency board economies may show fundamentally different unemployment-inflation dynamics compared to countries with independent monetary policy. Also, it establishes a framework for understanding regime-dependent macroeconomic relationships in the institutionally constrained economies. The remainder of the paper proceeds as follows. Section 2 provides institutional context for BiH and reviews the relevant literature on Phillips curve. Section 3 presents our data and econometric methodology. Section 4 provides the empirical results, including cointegration analysis with structural breaks, VECM estimation, and Granger causality testing. Section 5 concludes with economic interpretation, key contributions and directions for future research.?

LITERATURE REVIEW

The Phillips curve has evolved significantly since William Phillips' original 1958 study examining the relationship between unemployment and wage inflation in the United Kingdom from 1861-1957 (Phillips, 1958). The concept was later adapted to focus on price inflation rather than wage inflation (Paul, 2009), with Dicks-Mireaux and Dow (1959) arguing that wage changes are affected by prices. The relationship became widely recognized when Samuelson and Solow (1960) validated the relationship for the US economy and popularized the term "Phillips curve". However, the empirical evidence on Phillips curve relationship varies significantly between developed and developing countries. Research in developed countries like the US and Australia has generally identified stable negative relationship between inflation and unemployment (Shome, 2015), while the euro area analysis has found negative and significant relationships despite heterogeneous characteristics across countries (Hindrayanto *et al.,* 2019). Studies show conflicting results on whether the Phillips curve is pertinent in certain countries, such as the US (Hogan, 1998; Jorgensen & Lansing, 2021), the UK (Haldane & Quah, 1999; Sargent, 2002; Scott & Laslett, 1978), Italy (Del Boca *et al.,* 2010), and Greece (Dritsaki and Dritsaki, 2013)

In developing countries, the Phillips curve's relevance appears more complex. Studies suggest that supply-side shocks, particularly those affecting agricultural output, can complicate traditional inflation-unemployment relationships (Bleaney and Francisco, 2018). Panel data analysis indicated that the Phillips curve may be unstable in the developing countries. The literature on structural breaks in macroeconomic relationships has grown substantially following the pioneering work of Gregory and Hansen (1996). Their methodology allows for endogenous detection of structural breaks in cointegrating relationships, addressing the limitation that standard cointegration tests assume parameter stability throughout the sample period. This approach has proven particularly valuable for analyzing transition economies, where institutional changes and external shocks frequently cause regime shifts in the economic relationships (Kocenda, 2005; Korhonen & Fidrmuc, 2001). The recent studies have applied structural break methodologies to various macroeconomic relationships in Central and Eastern European countries, revealing that traditional economic relationships often exhibit instability during periods of economic transformation (Sander & Kleimeier, 2002; Babetskii *et al.,* 2004). The methodology has been particularly useful for understanding how global crises, such as the 2008 financial crisis and the COVID-19 pandemic, have altered fundamental economic relationships in emerging markets (Bahmani- Oskooee and Ratha, 2004; Hansen, 2001). Unemployment-inflation dynamics in BiH as an institutionally constrained economy, can be well understood in the context of currency board arrangements. Currency boards disables central banks' ability to make independent monetary policy decisions, as the domestic currency is pegged to a foreign currency at a fixed rate (Hanke and Schuler, 1994; Ghost *et al.,* 2002). Studies of currency board economies on Estonia during the 1990s and Bulgaria since 1997 show that such arrangements can lead to different unemployment-inflation dynamics (Dobrinsky, 2000; Korhonen, 2000; Miller, 1999). In currency board arrangements, as the foreign exchange rates cannot be adjusted, adjustments to external shocks must occur primarily through internal devaluation which involves changes in wages or prices. BiH's macroeconomic environment has experienced significant volatility in recent years. The COVID-19 pandemic triggered substantial economic disruptions globally, but the effects were particularly pronounced in small, open economies with limited policy tools (the Central Bank of Bosnia and Herzegovina 2022; IMF, 2023). According to official statistics from the Central Bank of BiH, inflation dynamics have shown considerable variation over the 2021-2025 period. Inflation remained stable at approximately 2% during 2021, consistent with the moderate price pressures typical of post-war stabilization period. However, the outbreak of the Russia-Ukraine conflict in early 2022 coincided with a dramatic surge in inflation, reaching 14% by mid-2022. This inflation surge reflected global commodity price increases, supply chain disruptions, and energy market volatility that affected most European economies. The subsequent moderation in inflation to 6.1% during 2023 and projections for continued normalization suggest that the initial shock was largely temporary. However recent estimates indicate renewed price pressures, with core inflation projected at 4.17% for the first quarter of 2025, substantially above the 2024 average of 2%.

Simultaneously, unemployment dynamics have exhibited unprecedented patterns. The traditional post-war unemployment rate, which consistently exceeded 30% and peaked at 45% in 2012, began declining substantially from 2021 onwards. Current estimates suggest unemployment has fallen to approximately 12% by 2024. While demographic factors contribute to this decline, the magnitude suggests fundamental changes in labor market functioning. The Central Bank of BiH projects moderate economic growth of 2.6% for 2025, with personal consumption growth constrained by demographic trends and recent natural disasters, including the severe flooding in October 2024 that disrupted economic activity in several regions. The limited research on BiH presents mixed findings regarding the existence and stability of Phillips curve relationships. Stanic (2008) examined the 2001-2007 period and found evidence of a short-term Phillips curve relationship. However, this study's reliability is questionable due to institutional reconstruction and data quality issues during the immediate post-war period. More comprehensive analysis by Omercevic and Nuroglu (2014) examined the 2008-2012 period and found no evidence of a conventional Phillips curve. Instead the study documents a positive relationship between inflation and unemployment that contradicts traditional economic theory. The findings suggest that institutional constraints and economic stress during a global financial crisis period may have fundamentally altered a macroeconomic relationship. These contradictory findings

highlight the need for contemporary analysis using more robust econometric techniques that can account for potential structural instability in the underlying relationships.

DATA AND METHODOLOGY

This study uses quarterly macroeconomic data for BiH covering the period 2018Q1 and 2024Q2. The data are sourced from Agency for Statistics of Bosnia and Herzegovina (BHAS). The analysis focuses on two key macroeconomic statistics for the country:

- Unemployment rate (U): Quarterly unemployment rate expressed as a percentage of the labor force.
- Inflation rate (π): Quarterly consumer price inflation rate measured as the year-over-year percentage change in the Consumer Price Index (CPI).

The sample period is chosen for several methodological reasons and limitations. First, this period provides sufficient observations for robust time series analysis. Second, the period captures economic events including the COVID-19, the Ukraine conflict, and associated supply chain disruptions. Third, data quality and consistency are higher during this period compared to the earlier post-war year. Both unemployment and inflation rates are used in their original form as percentages, consistent with standard practice in Phillips curve literature. No logarithmic transformations are applied, as the variables are already expressed as rates. The quarterly frequency allows for an adequate temporal resolution while avoiding the noise related with higher-frequency data. The econometric strategy employed in this study addresses the specific challenges of analyzing structural breaks in Phillips curve for small sample sizes. Our approach combines the standard time series techniques with structural break-robust methodology to provide comprehensive analysis of the unemployment-inflation dynamics.

We employ the Augmented Dickey-Fuller (ADF) test in order to determine the integration order of our time series (Dickey and Fuller, 1979). The ADF test examines the null hypothesis that contains a unit root against the alternative stationarity. The test is conducted with different specifications (no constant, constant, constant with trend) and optimal lag length is selected using the Akaike Information Criterion (AIC). If variables are found to be I(1), we proceed to test for cointegration relationships. We initially employ standard cointegration tests, including the Engle-Granger two-step procedure and the Johansen maximum likelihood approach, to establish baseline results. However, these tests assume parameter stability throughout the sample period, which may be inappropriate for transition economies experiencing structural changes. When structural breaks are present, the Johansen cointegration test produces theoretically impossible results that serve as diagnostic indicators of parameter instability. Specifically, the Johansen test indicating the presence of two cointegrating relationships with only two variables is mathematically impossible and signals structural breaks in the data. This occurs because structural breaks create apparent multiple equilibrium relationships that the Johansen test incorrectly identifies as separate cointegrating vectors. The failure of standard cointegration tests in the presence of structural breaks necessitates employing structural break-robust methodologies. The standard tests assume stable parameters and produce misleading results when this assumption is violated, potentially leading to spurious regression problems or failure to detect genuine long-run relationships that exist within regimes. Given the evidence of structural instability from standard tests, we employ the Gregory-Hansen (1996) cointegration methodology, which allows for a single unknown structural break in the cointegration relationships. This test is specifically designed to detect cointegration in the presence of regime shifts, addressing the limitation identified above. The test searches over all possible break points and selects the one that provides that strongest evidence against the null hypothesis of no cointegration. The test statistics are compared to critical values that account for the unknown break point. If we have established the presence of cointegration with structural break, we proceed to estimate a Vector Error Correction Model (VECM) that explicitly incorporates the regime shift. Due to the structural break and relatively small sample size, we employ a manual VECM approach that provides more robust results than standard automated procedures. The VECM specification allows for regime-specific parameters while maintaining the long-run cointegrating relationship. The cointegrating equation with structural break is specified as:

where β_2 captures the shift in the intercept, and β_3 captures the change in slope after the break.

The Granger causality test is a multivariate statistical test to determine whether one time series' past values can be used to predict the other time series' future values (Granger, 1969). In the presence of cointegration with structural breaks, Granger causality test requires a VECM approach that incorporates both short-run dynamics and long-run equilibrium adjustment.
We test three types of causality:

- Short-run causality: Test whether lagged changes in one variables predict current changes in the other variable. F-test is used on coefficients of lagged first differences.
- Strong causality: Combines short-run and long-run causality

Short-run causality is tested using F-tests on the coefficient of lagged first differences. Long-run causality is assessed through significance of error correction terms in each equation, indicating whether variables adjust to restore long-run equilibrium. Note that this study is conducted in Python using standard econometric libraries for time series analysis.

RESULTS

The ADF tests confirm that both unemployment and inflation rates are non-stationary in levels but stationary in first differences. This indicates both variables are I(1). Table 1 below presents the unit root test results for the levels, while a

Table 2 is showing the results for the first differences.

Long-run causality: Tests whether variables respond to equilibrium deviations (error correction)

The both tables are presented below.

Following the unit root analysis, which confirmed that both unemployment and inflation rates are integrated of order one, I(1), we proceed to test for cointegration between these variables.

Table 1. ADF Unit Root Test

Variables	Series	Test statistic values	Critical value at 5%	p-value
5	No intercept no trend	-1.5722	-1.9551	0.1090
	Intercept w/o trend	-0.5498	-2.9864	0.8819
	Intercept w/ trend	-2.2897	-3.7312	0.4396
Π	No intercept no trend	2.4051	-1.9620	0.9973
	Intercept w/o trend	-0.1165	-3.0684	0.9478
	Intercept w/ trend	0.0316	-3.7092	0.9945
lag levels were selected according to Akaike Information Criterion (AIC).				

Table 2. ADF Unit Root Test on First Differenced

Variables	Series	Test statistic values	Critical value at 5%	p-value
Δ5	No intercept no trend	-4.4878	-1.9557	0.0000
	Intercept w/o trend	-4.7448	-2.9922	0.0000
	Intercept w/ trend	-4.6704	-3.6123	0.0007
ΔΠ	No intercept no trend	0.0874	-1.9634	0.7125
	Intercept w/o trend	-0.7812	-3.0685	0.8228
	Intercept w/ trend	-4.7609	-3.7092	0.0005
Lag levels were selected according to Akaike Information Criterion (AIC).				

Table 3.Standard Cointegration Test Results

Method	Direction	Test statistic values	Critical value	Conclusion
Engle-Granger	Unemployment~Inflation	-2.5319	-3.34	Not cointegrated
	Unemployment~Inflation	-3.1502	-3.34	Not cointegrated
Johansen Tests				
Trace test				
Trace test	$r \leq 0$	24.725**	18.399	Reject H_0
Max Eigen value	$r \leq 1$	6.978**	3.842	Reject H_0
Max Eigen value	$r = 0$	17.746**	17.148	Reject H_0
	$r = 1$	6.978**	3.842	Reject H_0
*Johansen conclusion: 2 cointegrating relationships				
**Note: Two cointegrating relationships with two variables is theoretically impossible and indicated potential structural instability.				

Table 3 presents results from standard cointegration tests, that has revealed the structural break problem which motivates our methodological approach.

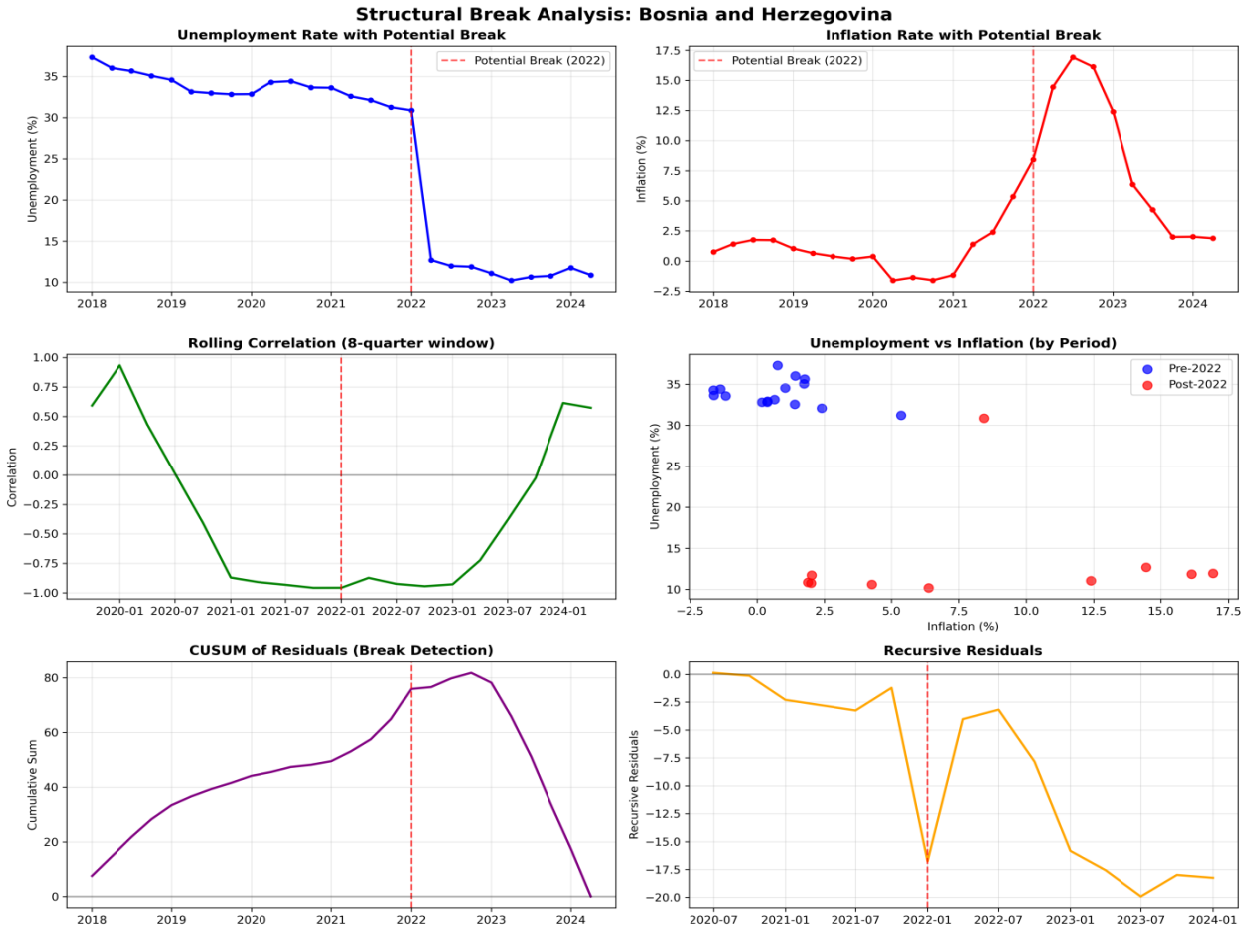

Figure 1. Diagnostic Evidence of Structural Break in 2022-Q1 in BiH Phillips Curve Relationship

The conflicting results from standard cointegration tests suggest potential structural breaks in the data. Figure **1** provides comprehensive visual evidence of the 2022-Q1 structural break through multiple diagnostic indicators: a diagnostic reveal a clear structural break in early 2022. Top left graph shows that unemployment drops sharply from 32% to 12% in Q1 2022. Inflation spikes to 17% in 2022 before declining in the top right graph. The rolling correlation between inflation and unemployment in the middle left graph reverses from negative to positive around 2022. A scatter plot in the middle right graph shows the clear regime separation between pre-2022 (blue) and post-2022 (red) observations. Finally both a cumulative sum of the residuals and the recursive residuals in the bottom graphs indicate instability beginning in 2022. These patterns collectively confirm a fundamental regime change in early of 2022.

The Gregory-Hansen cointegration test provides the strong evidence for a cointegrating relationship when accounting for a regime change. A test identifies 2022-Q1 as the optimal break point for both specifications. The computed ADF statistics exceeds the 5% critical value (-4.61), which is providing a strong evidence for cointegration when accounting for the structural break. Having established cointegration with a structural break, we estimate a VECM that explicitly incorporates the 2022-Q1 regime shift.

The results reveal a dramatic structural transformation. The highly significant break dummy coefficient (β_2 =-21.433) indicates that the structural break reduced the equilibrium unemployment by 21.4 percentage points.

- **Pre-2022 Regime (D_t= 0):** $U = 34.065 - 0.2355\Pi$
- **Post-2022 Regime (D_t = 1):** $U = 12.632 + 0.075\Pi$

The estimated slope changes from weakly negative to slightly positive post-break, although this change is not statistically significant. The findings suggest a possible shift in the Phillips curve, though not a statistically confirmed one. The error correction models reveal the crucial insights into the adjustment mechanism shown in Table 6 below.

First of all, the error correction coefficient of -0.824 indicates the unemployment adjusts 82.4% of any disequilibrium within one quarter – a half-life of approximately 1.2 months. So, this represents an exceptional labor market flexibility. Secondly, to equilibrium deviations, only unemployment responds. Inflation on the other hand, is showing no adjustment, placing the entire adjustment burden on the labor market. Lastly, the significant break dummy in the unemployment equation reinforces the ongoing impact of the 2022 transformation. Granger causality testing within the VECM framework reveals the directional relationship between unemployment and inflation while accounting for structural breaks.

Table 4.Gregory-Hansen Cointegration Test Results

Direction	Break Point	ADF Statistics	Critical values			Conclusion
			1%	5%	10%	
Unem.~InfInf.~Unem	2022-Q1	-5.031	-5.13	-4.61	-4.34	Cointegrated*
		-4.955				Cointegrated*
*Significant at 5%						

Table 5.Long-Run Cointegration Relationship with Structural Break

Parameter	Coefficient	Standard Error	t-statistics	p-value
α	34.065	1.1330	30.0647	0.000*
β_1	-0.235	0.6087	-0.3860	0.703
β_2	-21.433	2.6091	-8.2145	0.000*
β_3	0.310	0.6504	0.4768	0.638

*Significant at 1% level

R^2: 0.8728; ADF test on ECT = -4.795 ($p < 0.001$)

Table 6. Error Correction Model Results

Equation	Parameter	Coefficient	Error	t-statistics	p-value R^2
Δ Unemplo.	Constant	-0.293	-0.2726	-1.0736	0.9268
					0.295
	ECT(-1)	-0.824	0.0664	-12.4002	0.4396
	ΔInflation	-0.087	0.1126	0.7731	0.448
	Break Dummy	-1.747	0.4341	-4.0236	0.4396
Δ Inflation	Constant	0.170	0.5339	0.3187	0.3714
					0.753
	ECT(-1)	0.073	0.3661	0.1997	0.844
	Δ Unemployment	-0.318	0.4113	-0.7731	0.448
	Break Dummy	-1.167	1.0745	-1.0864	0.290
*** significance at 1% level					

Table 7.Granger Causality Test Results

Test Type:F Short-run Causality	Direction	Test statistics	p-value	Result
	Inflation→ Unemployment	-0.5498	-2.9864	0.8819
	Unemployment→Inflation	-2.2897	-3.7312	0.4396
Short-run Causality	t-test			
	Inflation→ Unemployment	2.4051	-1.9620	0.9973
	Unemployment→Inflation	-0.1165	-3.0684	0.9478
lag levels were selected according to Akaike Information Criterion (AIC).				

The analysis establishes unidirectional causality from inflation to unemployment. While neither variable Granger-causes the other in the short-run, the significant error correction in the unemployment equation creates long-run causality from inflation to unemployment. This indicates that BiH operates as a supply-side dominated economy where price changes drive side dominated economy where price changes drive the labor market outcomes. Therefore, all the diagnostic tests support a validity of our VECM specification. The Ljung-Box test shows no evidence of the serial correlation in either equations (p-values of 0.080 and 0.084), while the Jarque-Bera test confirms normally distributed residuals (p-values of 0.515 and 0.372). The ADF test on an error correction term (-4.795, $p<0.001$) confirms the stationarity required for the valid cointegration, supporting the robustness of our structural break findings.

Conclusion

This study provides the first comprehensive evidence of Phillips curve structural breaks in post-war Bosnia and Herzegovina, documenting a fundamental economic transformation that challenges conventional understanding of unemployment-inflation dynamics in transition economies. Our Gregory-Hansen cointegration analysis identifies a dramatic regime shift in 2022-Q1, reducing the equilibrium unemployment by 21.4 percentage points which represents one of the most substantial labor market adjustments documented in transition economics literature. This structural break fundamentally altered the Phillips curve relationship from a weak negative correlation consistent with traditional theory to a slight relationship in the post-2022 regime.

The Vector Error Correction Model reveals exceptional labor market flexibility, with unemployment adjusting 82.4% of equilibrium deviations within one quarter while inflation shows no error correction response. Granger causality analysis establishes unidirectional causality from inflation to unemployment, indicating that BiH operates as a supply-side dominated economy where price changes drive long-term labor market outcomes. These findings have significant policy implications: inflation-targeting policies can effectively influence employment outcomes, while the asymmetric mechanism places the entire stabilization burden on labor markets rather than prices.

Our results contribute to transition economy literature by demonstrating that conventional Phillips curve relationships may be highly unstable and context-dependent. The magnitude and timing of the structural break suggest that external shocks can trigger permanent regime changes in institutionally constrained economies like BiH with its currency board arrangement. The unidirectional causality pattern differs markedly from developed economy experiences, highlighting the need for specialized analytical frameworks for emerging markets.

While our analysis provides robust evidence for a documented relationships, the relatively small sample size and bivariate focus suggest important directions for a future research. Extensions should include additional macroeconomic variables, investigate the microeconomic foundations of the observed labor market flexibility, and conduct comparative analyses across other transition economies to determine whether the BiH experience represents a unique case or broader patterns in post-socialist economic development. The dramatic nature of the documented transformation indicates that policymakers and researchers must remain vigilant for additional regime shifts as transition economies continue evolving toward the mature market structures.

REFERENCES

1. Azam, M., & Khan, S. (2014). Investigating the stability of Philips curve: panel data evidence from developing World. *ASERS Publishing 2(19)*, 179- 194.
2. Babetskii, I., Boone, L., & Maurel, M. (2004). Exchange rate regimes and shocks asymmetry: the case of the accession countries. *Journal of Comparative Economics, 32(2)*, 212-229.
3. Bahmani-Oskooee, M., & Ratha, A. (2004). The J-curve: a literature review. *Applied economics, 36(13)*, 1377-1398.
4. Bleaney, M., & Francisco, M. (2018). Is the Phillips Curve Different in Poor Countries. *Bulletin of Economic Research, 70(1)*, E17-E28.
5. Central Bank of Bosnia and Herzegovina. (2022). Annual Report 2021. Sarajevo: CBBH.
6. Central Bank of Bosnia and Herzegovina. (2024). Quarterly Bulletin, Q1 2024. Sarajevo: CBBH.
7. Del Boca, A., Fratianni, M., Spinelli, F., & Trecroci, C. (2010). The Phillips curve and the Italian lira, 1861–1998. *The North American Journal of Economics and Finance*, *21*(2), 182–197. https://doi.org/10.1016/j.najef.2009.07.001
8. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association, 74(366a)*, 427-431.
9. Dicks-Mireaux, L. A., & Dow, J. C. R. (1959). *The Determinants of Wage Inflation: United Kingdom*, 1946-56. *Journal of the Royal Statistical Society. Series A (General), 122(2)*, 145. https://doi.org/10.2307/2342602
10. Dobrinsky, R. (2000). The transition crisis in Bulgaria. *Cambridge Journal of Economics, 24(5)*, 581-602.
11. Dritsaki, C., & Dritsaki, M. (2013). Phillips curve inflation and unemployment: An empirical research for Greece | International Journal of Computational Economics and Econometrics. *International Journal of Computational Economics and Econometrics*, *3*(1–2), 27–42.
12. Enders, W. (2014). *Applied Econometric Time Series*. Wiley, New York.
13. Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, *55(2)*, 251-276.
14. Ghosh, A. R., Gulde, A. M., & Wolf, H. C. (2002). *Exchange rate regimes: choices and consequences* (Vol. 1). MIT press.
15. Gudmundsson, T., Jackson, C., & Portillo, M. R. A. (2024). *The shifting and steepening of Phillips curves during the pandemic recovery: International evidence and some theory*. International Monetary Fund.
16. Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: journal of the Econometric Society*, 424-438.
17. Gregory, A. W., & Hansen, B. E. (1996). Residual-based tests for cointegration in models with regime shifts. *Journal of Econometrics*, *70(1)*, 99-126.
18. Haldane, A., & Quah, D. (1999). UK Phillips curves and monetary policy. *Journal of Monetary Economics*, *44*(2), 259–278.
19. Hanke, S. H., & Schuler, K. (1994). *Currency boards for*

developing countries: a handbook (Vol. 9). ICS press.
20. Hansen, B. E. (2001). The new econometrics of structural change: Dating breaks in US labor productivity. *Journal of Economic perspectives, 15(4)*, 117-128.
21. Hindrayanto, I., Samarina, A., & Stanga, I. M. (2019). Is the Phillips curve still alive. Evidence from the euro area. *Economics Letters, 174*, 149-152.
22. Hogan, V. (1998). Explaining the Recent Behavior of Inflation and Unemployment in the United States. *IMF Working Papers*, *1998*(145). https://doi.org/10.5089/9781451856514.001.A001
23. IMF. (2023). Bosnia and Herzegovina: Staff Report for the 2023 Article IV Consultation. IMF Country Report No. 23/123. Washington: International Monetary Fund.
24. Jorgensen, P. L., & Lansing, K. (2021). Return of the Original Phillips Curve. *FRBSF Economic Letter*, *2021*(21), 01–06.
25. Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2-3), 231-254.
26. Kocenda, E. (2005). Beware of breaks in exchange rates: evidence from European transition countries. *Economic Systems, 29(3)*, 307-324.
27. Korhonen, I. (2000). Currency boards in the Baltic countries: what have we learned. *Post-Communist Economies, 12(1)*, 25-46.
28. Korhonen, I., & Fidrmuc, J. (2001). Similarity of supply and demand shocks between the euro area and the CEECs.
29. Miller, J. B. (1999). *The currency board in Bulgaria: the first two years.* Bulgarian National Bank.
30. Omercevic, E., & Nuroglu, E. (2014). Phillips and wage curves: empirical evidence from Bosnia and Herzegovina. *Economics Research International, 2014(1)*, 436527.
31. Paul, B. P. (2009). *In search of the Phillips curve for India*. Journal of Asian Economics, 20(4), 479–488. https://doi.org/10.1016/j.asieco.2009.04.007
32. Phillips, A. W. (1958). The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957. *Economica, 25(100)*, 283–299.
33. Samuelson, P. A., & Solow, R. M. (1960). Analytical aspects of anti-inflation policy. *The American Economic Review, 50(2)*, 177–194.
34. Sander, H., & Kleimeier, S. (2002). Asymmetric adjustment of commercial bank interest rates in the euro area: an empirical investigation into interest rate pass-through. *Credit and Capital Markets–Kredit und Kapital, (2)*, 161-192.
35. Sargent, J. R. (2002). Towards a New Economy? Recent Inflation and Unemployment in the United Kingdom. *National Institute Economic Review*, *181*(1), 69–86. https://doi.org/10.1177/002795010218100110
36. Scott, M., & Laslett, R. A. (1978). *A model of inflation and unemployment* (pp. 92–112) [Palgrave Macmillan Books]. Palgrave Macmillan. https://econpapers.repec.org/bookchap/palpalchp/978-1-349-16020-4_5f8.htm
37. Shome, S. (2015). *Philips Curve A comparison between UK and Australia. International Journal of Research in Economics and Social Sciences, 5(4)*, 246-254.
38. Stanic, M. (2008). Inflation and unemployment in Bosnia and Herzegovina, *Zbornik radova Ekonomskog fakulteta Brcko*.
39. Yule, G. U. (1926). Why do we Sometimes get Nonsense-Correlations between Time-Series. A Study in Sampling and the Nature of Time-Series. *Journal of the Royal Statistical Society, 89(1)*, 1–63. https://doi.org/10.2307/2341482
40. Zivkovic, A. (2023). Can Phillips Curve be applied in selected European countries today. *Anali Ekonomskog fakulteta u Subotici, 59(50)*, 83-97.

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