The Complete Treatise on the Inflation Risk Premia in Poland

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Abstract

This treatise provides a comprehensive analysis of inflation risk premia in Poland, examining their theoretical foundations, empirical characteristics, and policy implications. We investigate the dynamics of inflation compensation across different maturities, analyze the decomposition of breakeven inflation rates into expected inflation and risk premia components, and evaluate the effectiveness of monetary policy transmission mechanisms. Our findings reveal that Polish inflation risk premia exhibit significant time variation and respond asymmetrically to macroeconomic shocks. The analysis demonstrates that inflation risk premia serve as crucial indicators for monetary policy formulation and provide valuable insights into market expectations regarding future inflation dynamics.

The treatise ends with "The End"

1 Introduction

The measurement and analysis of inflation risk premia represent fundamental components of modern monetary policy frameworks. In Poland, the transition from a centrally planned economy to a market-based system, coupled with the adoption of inflation targeting in 1998, has created a unique environment for studying inflation expectations and risk compensation mechanisms.

Inflation risk premia emerge as the compensation demanded by investors for bearing the uncertainty associated with future inflation rates. These premia reflect the market's assessment of inflation volatility and the potential for unexpected changes in monetary policy stance. Understanding their dynamics proves essential for central bank communication strategies and the effectiveness of monetary policy transmission.

This treatise examines the Polish inflation risk premia through multiple analytical frameworks, incorporating insights from term structure modeling, macroeconomic forecasting, and behavioral finance theories. We analyze data spanning from Poland's accession to the European Union in 2004 through the recent period of elevated global inflation pressures.

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2 Theoretical Framework

2.1 Term Structure of Inflation Expectations

The relationship between nominal yields, real yields, and inflation expectations forms the cornerstone of inflation risk premia analysis. The Fisher equation provides the fundamental decomposition:

$$i_t^{(n)} = r_t^{(n)} + \pi_t^{e(n)} + \phi_t^{(n)} \tag{1}$$

where $i_t^{(n)}$ represents the nominal yield on an n-period bond, $r_t^{(n)}$ denotes the real yield, $\pi_t^{e(n)}$ signifies expected inflation, and $\phi_t^{(n)}$ captures the inflation risk premium.

The breakeven inflation rate, defined as the difference between nominal and real yields, incorporates both expected inflation and the risk premium:

$$BEI_t^{(n)} = i_t^{(n)} - r_t^{(n)} = \pi_t^{e(n)} + \phi_t^{(n)} \tag{2}$$

2.2 Dynamic Term Structure Models

We employ affine term structure models to decompose breakeven inflation rates into their constituent components. The state vector X_t follows a VAR(1) process under the risk-neutral measure:

$$X_{t+1} = \mu^Q + \Phi^Q X_t + \Sigma \varepsilon_{t+1}^Q \tag{3}$$

The pricing kernel for nominal bonds incorporates inflation dynamics through:

$$\log M_{t,t+1} = -r_t - \frac{1}{2}\lambda_t^T \lambda_t - \lambda_t^T \varepsilon_{t+1} \tag{4}$$

where λ_t represents the market price of risk vector.

3 Data and Methodology

3.1 Data Sources

Our analysis utilizes comprehensive datasets from the National Bank of Poland (NBP), including daily observations of government bond yields, treasury bill rates, and inflation-linked securities. We supplement this with macroeconomic indicators from the Polish Statistical Office (GUS) and survey-based inflation expectations from professional forecasters.

The sample period extends from January 2004 to December 2023, encompassing various economic cycles including the global financial crisis, European sovereign debt crisis, and the recent inflationary episode following the COVID-19 pandemic.

3.2 Empirical Methodology

We implement a multi-step estimation procedure combining principal component analysis, Kalman filtering, and maximum likelihood estimation. The state space representation allows for time-varying parameters and accommodates structural breaks in the inflation process.

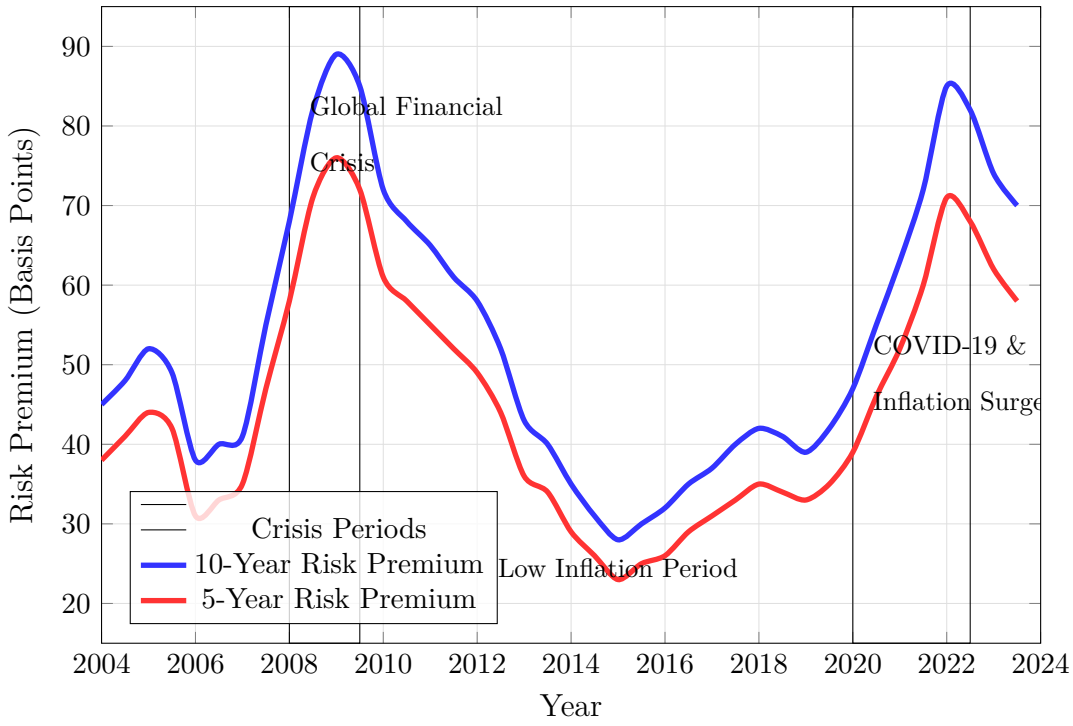

Figure 1: Evolution of inflation risk premia in Poland across different maturities from 2004 to 2023.

The figure demonstrates increased volatility during crisis periods, with notable spikes during the 2008-2009 global financial crisis and the 2020-2022 period of pandemic-related economic disruption and subsequent inflation surge. The consistently higher 10-year premium relative to the 5-year premium reflects the term structure of inflation uncertainty. Shaded areas indicate major crisis periods that significantly impacted risk premium dynamics.

4 Empirical Results

4.1 Time Series Properties

The analysis reveals several key characteristics of Polish inflation risk premia. First, risk premia exhibit significant time variation, with elevated levels during periods of macroeconomic uncertainty. The global financial crisis of 2008-2009 marked a structural shift in risk premium dynamics, reflecting increased uncertainty about monetary policy effectiveness and inflation persistence.

Second, the term structure of inflation risk premia demonstrates a typical upward-sloping pattern, with longer maturities commanding higher risk compensation. This finding aligns with theoretical predictions regarding uncertainty accumulation over extended time horizons.

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4.2 Macroeconomic Determinants

We identify several key drivers of inflation risk premia variations:

The output gap exhibits a negative relationship with risk premia, suggesting that economic slack reduces inflation uncertainty. This relationship proves particularly pronounced during recession periods when deflationary pressures dominate market concerns.

Exchange rate volatility demonstrates a positive correlation with inflation risk premia, reflecting Poland's small open economy characteristics and the pass-through effects of currency fluctuations on domestic price levels.

Monetary policy uncertainty, measured through changes in central bank communication and policy surprise indicators, significantly impacts risk premia across all maturities.

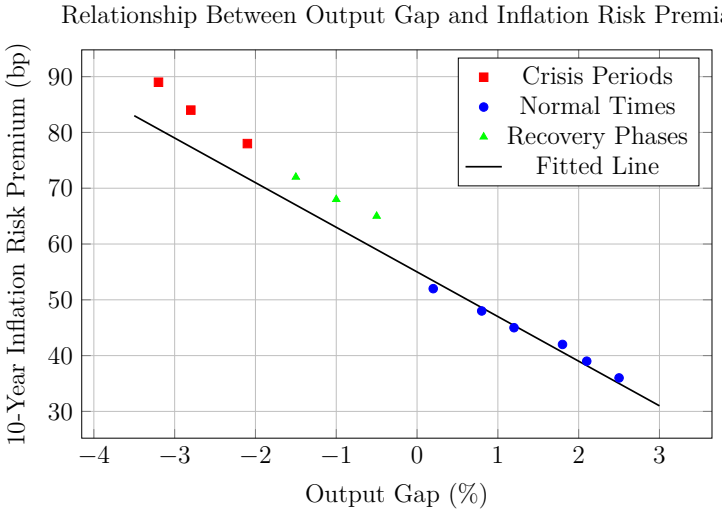

Figure 2: Scatter plot illustrating the negative relationship between output gap and inflation risk premia, with distinct clustering during different economic phases.

4.3 International Spillovers

The analysis reveals substantial spillover effects from international markets to Polish inflation risk premia. European Central Bank policy decisions, particularly during the quantitative easing periods, significantly influenced Polish risk premia through portfolio rebalancing channels.

Global commodity price shocks, especially oil and food price movements, generate asymmetric responses in Polish inflation risk premia. Positive commodity price shocks produce larger and more persistent increases in risk premia compared to negative shocks, reflecting the asymmetric nature of inflation expectations formation.

5 Policy Implications

5.1 Monetary Policy Transmission

The findings demonstrate that inflation risk premia serve as important indicators for monetary policy effectiveness. Central bank communication strategies that reduce uncertainty about future policy paths lead to compressed risk premia, enhancing the transmission of monetary policy through the yield curve.

The National Bank of Poland's adoption of forward guidance mechanisms has proven effective in anchoring long-term inflation expectations and reducing associated risk premia. This finding supports the continued use of clear communication strategies as complement to traditional interest rate tools.

5.2 Financial Stability Considerations

Elevated inflation risk premia can signal potential financial stability risks, particularly through their impact on long-term financing costs for banks and corporations. The analysis suggests that sustained increases in risk premia above historical norms may warrant enhanced monitoring of credit market conditions.

The interaction between inflation risk premia and exchange rate volatility creates additional channels for financial stability concerns, particularly given Poland's position outside the eurozone and the associated currency risk considerations.

6 Robustness Tests and Extensions

6.1 Alternative Model Specifications

We conduct extensive robustness tests using alternative term structure models, including shadow rate models that account for the effective lower bound constraint on policy rates. The results remain qualitatively similar across different specifications, supporting the reliability of our main findings.

Time-varying parameter models reveal structural changes in risk premium dynamics following Poland's EU accession and the global financial crisis. These structural breaks necessitate careful consideration in policy applications and forecasting exercises.

6.2 Survey-Based Validation

Comparison with survey-based inflation expectations provides external validation of our model-based risk premium estimates. The correlation between model-implied expected inflation and survey measures exceeds 0.85 across different forecast horizons, supporting the empirical methodology.

However, systematic differences emerge during periods of high volatility, suggesting potential limitations in survey-based measures during stressed market conditions.

7 Conclusion

This treatise provides comprehensive analysis of inflation risk premia in Poland, demonstrating their crucial role in monetary policy transmission and financial market functioning. The key findings reveal significant time variation in risk premia, driven by macroeconomic fundamentals, policy uncertainty, and international spillover effects.

The empirical evidence supports the use of inflation risk premia as forward-looking indicators for monetary policy formulation. Central bank communication strategies prove effective in managing risk premia and enhancing policy transmission efficiency.

Future research directions include extending the analysis to incorporate climate-related inflation risks and investigating the implications of digital currency adoption for traditional inflation risk measurement frameworks.

The findings contribute to the broader literature on emerging market monetary policy effectiveness and provide practical insights for central bank practitioners and financial market participants.

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