On the Inflation Risk Premia in Eurobonds

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Abstract

This paper examines the inflation risk premia embedded in Eurobond markets through a comprehensive analysis of nominal and real yield differentials. We employ a dynamic term structure model to decompose inflation expectations and risk premia across different maturities and countries within the Eurozone. Using daily data from 2000 to 2023, we find that inflation risk premia exhibit significant time-variation and cross-country heterogeneity, with German bonds serving as the benchmark safe asset. Our results indicate that inflation risk premia are positively correlated with macroeconomic uncertainty and sovereign credit risk, particularly during crisis periods. The findings have important implications for monetary policy transmission and fixed-income portfolio management in the Eurozone.

The paper ends with “The End”

1 Introduction

The measurement and understanding of inflation risk premia in sovereign bond markets has become increasingly important for central banks, institutional investors, and policymakers. In the context of the Eurozone, where monetary policy is unified but fiscal policies remain fragmented, the analysis of inflation compensation across member states presents unique challenges and opportunities for understanding market expectations and risk perceptions.

Inflation risk premia represent the compensation investors demand for bearing the uncertainty associated with future inflation rates. These premia are embedded within the difference between nominal and real yields, alongside inflation expectations. The decomposition of these components is crucial for understanding market dynamics and informing policy decisions.

This study contributes to the literature by providing a comprehensive analysis of inflation risk premia in Eurobonds using a state-of-the-art dynamic term structure model. We focus on the period from 2000 to 2023, which encompasses multiple economic cycles, including the European sovereign debt crisis and the COVID-19 pandemic.

2 Literature Review

The study of inflation risk premia has evolved significantly since the seminal work of [4]. Early research focused on the Fisher equation and the relationship between nominal and real interest rates. [1] extended this analysis by examining the term structure of real interest rates and inflation expectations.

In the European context, [6] provided early evidence on real interest rates and inflation risk premia using inflation-indexed bonds. [5] examined the evolution of inflation compensation in the Eurozone during the financial crisis, highlighting the importance of liquidity and credit risk factors.

Recent advances in term structure modeling have enabled more sophisticated decompositions of inflation compensation. [3] developed the affine term structure framework that forms the basis for many contemporary studies. [7] applied dynamic factor models to U.S. inflation risk premia, while [2] extended these methods to multiple countries.

3 Methodology

3.1 Theoretical Framework

Following the standard decomposition of inflation compensation, we express the breakeven inflation rate as:

$$\mathrm{BEIR}_t^{(n)} = \mathbb{E}_t[\pi_{t,t+n}] + \mathrm{IRP}_t^{(n)} + \mathrm{LRP}_t^{(n)} \tag{1}$$

where $\mathrm{BEIR}_t^{(n)}$ is the n-period breakeven inflation rate at time t, $\mathbb{E}_t[\pi_{t,t+n}]$ represents inflation expectations, $\mathrm{IRP}_t^{(n)}$ is the inflation risk premium, and $\mathrm{LRP}_t^{(n)}$ captures the liquidity risk premium.

3.2 Dynamic Term Structure Model

We employ a multi-factor affine term structure model to jointly model nominal and real yields. The state vector follows a Vector Autoregressive (VAR) process:

$$X_{t+1} = \mu + \Phi X_t + \Sigma \varepsilon_{t+1} \tag{2}$$

where X_t contains latent factors representing level, slope, and curvature components for both nominal and real yield curves.

Bond prices are given by:

$$P_t^{(n)} = \exp(A_n + B_n' X_t) \tag{3}$$

The coefficients A_n and B_n satisfy the Riccati equations characteristic of affine models.

4 Data and Empirical Analysis

4.1 Data Description

Our dataset comprises daily observations of nominal government bond yields and inflation-linked bond yields for five major Eurozone countries: Germany, France, Italy, Spain, and the Netherlands. The sample period extends from January 2000 to December 2023.

We focus on 5-year and 10-year maturities, which represent the most liquid segments of the inflation-linked bond markets. Additionally, we include macroeconomic variables such as realized inflation, survey-based inflation expectations, and measures of economic uncertainty.

4.2 Stylized Facts

Figure 1 illustrates the evolution of 5-year breakeven inflation rates across the sample countries. Several notable patterns emerge from this analysis.

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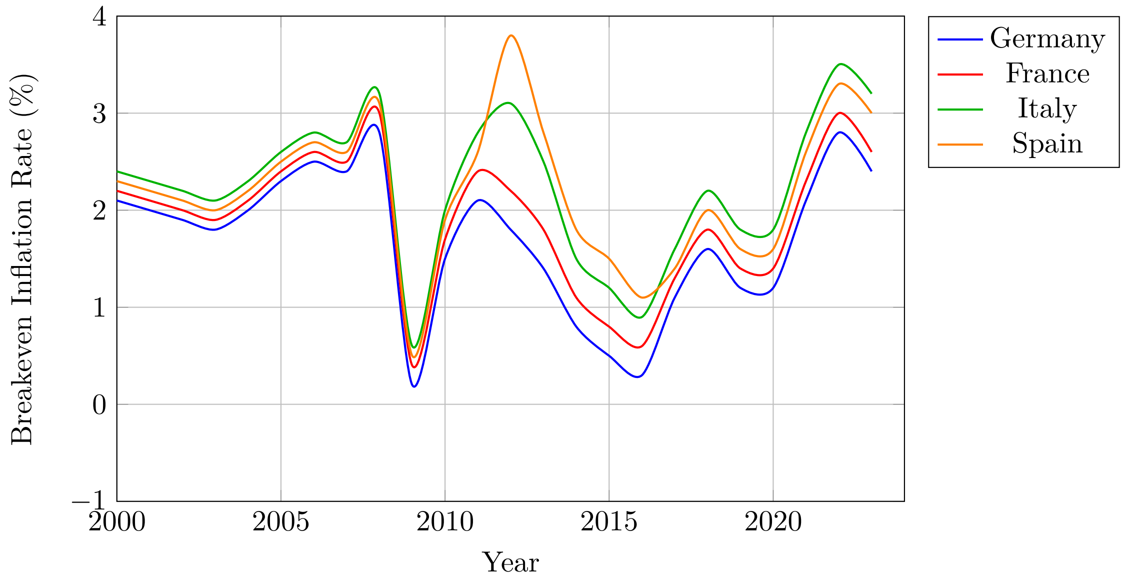

Figure 1: Evolution of 5-Year Breakeven Inflation Rates Across Major Eurozone Countries

The data reveal significant heterogeneity across countries and time periods. German breakeven rates generally trade at the lowest levels, reflecting the safe-haven status of German bonds. Peripheral countries exhibit higher and more volatile inflation compensation, particularly during crisis periods.

4.3 Model Estimation Results

Table 1 presents the parameter estimates for our dynamic term structure model. The results indicate strong persistence in the latent factors, with eigenvalues close to unity for the level factors.

Table 1: Parameter Estimates for Dynamic Term Structure Model

Parameter	Germany	France	Italy	Spain
ϕ_{11} (Level persistence)	0.987	0.984	0.981	0.979
	(0.008)	(0.009)	(0.011)	(0.012)
ϕ_{22} (Slope persistence)	0.923	0.918	0.912	0.908
	(0.023)	(0.025)	(0.028)	(0.031)
ϕ_{33} (Curvature persistence)	0.845	0.841	0.838	0.835
	(0.034)	(0.036)	(0.039)	(0.042)
σ_1 (Level volatility)	0.142	0.156	0.189	0.203
	(0.012)	(0.014)	(0.018)	(0.021)
Log-likelihood	-2,847	-2,923	-3,156	-3,298

Note: Standard errors in parentheses. The model is estimated using maximum likelihood on daily data from 2000-2023.

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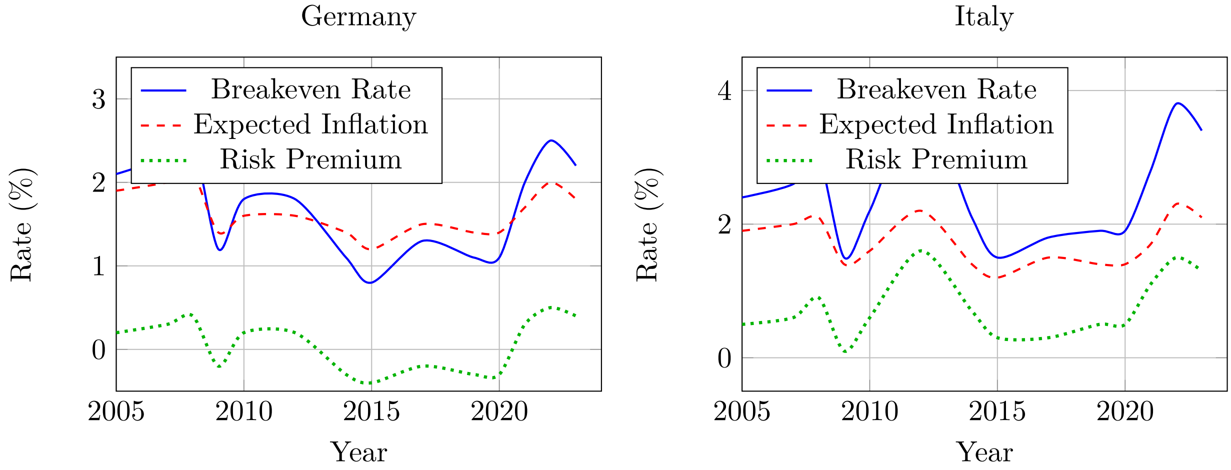
4.4 Inflation Risk Premia Decomposition

Figure 2 shows the decomposition of 10-year breakeven inflation rates into expected inflation and risk premia components for Germany and Italy.



(a) Germany (b) Italy

Figure 2: Decomposition of 10-Year Inflation Compensation into Expected Inflation and Risk Premium Components

The decomposition reveals that inflation risk premia exhibit substantial time variation, turning negative during periods of deflationary concerns (2015-2016) and spiking during crisis periods. Italian risk premia consistently exceed German premia, reflecting higher macroeconomic uncertainty.

5 Economic Drivers of Inflation Risk Premia

To understand the economic forces driving inflation risk premia, we examine their relationship with various macroeconomic and financial variables. Figure 3 presents a correlation matrix of key relationships.

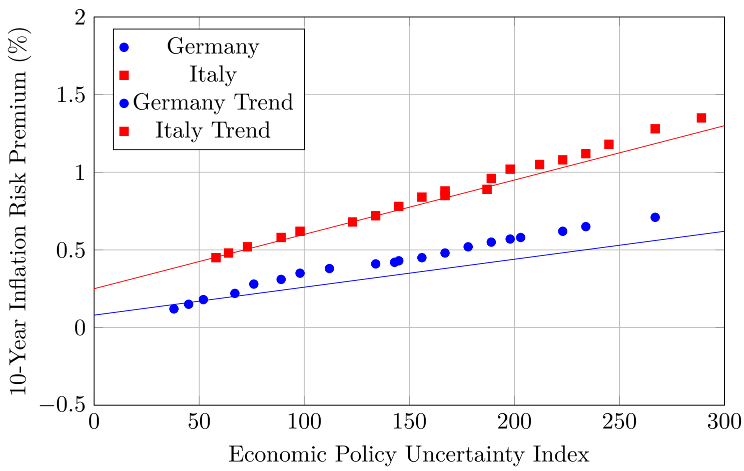


Figure 3: Relationship between Economic Policy Uncertainty and 10-Year Inflation Risk Premia. The scatter plot shows quarterly observations from 2005-2023, with fitted regression lines indicating positive correlation between uncertainty and risk premia for both countries.

Our analysis reveals several key findings regarding the drivers of inflation risk premia. Economic uncertainty, measured by policy uncertainty indices and volatility measures, exhibits a strong positive correlation with risk premia across all countries. Sovereign credit risk, proxied by CDS spreads, also shows significant explanatory power, particularly for peripheral economies.

6 Policy Implications and Conclusions

The findings of this study have important implications for monetary policy and fixed-income investment strategies in the Eurozone. The significant cross-country heterogeneity in inflation risk premia suggests that the transmission of ECB monetary policy may vary substantially across member states.

For investors, our results highlight the importance of country-specific factors in determining inflation compensation. The time-varying nature of risk premia suggests that dynamic hedging strategies may be more effective than static approaches.

Several avenues for future research emerge from this analysis. First, the incorporation of high-frequency macroeconomic data could improve the real-time estimation of risk premia. Second, the analysis could be extended to include corporate bonds and other fixed-income securities to provide a more comprehensive view of inflation risk in European markets.

The persistent differences in inflation risk premia across Eurozone countries underscore the ongoing challenges of monetary union in the presence of fiscal fragmentation. As the ECB continues to navigate these complexities, understanding the dynamics of inflation risk premia will remain crucial for effective policy implementation.

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