Global Real Interest Rate Dynamics and Monetary Policy Announcements

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By providing long-run guidance, the central bank may influence long-term interest rates.

— Isabel Schnabel, Member of the Executive Board of the ECB

1 Introduction

The declining trend of interest rates in the past few decades is striking. Although some scholars discussed that the slump in the real interest rates could be traced back for centuries (**?**), there has been, at least, more or less a consensus on the secular stagnation of the last few decades since the IMF Conference in 2013. Economists suggested a variety of explanations for the secular decline, including demand-side explanations such as demand shortfall along with aging population (**?**), "a lack of investment opportunities" (**?**), as well as supply-side explanations such as the slump in productivity growth (**?**). While these prominent explanations account for the economic forces that are beyond the reach of monetary policy, in a recent and striking study, **?** found that 3-day time windows around the Federal Open Market Committee (FOMC) meetings capture the secular decline in 10-year Treasuries in the past few decades, and outside-window yield changes are transitory. By courtesy of this remarkable result, the question naturally arises is the following: In the world of US dollar dominated debt markets, do the monetary policy decisions of central banks other than the Fed have similar explanatory power on the yield change in long-term government bonds, or is Hillenbrand's (2022) result a unique case for the Fed? By extension, can the secular decline in the real interest rates in other countries, depicted in the yield change of the long-term government bonds, be accounted for by the monetary policy decisions of the Fed, leading to a potential discussion on a global monetary policy and the "Global Financial Cycle"?

The results of my paper indicate that although there is a strong heterogeneity between advanced economies and confounders such as unconventional monetary policy tools or exchange rate interventions, to a certain extent, there is a supporting evidence for a stronger Fed effect than the national monetary policy over other countries' government bond yields. In this respect, this evidence is in line with **?** work on the World Asset Market bla bla.

In a nutshell, in this paper, following the descriptive yet stimulating approach of

?, I constructed 3-day monetary policy decision windows around the 10-year government bond yields for selected advanced economies, using both the decision dates of the domestic central bank and the Fed. This approach allowed me to capture yield movements around both central banks that confirm or reject the Global Financial Cycle thesis. Then, the simple empirical approach developed in this study is an OLS method to confirm or deny at this covariance with certain statistical significance. With an attempt to establish a link between the literature on Global Financial Cycle and Secular Stagnation, this paper departs from the similar studies.

2 Related Literature

The decline in real interest rates in recent decades is noted by **?**, claiming that the lack of investment opportunities along with raised private saving propensities and reduced investment propensities. That is to say, this approach determines a macroeconomic framework around the Global Financial Crisis and the Eurozone crisis. On the other hand, **?** argues that the decline in the long-term real interest rates is not particular to recent decades. Instead, it is a trend stationary and persistent decline that dates back to the 1300s. This long-term decline, according to **?** reflects the reduced discount factors over time at the global scale and challenges explanations around productivity and demographics.

Shifting the perspective on the decline of real interest rates to financial markets and monetary policy, in their study, **?** presented that the longer-term interest rates in advanced economies, proxied by 10-year bond yields, were declined in response to both an unanticipated conventional easing and unconventional monetary actions of the Fed. While conventional monetary easing steepens the yield curve in advanced economies through a larger decline in the short-end of the yield curve, unconventional monetary actions narrow the yield spread of nominal foreign interest rates down. Moreover, **?** documented that the changes in monetary policy affect the 10-year forward real rates, utilizing movements during the FOMC announcement days. They offer a "reaching for yield" mechanism such that the yield-oriented investors substitute for longer-term bonds as short-term yields decline if the yield curve is upward-sloping. In turn, increasing demand for longer maturity bonds leads to increasing prices and declining yields. That is, this explanation relies on a "term premium" effect. (**?**)

Starting from ? and ?, there is a growing literature on identifying high-frequency monetary policy shocks. ? provide a comprehensive analysis of the "Fed information effect" and monetary non-neutrality by examining high-frequency interest rate changes around FOMC meetings, i.e., monetary policy announcements influence not only financial variables but also adjust the beliefs and expectations of private sector participants about economic trajectory. By incorporating the adjustment of private sector expectations, the authors reveal that a considerable portion of the observed responses in real interest rates can be attributed to changes in perceptions of the natural rate of interest, emphasizing the dual role of monetary policy in shaping expectations. Yet, later on, ? challenge the prevailing "Fed information effect" hypothesis, which posits that monetary policy announcements convey new information about economic conditions to the market. By analyzing high-frequency financial data around FOMC meetings and incorporating public economic news in their regressions, they propose the "Fed response to news" hypothesis. Their findings suggest that both the Fed and market participants react similarly to public economic information rather than the Fed possessing unique, market-moving insights.

? states that a narrow window around Fed meetings captures the secular decline in U.S. Treasury yields since 1980. Yield movements outside this window are transitory and wash out over time. This is surprising because the forces behind the secular decline are thought to be independent of monetary policy. However, Fed announcements might provide guidance about the long-run path of interest rates. In direct support of such"Long-run Fed Guidance".

Heretofore, I discussed the literature on the monetary policy and declining real interest rates, depicted in bond yields. Nevertheless, another line of research that is indispensable for this study, is on the "Global Financial Cycle", which is elaborated in ?, ? and ?. ? demonstrated that a single global factor explains around one-fifth of a common variation of the risky asset prices around the world. Given that the U.S. dollar is the dominant currency of global banking, one instance of this is that almost %80 of the syndicated loans that have an average amount greater than $5 million are denominated in the U.S. dollar, the monetary policy decisions by the Fed have a direct impact over the Global Financial Cycle. The potential explanations for this phenomenon are the deleveraging of the financial intermediaries around the globe, and relatedly, a decline in global credit and gross capital flows, and a significant rise in aggregate risk aversion. (?) In their work on

surrender options in life insurance and market interest rates, **?** estimates two-stage least-squares regressing German government bond rates on the U.S. monetary policy shocks, claiming a transmission through the international bond market channel.

3 Data and Institutional Background

This section involves providing background information on the institutional background of the central banks' mechanisms for monetary decision-making for each country in the sample. Later, I elaborate on both yield data and monetary policy decision data, including the number of observations and time intervals.

3.1 Eurozone

In the European Central Bank (ECB), the Governing Council is the principal decision-making entity for conducting monetary policy. The Governing Council consists of twenty-six members—six members of the Executive Board and the Euro-area national central bank governors. While the Governing Council members meet twice a month to evaluate macroeconomic and financial conditions, it decides monetary policy stance every six weeks. The Governing Council conducts monetary policy through three key interest rates: the main refinancing operations rate, the deposit facility rate, and the marginal lending facility rate. I obtained the dates of monetary policy decisions from the ECB website. My sample contains in total 299 monetary policy decision dates, from March 1999 to March 2024. To remove potential heterogeneity between bond yields of different countries, I selected Germany. I collected on-the-run yield data on 10-year German Bunds.

3.2 United Kingdom

In the United Kingdom, the Monetary Policy Committee (MPC) is the key decision-making body of the Bank of England (BoE) to conduct monetary policy. The MPC is made up of nine members – the Governor, the three Deputy Governors for Monetary Policy, Financial Stability and Markets and Banking, our Chief Economist and four external members appointed directly by the Chancellor. The main monetary policy interest rate set by the MPC is called the 'Bank Rate', which refers to the interest rate BoE pays to commercial banks that hold money with the BoE. The dates of monetary policy decisions are collected from the BoE's voting history database, ranging from June 1997

to March 2024, and the total number of data points is 295. I collected yield data of the UK government bonds, also known as gilts, from 1979 to 2024 from the BoE database. The yield data contains the estimation for zero-coupon continuously-compounded yields, computations are elaborated in **?**.

3.3 Japan

In Japan, the key decision-making body for conducting monetary policy is the Policy Board of the Bank of Japan (BoJ). The Policy Board consists of nine members, including the Governor, two Deputy Governors, and six other members who are appointed by the Cabinet. The primary monetary policy instrument used by the BoJ is the Policy-Rate Balance, which refers to the interest rate applied to the policy-rate balances held by financial institutions at the BoJ. In the dataset on monetary policy decision dates by the BoJ, there are 515 data points, ranging from December 1981 to March 2024. The interest rates on government bonds are collected from the database of Japanese Ministry of Finance, and computed using on-the-run securities.

3.4 Canada

In Canada, the Governing Council of the Bank of Canada is the decision-making body for conducting monetary policy and promoting a more resilient financial system. The Governing Council comprises six members: the Governor, the Senior Deputy Governor, and four Deputy Governors. The Council uses the policy interest rate as a main tool for conducting monetary policy, and the rate is typically set on eight predetermined announcement dates annually, with decisions reached by consensus rather than through individual votes. Within the sample, there are 175 monetary policy decision dates spanning from January 1999 to April 2024, and for the yield data, I consulted the Bank of Canada's own data sources, from which **?** constructed the historical zero-coupon yield curve data.

3.5 Switzerland

The Governing Board, the Swiss National Bank's (SNB) highest management and executive body, comprises three members appointed for six-year terms by the Federal Council upon the recommendation of the Bank Council. The Governing Board holds the primary responsibility for formulating monetary policy. The SNB implements this policy by setting the SNB policy rate, with the objective of aligning short-term Swiss franc money

market rates closely with the policy rate. The data on the monetary policy decision dates spans from January 2000 to March 2024, with a total number of 109 meetings. Yield data, referred to as the spot interest rates, represent the yields on zero-coupon bonds computed by the extended Nelson-Siegel procedure by the SNB.

3.6 Australia

The Reserve Bank of Australia (RBA) conducts monetary policy through its key executive body, the Reserve Bank Board. This Board comprises nine members, including the Governor, the Deputy Governor, the Secretary to the Treasury, and six other members appointed by the government. The Board convenes eight times a year to review and set monetary policy. The primary monetary policy instrument utilized by the RBA is the "cash rate target", which is the interest rate on overnight loans in the money market, and this rate influences a range of interest rates across the economy. For my analysis, I collected the dates of monetary policy decisions from the RBA, spanning from August 1992 to March 2024, which includes a total of 215 meetings. Additionally, I collected yield data of Australian government bonds from January 1995 to May 2024 from the Reserve Bank of Australia's database. The yields are computed and interpolated by the RBA.

4 The Decline in Interest Rates and Monetary Policy

In the selected sample of advanced economies, the results imply heterogeneous effects of the national monetary policy and the U.S. monetary policy. Furthermore, unconventional monetary policy interventions, e.g., quantitative easing programs, yield varying results in different countries. Therefore, I examine the yield movements around the monetary policy decision dates by country.

4.1 German Bund Yields

In Figure 1 and 2, the cumulative yield change of the 10-year German bunds are depicted. Figure 1 implies that the monetary policy decision by the ECB appears to be a white noise for German bunds. Yield change and ECB's within-window yield change have even opposite directions around 2009-2012. This raises a question whether the unconventional monetary policy tool of the ECB, namely the Securities Market Programme of 2010-2012, has fortify the lack of relationship between ECB's monetary policy actions and German

bunds. On the other hand, the Fed's actions, at least between 2008 and 2012, appears to have an effect on German bund yields.

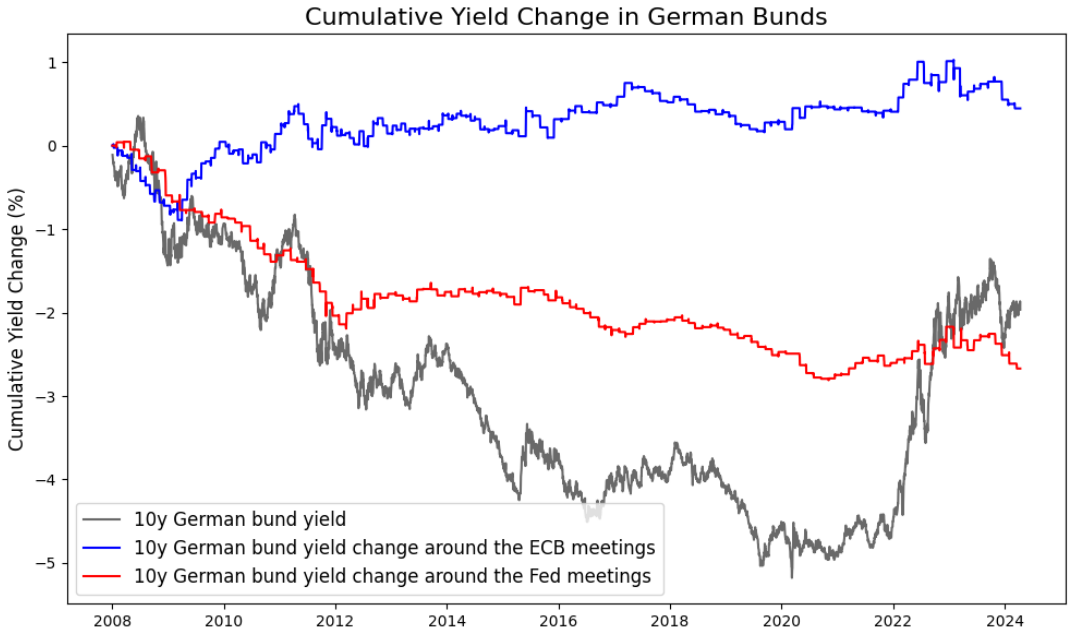

Figure 1: 3-day windows around the ECB and Fed meetings (2008-2024)

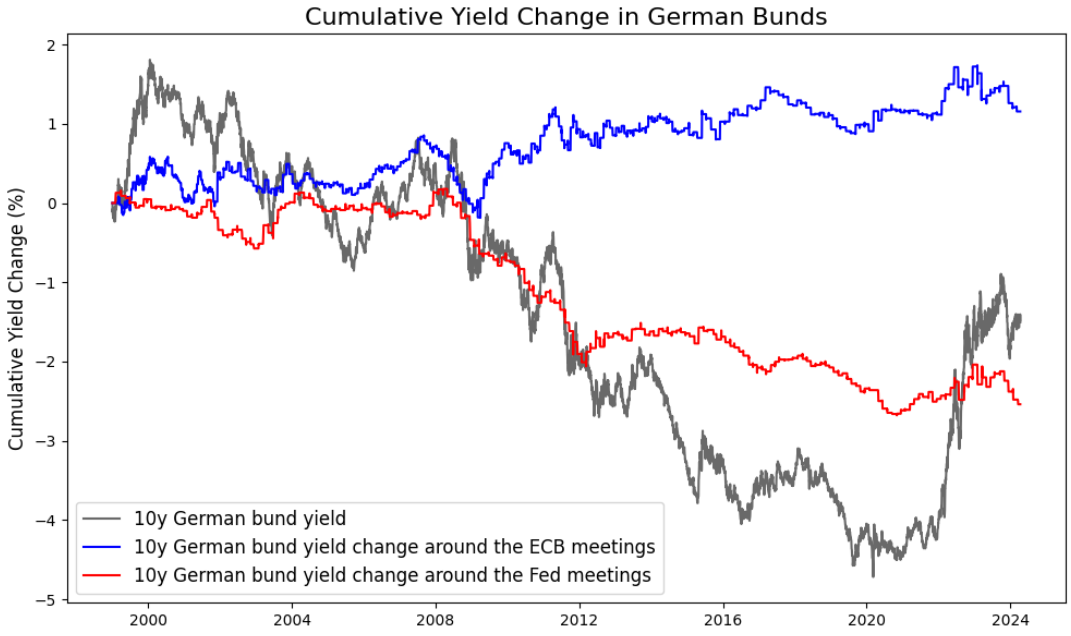

Figure 2: 3-day windows around the ECB and Fed meetings (1999-2024)

4.2 UK Gilt Yields

Evidence suggest that although after 2008 crisis BoE has lost some of its authority over the long term real rates, comparing the other countries within the sample, United Kingdom

enjoys more monetary authority over its yields.

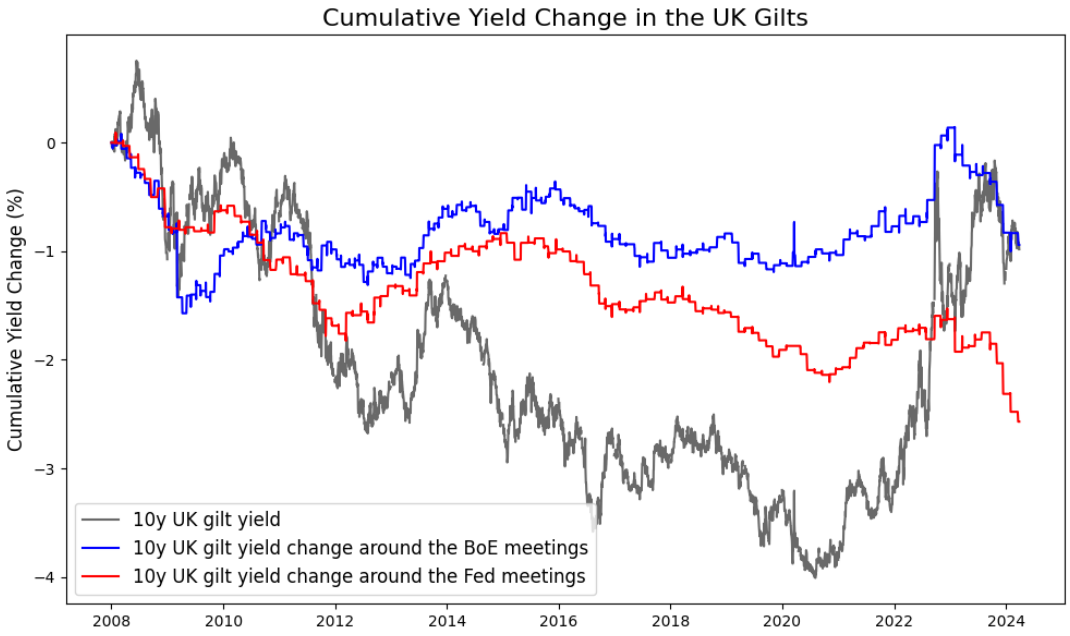

Figure 3: 3-day windows around the BoE and Fed meetings (2008-2024)

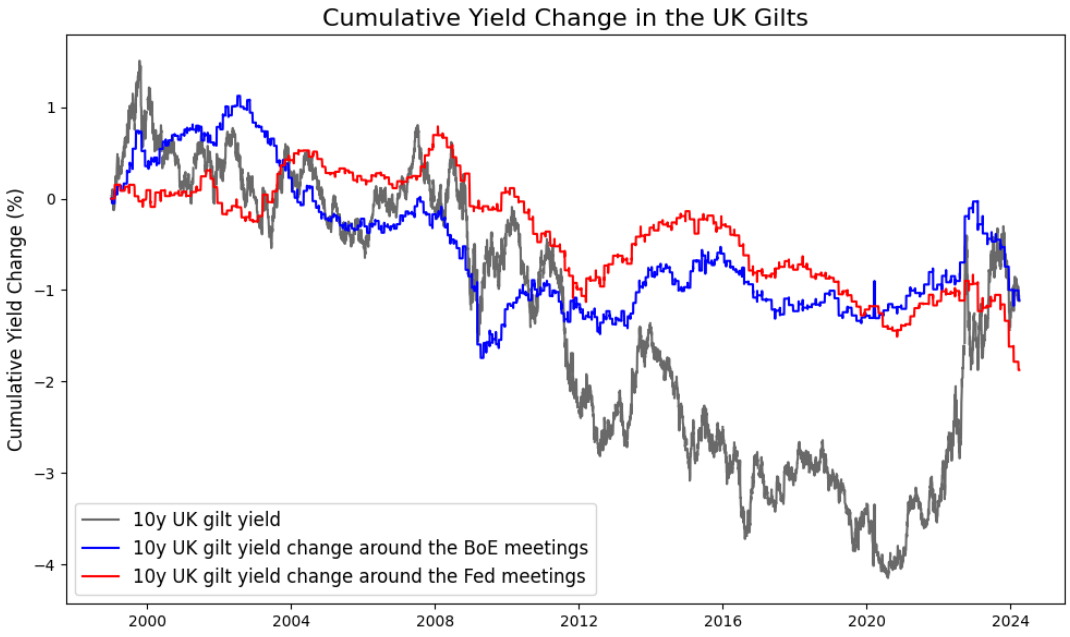

Figure 4: 3-day windows around the BoE and Fed meetings (1999-2024)

4.3 Japanese Government Bond (JGB) Yields

While Bank of Japan was enjoyed monetary authority over the long-term bond yields up until around 2006-2008, evidently, after the crisis, the yield movements happen around the Fed meetings thereafter.

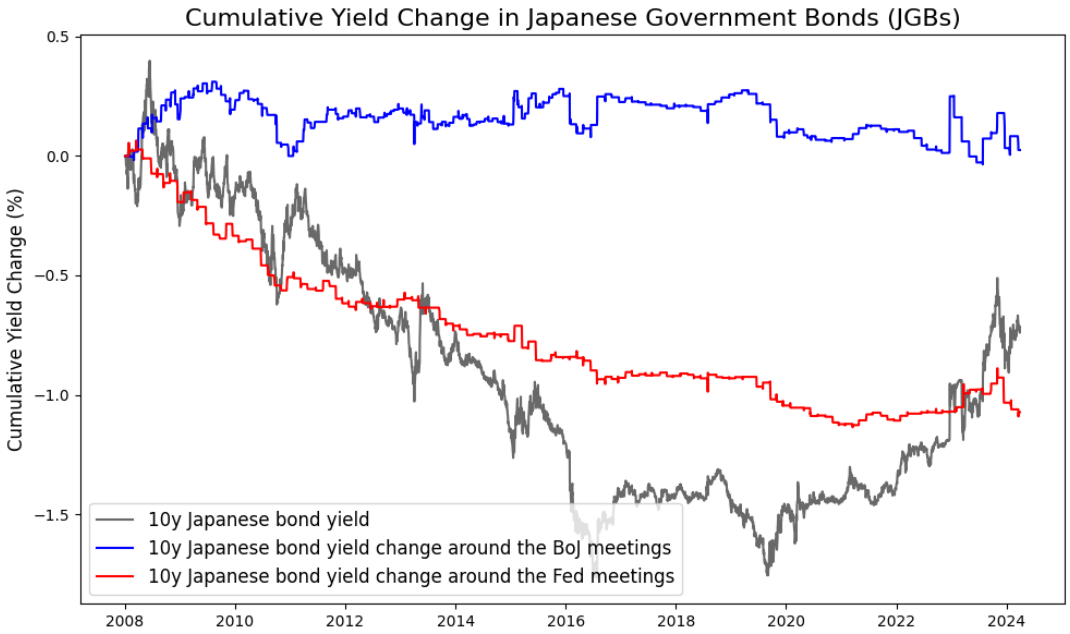

Figure 5: 3-day windows around the BoJ and Fed meetings (2008-2024)

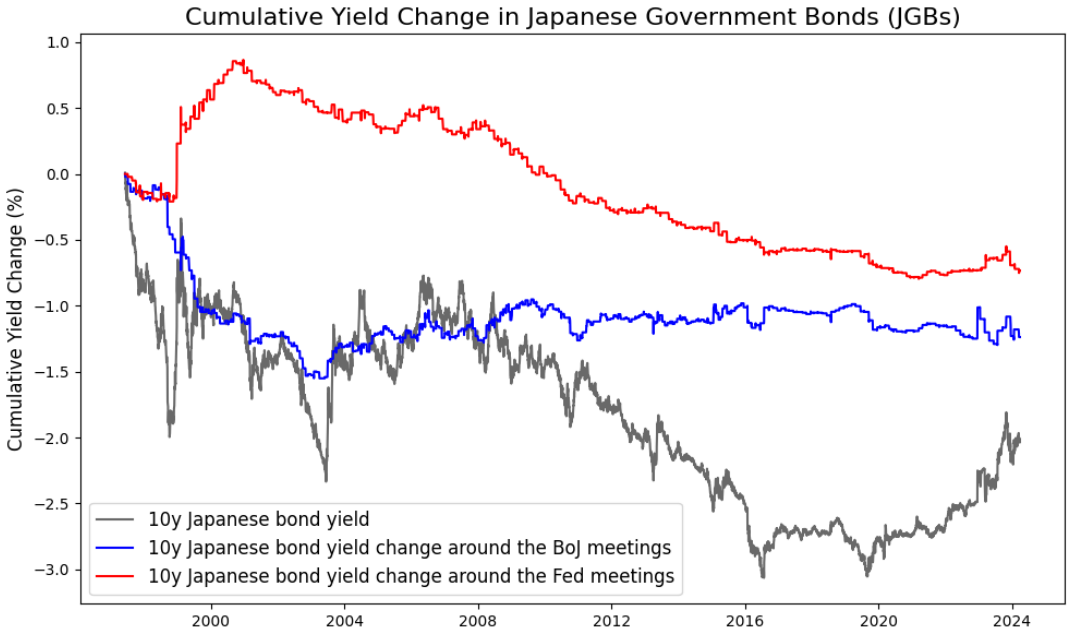

Figure 6: 3-day windows around the BoJ and Fed meetings (1997-2024)

4.4 Canadian Bond Yields

Thank God, this one is a bit more obvious. Canadian yield movements follow the Fed more than it follows BoC.

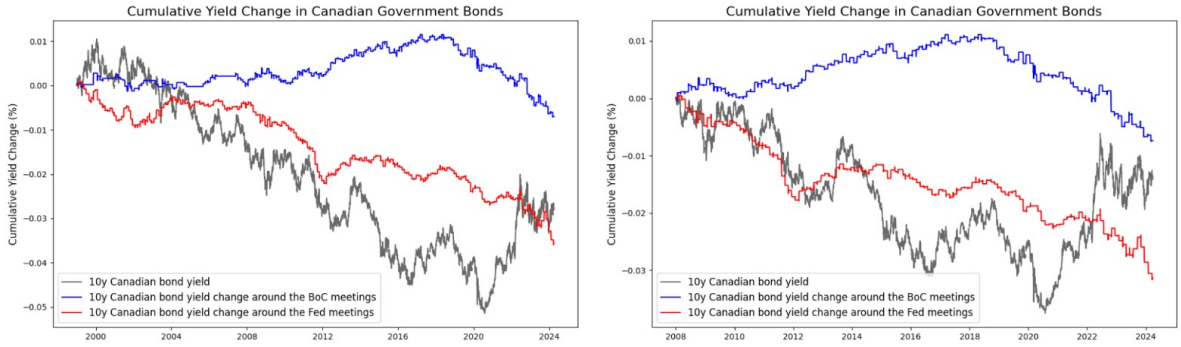

Figure 7: 3-day windows around the BoC and Fed meetings (2008-2024)

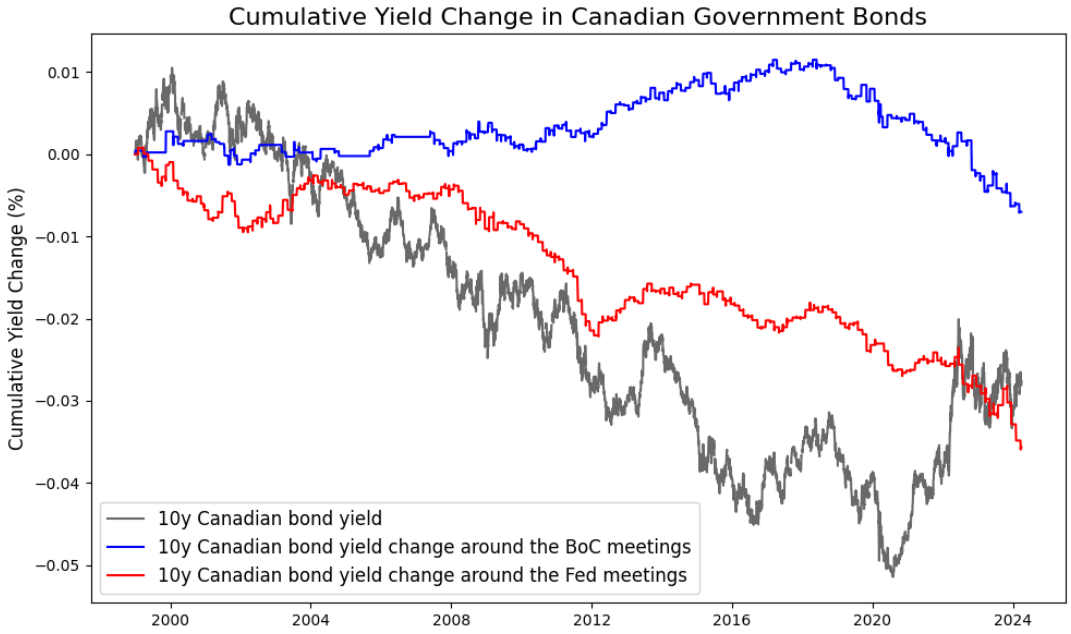

Figure 8: 3-day windows around the BoC and Fed meetings (1999-2024)

4.5 Swiss Confederation Bond Yields

Figure 9 and 10 accurately indicate that neither the 3-day windows around the FOMC meetings nor those around the Swiss National Bank meetings have any explanatory power of declining long-term yields. Furthermore, there exist no structural breaks attributable to the Global Financial Crisis. Given that these results differ significantly from those of other countries in the sample, further investigation is warranted.

There are significant macro-financial differences between Switzerland and the rest of the sample. First, the statistics and ? suggest that the Swiss National Bank conducts sizeable currency intervention in order to influence inflation or to protect the "safe haven" status of the Swiss Franc. ? states that the exchange rate affects the real interest rates in Switzerland, through the convenience yield, mediated by a valuation effect.

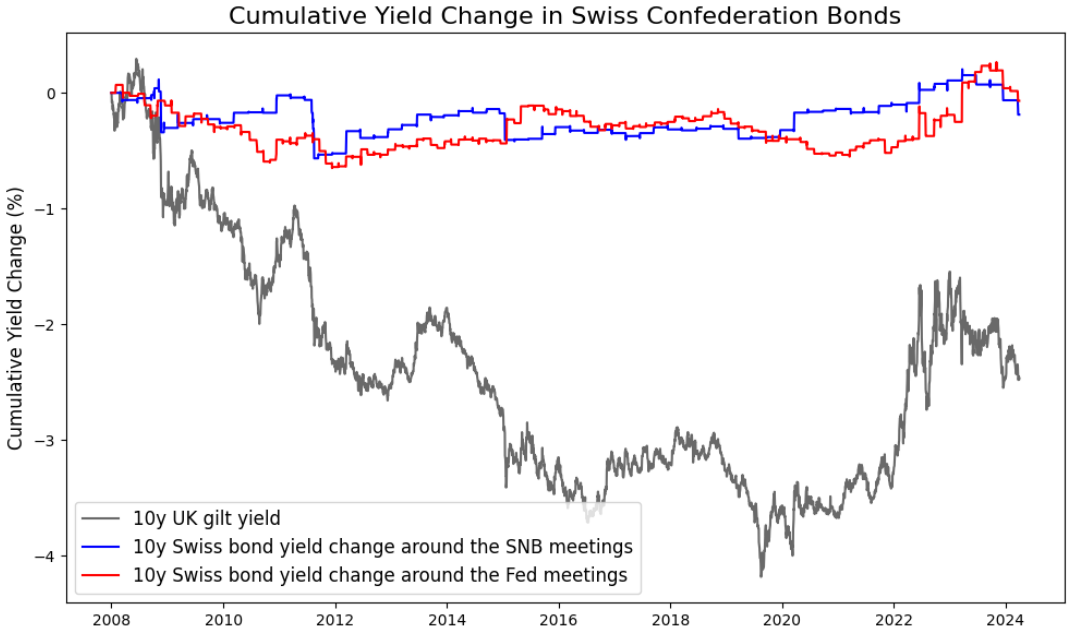

Figure 9: 3-day windows around the SNB and Fed meetings (2008-2024)

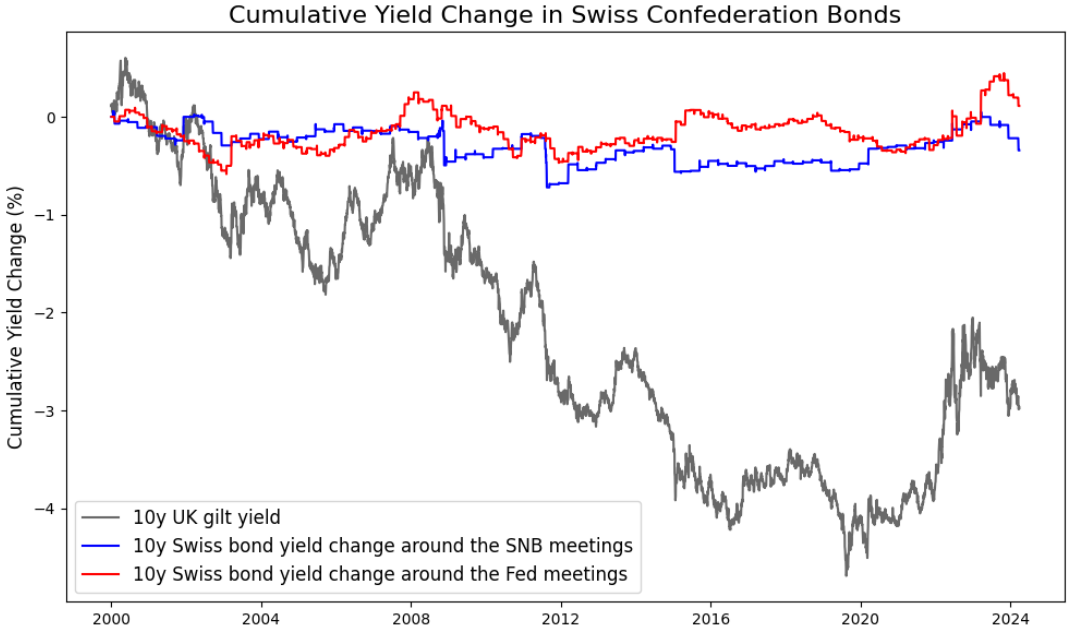

Figure 10: 3-day windows around the SNB and Fed meetings (2000-2024)

4.6 Australian Government Bond Yields

OK. This one is a bit more complicated. First, I need to think about it

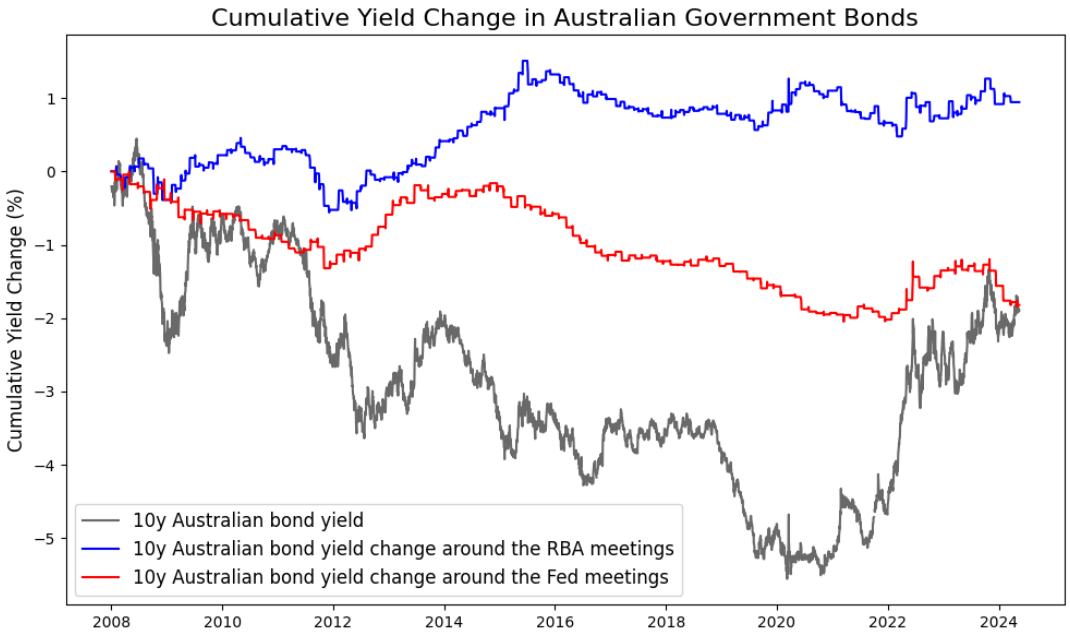

Figure 11: 3-day windows around the RBA and Fed meetings (1997-2024)

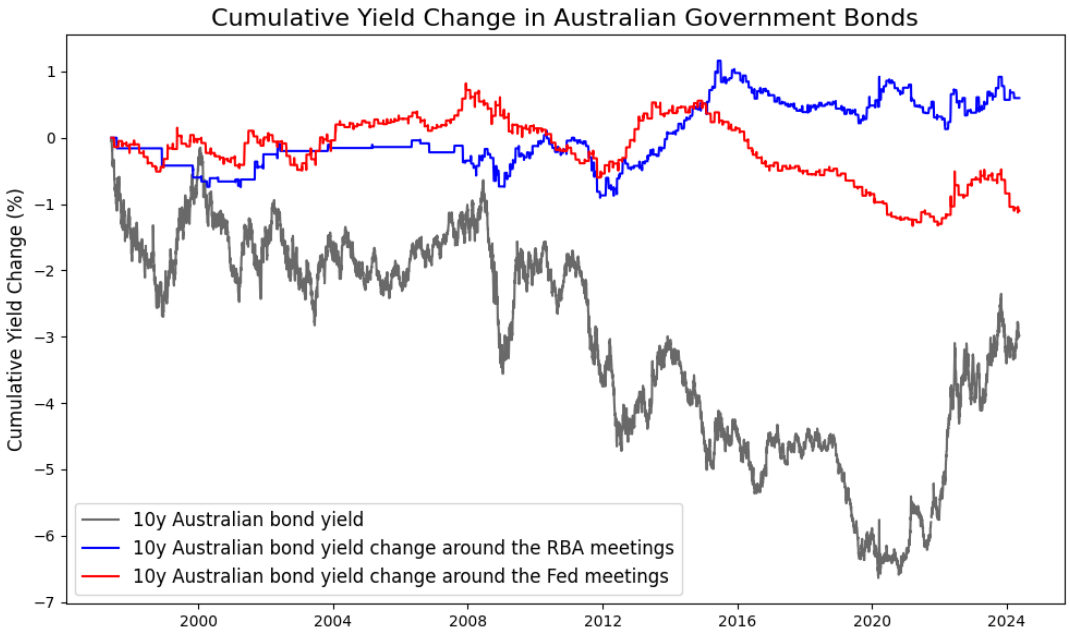

Figure 12: 3-day windows around the RBA and Fed meetings (1997-2024)

5 Empirical Strategy

In order to test the statistical significance of this relationship, I regress the daily yield change of 10-year government bonds on the 3-day window of both national and the U.S. monetary policy decisions, and quantitative easing variables, to strip the yield effect of QEs out, such that the specification is:

$$\begin{aligned}\Delta_{t-1,t}10\text{yr} = \beta_0 &+ \beta_1 \,\text{Dummy(3-day MP Window)}_t + \\ &\beta_2 \,\text{Dummy(3-day FOMC Window)}_t + \\ &\beta_3 \,\text{Dummy(QE)}_{t,s} + \beta_4 \,\text{Dummy(QE)}_{t,\text{US}} + \mathbf{Z}_t + \varepsilon_t\end{aligned}$$

where $\Delta_{t-1,t}10\text{yr}$ represents the yield change of 10-year government bond from $t-1$ to t. While MP Window$_t$ represents domestic 3-day window, FOMC Window$_t$ is the U.S. monetary policy. QE variables are by construction dummy, and the domestic and U.S. quantitative easing variables, respectively. $\mathbf{Z}_t$ denotes the set of control variables to avoid potential endogeneity problems. Since the on-the-run bond prices are determined in the market through the supply and demand, (1) US Dollar Index to measure the strength of the U.S. dollar against a basket of currencies, (2) CBOE Volatility Index to capture market sentiment and volatility as both might impact investors' preferences, (3) Index of Global Real Economic Activity to capture the state of global real economic activity (developed by **??**), are included in the matrix of control variables, $\mathbf{Z}_t$.

6 Results

Table 1: Regression Results

	Dependent variable: 10yr Change					
	ECB	BoE	BoJ	SNB	RBA	BoC
In BoC 3dWindow						-0.000
						(0.000)
In BoE 3dWindow		-0.002				
		(0.007)				
In BoJ 3dWindow			0.000			
			(0.001)			
In ECB 3dWindow	0.001					
	(0.002)					
In Fed 3dWindow	-0.002	-0.010	-0.003**	0.001	-0.004	-0.000**
	(0.002)	(0.007)	(0.001)	(0.002)	(0.004)	(0.000)
In RBA 3dWindow					0.001	
					(0.005)	
In SNB 3dWindow				-0.000		
				(0.002)		
Intercept	-0.016**	-0.016	-0.006*	-0.005	-0.008	-0.000
	(0.007)	(0.035)	(0.003)	(0.004)	(0.010)	(0.000)
DXY	0.000**	0.000	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IGREA	0.000*	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VIX	0.000	0.000	-0.000	-0.000**	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4284	1071	3412	5371	4556	5168
R^2	0.002	0.005	0.003	0.001	0.001	0.001
Adjusted R^2	0.001	0.001	0.001	0.000	-0.000	0.000
Residual Std. Error	0.041	0.060	0.019	0.035	0.074	0.000
F Statistic	1.496	1.175	1.997*	1.471	0.732	1.001

Note: *p<0.1; **p<0.05; ***p<0.01

7 Conclusion

Appendix

Estimation of Yield Curve with Nelson-Siegel-Svensson Model

In their seminal paper, **?** specifies the forward rate curve $\tau(f)$ as follows:

$$f(\tau) = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \end{pmatrix}' \begin{pmatrix} 1 \\ e^{-\tau/\lambda} \\ (\tau/\lambda)e^{-\tau/\lambda} \end{pmatrix} = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \end{pmatrix}' \begin{pmatrix} f_0 \\ f_1 \\ f_2 \end{pmatrix}$$

The spot rate function, which is the average of the forward rate curve up to time to maturity τ, is defined as:

$$r(\tau) = \frac{1}{\tau} \int_0^\tau f(u)\, du$$

with continuous compounding. Hence, the corresponding spot rate function at time to maturity τ reads

Table 2: Historical Credit Ratings of Sampled Countries

	S&P	Moody's Ratings	Fitch Ratings
Germany			
2024	AAA	Aaa	AAA
1994			AAA
1986		Aaa	
1983	AAA		
United Kingdom			
2024	AA	Aa3	AA-
2020		Aa3	AA-
2017		Aa2	
2016	AA		AA
2013		Aa1	AA+
1994			AAA
1978	AAA	Aaa	
Japan			
2024	A+	A1	A
2015	A+		A
2014		A1	
2012			
2011	AA-	Aa3	
2009		Aa2	
2007	AA		
2004		Aaa	
2002	AA-		
2001	AA		AA
2000			AA+
1998		Aa1	
1994			AAA
1981		Aaa	
1975	AAA		

	S&P	Moody's Ratings	Fitch Ratings
Canada			
2024	AAA	Aaa	AA+
2020			AA+
2004			AAA
2002	AAA	Aaa	
2001			AA+
2000		Aa1	
1995		Aa2	
1994		Aa1	AA
1992	AA+		
1974		Aaa	
Switzerland			
2024	AAA	Aaa	AAA
2000			AAA
1999			AA
1994			AA-
1994			AA
1988	AAA		
1982		Aaa	
Australia			
2024	AAA	Aaa	AAA
2011			AAA
2003	AAA		AA+
2002		Aaa	
1999	AA+		
1996			AA
1989	AA	Aa2	
1986	AA+	Aa1	

Note: The data is obtained from the World Government Bonds.

Historical Interest Rates

Figure 13: Long-Term *Nominal* Interest Rates

Note: In this figure, long-term interest rates refer to 10-year bond yields. The data is obtained from OECD Database.

Statement of Authorship:

I hereby confirm that the work presented has been performed and interpreted solely by myself except for where I explicitly identified the contrary. I assure that this work has not been presented in any other form for the fulfillment of any other degree or qualification. Ideas taken from other works in letter and in spirit are identified in every single case.