Monetary Policy and Stock Prices

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Abstract

Stock prices have recently fallen as inflation has risen and expectations of rate rises have grown. I assess how changes in monetary policy affect stock prices through a high-frequency approach across a panel of nine developed countries and the eurozone and accounting for changes in interest rates across the yield curve. I find that a 1 basis point increase in the five-year interest rate due to monetary policy changes lowers stock prices by 3.56 basis points. Movements in the short-term part of the yield curve drive the relationship. I estimate the degree to which increases in interest rates have lowered stock prices in recent months and how much further they could fall if rates continue to rise.

Keywords: Monetary policy, stock prices, yield curve
JEL Codes: E44, G12, E52

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1 Introduction

Over the past year, stock markets have seesawed as they process the potential for interest rate rises in response to higher inflation. US inflation rose to 8.5 percent year-over-year in March 2022, which was the highest rate in more than 40 years. In March, the Federal Reserve raised interest rates for the first time since December 2018. Markets expect additional rate increases from the Fed. Following the initial rate hike, the 10-year interest rate rose from below 1 percent during the height of the pandemic in mid-2020 to 2.9 percent in April 2022. As interest rates rise, bonds become a more attractive investment and the economy may face contractionary headwinds, so stocks typically fall. Indeed, this has already played out to some degree, as stock markets had pulled back by around 10 percent at the time of this writing, in April 2022, from record highs at the end of 2021. There has also been marked volatility as markets process the degree to which expected rate rises are likely to impact stock prices. It is important for policymakers to understand how stock markets may respond to interest rate rises because stock prices have been shown to affect consumption (Chodorow-Reich, Nenov, and Simsek, 2021) and investment (Baker, Stein, and Wurgler, 2003), so a fall in stock prices could have a contractionary effect on the economy.

In this paper, I identify how a change to monetary policy affects stock prices and assess what this could mean in the current environment. I have three questions in mind. First, how does a movement in interest rates due to a change in monetary policy affect stock prices? Second, how much have stock prices fallen and how much further could they fall due to changes in monetary policy in response to higher inflation? Third, how does the current policy environment affect the relationship between interest rates and stock prices?

I identify the impact of monetary policy changes on stock prices using a high-frequency approach. I look at how interest rates on sovereign bonds change around domestic monetary policy events and the response of domestic stock markets in the same window. The high-frequency identification approach helps to ensure I'm capturing only the impact of monetary policy changes on stock markets rather than the effects of other announcements as well. I analyze a panel that includes the eurozone, the United State, and eight other developed countries. The monetary policy events I consider are the releases of decisions made in monetary policy committees and the subsequent releases of minutes about these meetings. These data are primarily compiled from Bloomberg. The high-frequency interest rate and stock market data are mainly sourced from Refinitiv. I consider a high-frequency window of one hour on either side of monetary policy events, though my results are similar with a narrower window.

I find that monetary policy changes that raise interest rates significantly lower stock prices. A 1 basis point rise in the five-year interest rate due to monetary policy changes lowers stock prices by 3.56 basis points. The result is very similar under an alternative method for constructing the measure of the five-year interest rate and when considering the United States only. I explore how the results vary across different maturities. I find that changes in longer-term maturities have a larger impact on stock prices, though this is perhaps unsurprising since a monetary policy event that raises the 10-year interest rate by 1 basis point is likely to be more significant than a monetary policy event that raises the two-year interest rate by 1 basis point. Therefore, I also decompose how changes in different parts of the yield curve impact stock prices. I find that the only part of the yield curve that has a significant impact on stock prices is the zero- to two-year component. In other words, only changes in the expected short-term path of interest rates appear to impact stock prices. One reason for this could be because changes in longer-term interest rates may reflect changes in the term premium rather than changes in the expected path of interest rates.

I estimate the impact of recent and hypothetical interest rate rises. I consider two policy cases. First, I estimate that the rise in interest rates from July 2021 to January 2022 lowered stock prices by 1.7 to 5.5 percentage points. Second, I estimate that if interest rates were to rise from their level in January 2022 to their average 2002–2007 level, stock prices would fall by 10.2 to 29.0 percentage points. I do this by multiplying the estimates I obtain for the impact of monetary policy changes on stock prices by the change in interest rates in each of these policy cases. My analysis and the policy estimates look at how surprise changes to monetary policy affect interest rates, as opposed to how movements in monetary policy in response to changes in the economic environment affect interest rates. Therefore, I effectively abstract from the underlying causes that might lead interest rates to rise. I make this simplification because it is difficult to realistically simulate which economic changes could cause interest rates to rise and how monetary policy would respond to them.

I also consider how the current environment may affect the strength of the relationship between interest rates and stock prices. I find that monetary policy changes that raise rates have a greater negative effect on stock prices when the yield curve is less upward sloping. One potential explanation is that a flatter yield curve implies there will be less discounting by market participants in the future, so stock prices in the future will respond more to interest rate changes. Yield curves were relatively flat as of April 2022, implying that there will be a strong negative relationship between interest rates and stock prices if rates do rise further.

Other papers also look at the impact of monetary policy changes on stock prices. Ioannidis and Kontonikas (2008) look at 13 Organisation for Economic Co-operation and Development (OECD) countries separately through a linear regression approach and find that a 1 basis point rise in domestic short-term interest rates significantly lowers stock prices for most of the countries by about 1 to 2 basis points. Bjørnland and Leitemo (2009) estimate the relationship between interest rates and stock prices using a structural vector autoregression method and find that a 1 basis point rise in the policy rate lowers stock prices by 7 to 9 basis points. I apply a rigorous high-frequency approach to determine the strength of the interest-rates-stock-prices relationship. Other papers looking at the impact of monetary policy shocks through a high-frequency identification approach assess the relationship strength only in passing. Gürkaynak, Sack, and Swanson (2004) find that a rise of 1 basis point in the target component of interest rates lowers stock prices by 4.3 basis points, while a 1 basis point rise in the path component of interest rates does not significantly affect stock prices. Nakamura and Steinsson (2018) find that a rise of 1 basis point in the path component of interest rates lowers stock prices by 6.5 basis points, but this decrease is not significant at the usual 5 percent level. I add to these results by looking at the interest-rates-stock-prices relationship across a wide range of countries, studying in detail the response to changes in medium-term and long-term interest rates, and considering which part of the yield curve drives the relationship. Due to my high-frequency approach combined with a large panel of countries, I am also able to provide estimates with much greater precision relative to comparable papers.

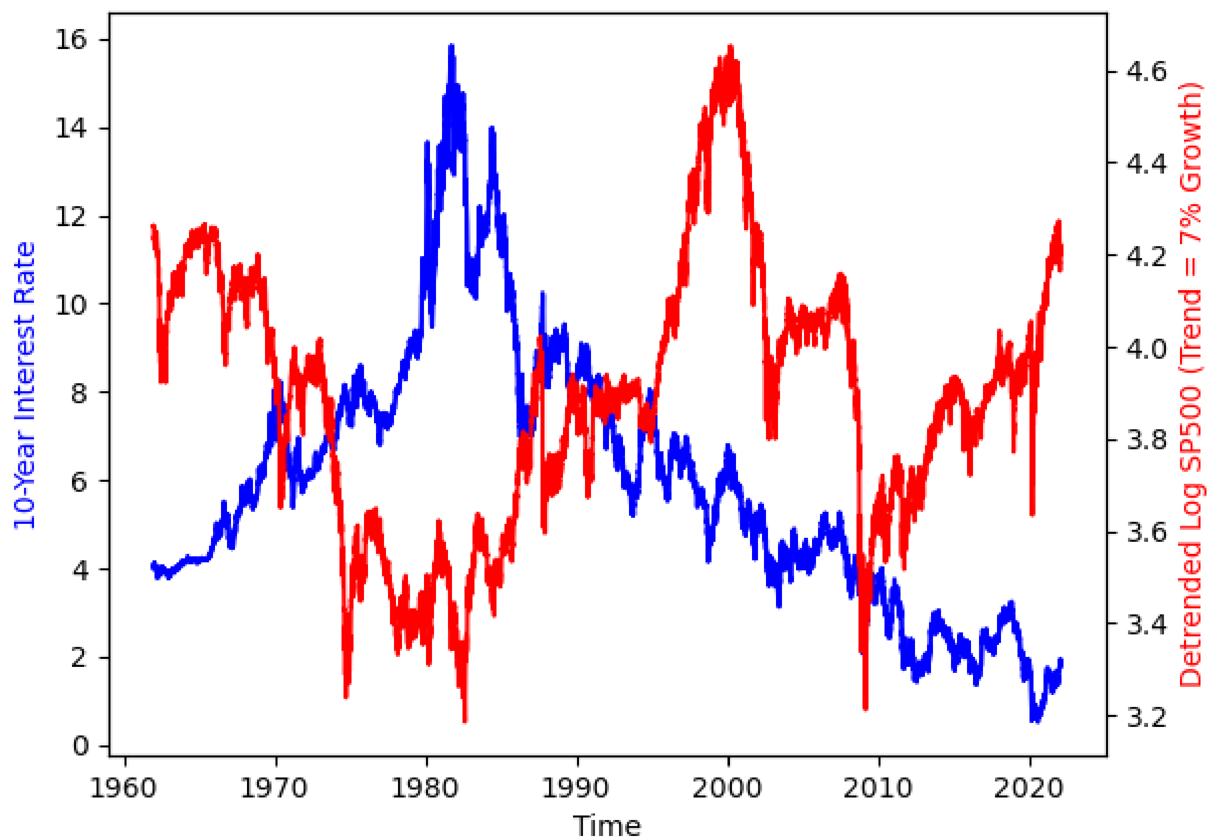
In section 2, I assess the historical relationship between interest rates and stock prices. Section 3 explains my empirical approach. In section 4, I provide my estimates for the impact of monetary policy changes on stock prices. Section 5 discusses the policy estimates. In section 6, I look at how current conditions may affect the relationship between monetary policy and stock prices. Section 7 concludes.

2 Historical Relationship

In this section, I consider the historical relationship between interest rates and stock prices. Figure 1 shows this relationship since the 1960s. The 10-year interest rate is shown in blue and the log of the SP500 (detrended by 7 percent growth) is shown in red. The broad trends seem to be that detrended stock prices fell as interest rates rose from 1960 to 1980 and have risen as interest rates have fallen since 1980. Two exceptional periods were the dot-com boom around 2000, when stock prices were very high, and the Great Recession around 2008, when stock prices were very low. However, in general, there appears to be a negative relationship between long-term interest rates and stock prices.

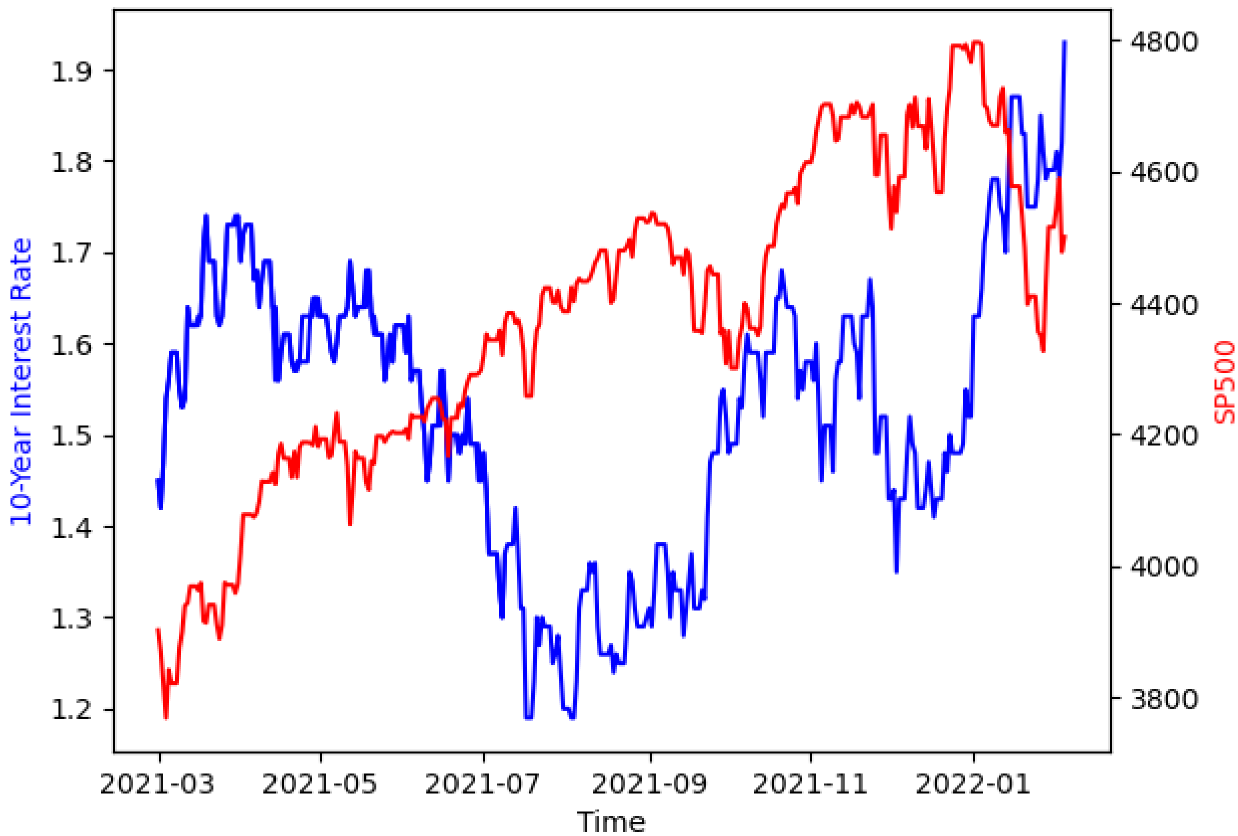
Figure 2 shows how the relationship evolved from March 2021 through February 2022. It includes the same variables as Figure 1, except I do not detrend the stock index. There were

Figure 1: Historical Relationship between Interest Rates and Stock Prices



The graph shows the US 10-year interest rate and the SP500 for 1962 to 2022. The 10-year interest rate is the rate released by the US Treasury. The SP500 data are detrended by 7 percent per year. The interest rate is shown in blue, and the SP500 is shown in red. Source: Haver.

Figure 2: Relationship between Interest Rates and Stock Prices over the Past Year



The graph shows the US 10-year interest rate and the SP500 for March 2021 through February 2022. The 10-year interest rate is the rate released by the US Treasury. The SP500 is not detrended in this graph. The interest rate is shown in blue and the SP500 is shown in red. Source: Haver.

broad rises in the stock market throughout this period as the economy recovered from the COVID-19 pandemic. However, stock prices fell in both October 2021 and more recently in January 2022 as interest rates rose.

It is not possible to draw any definitive conclusions about the impact of changes in monetary policy on stock prices from looking at historical trends. The relationship between interest rates and stock prices could demonstrate reverse causality, or other factors could be driving both variables. For example, if growth expectations improve, stock markets and interest rates may rise, biasing the relationship upward. This is why I study the impact of changes in monetary policy using a high-frequency approach, since it helps to remove the possibility that other factors are affecting the relationship.

3 Empirical Approach

I use a high-frequency approach involving monetary policy events to identify the impact of monetary policy changes on stock prices. I construct monetary policy shocks by looking at the change in interest rates on domestic sovereign bonds around monetary policy events in the eurozone, the United State, and eight other developed countries. I then look at how domestic stock prices respond to these monetary policy shocks.

3.1 Data

My analysis requires two types of data for each of the 10 countries/zones in the panel: (1) high-frequency data on interest rates and stock prices and (2) dates and times of monetary policy events.

The interest rate and stock data are primarily from Refinitiv, which offers high-frequency data from 1996 onward. The eight countries besides the eurozone and United States for which I construct high-frequency changes in interest rates and stock prices are Australia, Canada, Japan, Norway, New Zealand, Sweden, Switzerland, and the United Kingdom. I measure the interest rate in the eurozone using German bonds. I incorporate benchmark bonds (the bond closest to a specific maturity at a given time) and non-benchmark bonds (a specific bond expiring on a specific day). There are restrictions in Refinitiv on bond price data for the United States, so I also incorporate GovPX data on all US bond transactions before 2013.[1] I use the primary national stock index for each country/zone[2]. There are restrictions in Refinitiv on stock price data for the United States, so I use an ETF to measure changes in stock prices (the SPDR S&P500), which is available back to 1996.

I compile the release dates and times of monetary policy meeting announcements from several sources. My primary source is Bloomberg. I augment this information with data directly from national central bank websites and from two other websites that also provide details on central bank release dates.[3] Most of the monetary policy events in my analysis are the releases of interest rate decisions from monetary policy committee meetings. In addition to obtaining the

[1]GovPX data provide pricing information on all US government bonds. In this sense, they actually provide greater coverage than the Refinitiv bond data, which cover only some of those bonds. However, GovPX data are available only for the United States, and I have access only to the data through 2013. GovPX provides only limited information on each bond, so I combine this with information from the Center for Research in Security Prices (CRSP) on the bond type and maturity date by matching the CUSIPs of the bonds.

[2]I chose the stock indexes based on the ordering in Refinitiv Eikon, which seems to show the most followed indexes first.

[3]The websites are `www.investing.com` and `www.centralbanknews.info`.

dates and times of these releases, for a limited selection of countries, I'm also able to obtain the release dates and times for the minutes from the meetings, which can provide additional information about policymakers' thinking.[4] I reconciled the results from the different sources and also was very careful to handle time zones appropriately. Table 1 summarizes the monetary policy events for which I have dates and times. The sample includes 2,060 monetary policy meetings and the minutes from 699 monetary policy meetings.

Table 1: Summary of Monetary Policy Events

Country	Num. Meetings	Num. Minutes	Start Year
Australia	263	155	1998
Canada	166	0	2001
Eurozone	277	1	1999
Japan	318	148	1998
New Zealand	169	0	1999
Norway	180	0	1999
Sweden	128	62	2000
Switzerland	74	0	2004
United Kingdom	272	152	1997
United States	213	181	1996

The table provides data on the number of meetings/minutes and when the data begin. The second column shows the number of meetings, that is, the number of events relating to the release of an interest rate decision after a monetary policy committee meeting. The third column shows the number of meeting minutes releases, which come after the interest rate decisions are released and can provide additional information about policymakers' thinking, but which are not available for all countries/zones. The fourth column shows when the data on the monetary policy events begin. Source: Bloomberg.

3.2 Specification

I am interested in measuring the relationship in equation 1. I regress the change in the log of the domestic stock index in country/zone z at time t on the change in the interest rate, ΔI, for domestic sovereign bonds of maturity m in country/zone z at time t. I want to identify how a change in monetary policy affects stock prices, so I use a high-frequency identification approach to isolate periods when monetary policy alone is likely to change. Therefore, I run the regression only for periods when there was a monetary policy event in country z. The underlying assumption is that the change in the interest rate is due to the monetary policy

[4]Unlike some papers (for example Cieslak and Schrimpf (2019)), I do not include speeches by central bank governors or other events in my analysis because these are difficult to time correctly and would increase the frequency of clashes with other country events.

event and uncorrelated with other factors that could affect stock prices.

$$\Delta \log(StockIndex)_{z,t} = \Delta I_{m,z,t} + u_{z,t} | \text{MP event in zone z} \tag{1}$$

Since my identification approach assumes that changes in yield curves and stock prices around monetary policy meetings are driven purely by changes in monetary policy, I look at changes in a narrow window around meetings. I look at stock prices from one hour to 10 minutes before a meeting, taking the latest prices available. I then look at prices from 10 minutes to one hour after a meeting, taking the earliest prices available. I consider bond prices and stock prices only if I am able to get prices from within these windows before and after a meeting. The results are similar if I instead restrict the period to no earlier than 20 minutes before a meeting and no later than 20 minutes after it.

3.3 Interest Rate Measures

For my high-frequency identification approach, I need to measure interest rates before and after a monetary policy event. I take several preliminary steps to clean the interest rate data. Crucially, I consider only bonds for which I have data both before and after the event to avoid the risk that the bonds may have different rates before and after monetary policy events for other reasons. The interest rate data are based on indicative quotes submitted by banks. I drop any quotes that are the same as the previously submitted quote to avoid the possibility that quotes have not been updated. There are occasional other issues with quotes, including random large rate deviations. Therefore, I include only bond data points that show a change similar to interest rate changes for other bonds around the same monetary policy event.[5]

[5] For each monetary policy event and country/zone, I obtain a list of bond interest rates before and after the monetary policy event and their corresponding maturities. For each list, I then go through and remove outliers. I drop any bonds for which the change in the bond price from before to after the meeting is greater than 1 percentage point , that is, when interest rates change by 1 percentage point or more from before to after a meeting, which would be an extremely large monetary policy shock. I drop cases where there's only a single bond available for a specific meeting. For comparison with each bond, I find another bond with similar maturity for that country/zone: I compare the bond with the lowest maturity to the bond with the second-lowest maturity, the bond with the highest maturity to the bond with the second-highest maturity, and other bonds with the mean of the two bonds with the closest lower and higher maturity. I drop the bond if the interest rate of the comparison bond is more than 5 percentage points different either before or after the meeting. If a bond changes by more than 0.2 percentage point and the sign of the change in the comparison bond is different, then I drop it. If a bond changes by more than 0.2 percentage point and the comparison bond changes by less than a quarter of this magnitude, then I drop it. If a bond changes by more than 0.3 percentage point and the comparison bond changes by less than a third of this magnitude, then I drop it. If a bond changes by more than 0.4 percentage point and the comparison bond changes by less than half of this magnitude, then I drop it. I repeat the process of removing outliers until there are no more outliers (in case there happen to be two large bond changes next to each other). I drop any bonds that show a rate of exactly 0 percent, which was

I primarily apply a nonparametric approach to estimate the change in the interest rate for a given maturity. In the nonparametric approach, I compute the rate change for a given maturity by taking the average change in bonds with a maturity in a window close to the desired maturity. For example, to compute the change in the 10-year rate for a bond with a 2-year window, I would compute the average change in bond prices for bonds with a maturity of more than 9 years and less than 11 years. A second approach I use is to estimate the yield curve parametrically through the Nelson and Siegel (1987) method. With this second approach, I restrict the underlying data to bonds with maturities of less than 15 years, because I do not want bonds with very long-term maturities to shift the yield curve, as is possible with simple parametric estimates of the yield curve. Figure 3 shows the estimation of the yield curve under both methods for Australia on May 7, 2013, when the policy rate fell from 3 percent to 2.75 percent. Figure 3a shows the estimation with the nonparametric approach for the five-year interest rate with a two-year window. There are three bonds with data available both before and after the monetary policy event in the four- to six-year window. The dots show the before and after interest rates, while the horizontal lines show the means of these rates. The difference between the blue and red horizontal line reflects the change in the five-year interest rate found through the nonparametric method. Figure 3b shows the estimation using the Nelson-Siegel method. This incorporates all bonds (with a maturity of less than 15 years). With this structural approach, interest rates for one maturity could potentially mechanically affect the measurement of interest rates for another maturity, so I primarily use the nonparametric approach in this paper. However, I find the choice of yield curve does not affect the results in practice.

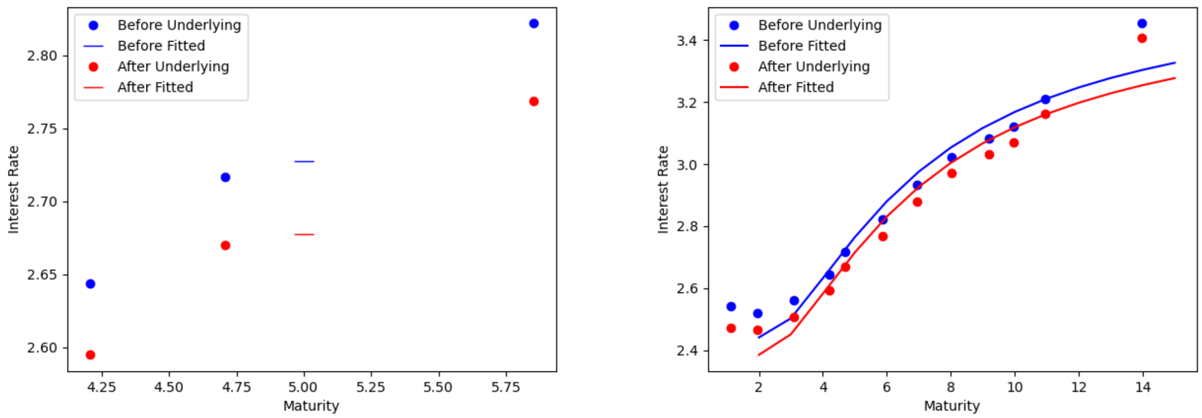
4 Empirical Relationship between Rates and Stock Indexes

In this section, I present my results identifying the impact of changes in monetary policy on stock prices.

In table 2, I present results on how a monetary policy change affects stock prices. The first column implies that a 1 basis point rise in the five-year interest rate due to monetary policy changes is associated with a 3.56 basis point fall in stock prices. This regression has a t-statistic of 14, so the result is very significant, which reflects the strong identification afforded by a high-frequency identification approach combined with outlier removal and running the regressions with many countries. The first column presents my baseline results. It measures the interest rate using the nonparametric method in which I look at the change in interest rates on all bonds

an issue occasionally. For any non-benchmark bonds with a starting maturity of more than one year, I drop the interest rates when the bond has a maturity of less than six months, because prices for longer-term bonds become inaccurate close to their maturity.

Figure 3: Yield Curve Fit for Australia on 5/7/2013



(a) Nonparametric Approach

(b) Nelson-Siegel Approach

The figure shows the different methods for constructing the yield curve for Australia on May 7, 2013, when the policy rate fell from 3 percent to 2.75 percent. The left subfigure shows the estimation of the five-year interest rate with a two-year window. The right subfigure shows the estimation with the Nelson-Siegel parametric approach. Sources: Bloomberg, Refinitiv.

with a maturity of four to six years. The second column presents the regression measuring the interest rate by the parametric Nelson-Siegel yield curve estimation method and finds similar results. The baseline regression uses all 10 countries/zones in my sample. However, the third column restricts the analysis to the United States. In this case, the coefficient is -3.91 and remains strongly significant. The fourth column restricts the time window to 20 minutes before and after a monetary policy event, which is narrower than the usual one hour. However, I find a very similar coefficient of -3.62.

Table 2: Basic Results

Δ log Stock Index	(1)	(2)	(3)	(4)
Intercept	0.014	0.014	0.028	0.017*
	(0.008)	(0.008)	(0.024)	(0.008)
Δ 5-Year Bond Non-Param	-3.560***		-3.910***	-3.616***
	(0.253)		(0.649)	(0.265)
Δ 5-Year Bond Nelson-Siegel		-3.515***		
		(0.271)		
N	1808	1640	383	1638
R^2	0.099	0.093	0.087	0.102
Zones	All	All	USA	All
Timeframe	1 Hour	1 Hour	1 Hour	20 Min

The table shows regressions of the change in the log of the domestic stock index on a measure of the five-year interest rate. The coefficient represents the basis point change in stock prices in response to a 1 basis point rise in the five-year interest rate. *, **, and *** correspond to a significance of < 0.05, < 0.01, and < 0.001, respectively. The first column is the baseline regression. The second column uses Nelson-Siegel yield curve estimation rather than nonparametric estimation. The third column uses monetary policy events in the United States only rather than the 10-country/zone panel. The fourth column uses a 20-minute window before and after a monetary policy event rather than a one-hour window. Sources: Bloomberg, GovPX, Refinitiv.

Next, I look at how the relationship between stock prices and interest rates varies for changes in interest rates of different maturities. In other words, I investigate how stock prices respond to a rise in interest rates due to a monetary policy change when the interest rates have different maturities. First, I regress stock prices on different components of the yield curve separately in table 3. This is equivalent to regressing stock prices on a one-, two-, three-, five-, and ten-year government bond interest rate, respectively. A rise of 1 basis point in the 2-year and 10-year components of the yield curve is associated with a fall of 2.43 and 3.84 basis points in stock prices, respectively. It makes sense that the effect would be larger for a 1 basis point rise in the 10-year rate because a 10-year bond rising by 1 basis point is more likely to capture a larger monetary policy change compared with a 2-year bond rising by 1 basis point. However, this does not directly answer the question of which part of the yield curve is driving changes in stock prices when interest rates change.

Table 3: By Maturity (Separate)

Δ log Stock Index	(1)	(2)	(3)	(4)	(5)
Intercept	0.013	0.013	0.015	0.014	0.014
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Δ 1-Year Bond Non-Param	-2.435***				
	(0.196)				
Δ 2-Year Bond Non-Param		-3.116***			
		(0.229)			
Δ 3-Year Bond Non-Param			-3.262***		
			(0.235)		
Δ 5-Year Bond Non-Param				-3.560***	
				(0.253)	
Δ 10-Year Bond Non-Param					-3.838***
					(0.312)
N	1733	1750	1746	1808	1828
R^2	0.082	0.096	0.100	0.099	0.077

The table shows regressions of the change in the log of the domestic stock index on the change in the interest rate measured with the two-year window nonparametric approach for different maturities. *, **, and *** correspond to a significance of < 0.05, < 0.01, and < 0.001, respectively. The regressions show how many basis points stock prices change in response to a rise of 1 basis point in the one-year, two-year, three-year, five-year, and ten-year interest rate, respectively. Sources: Bloomberg, GovPX, Refinitiv.

To determine how monetary policy changes that affect parts of the yield curve affect stock prices, in table 4, I disentangle the effect of raising interest rates in different parts of the yield curve on stock prices by controlling for changes in different parts of the yield curve. In particular, I measure the change in the zero- to two-year, two- to four-year, four- to six-year, six- to eight-year, and eight- to ten-year parts of the yield curve. This enables the identification of the impact of changing only one part of the yield curve. The change in the zero- to two-year part of the yield curve is measured using the change in the two-year interest rate. The change in the two- to four-year part of the yield curve is measured by computing the two- to four-year forward interest rate that corresponds to the two-year and four-year interest rates.[6] Raising interest rates in the short-term part of the yield curve has a much stronger effect on stock prices compared with raising rates in the longer-term part of the yield curve. A 1 basis point rise in the zero- to two-year part of the yield curve lowers stock prices by 2.7 basis points. Changes in the later parts of the yield curve are mostly negative but not significant.

[6] $TwoToFourYearForwardRate = (4^{*}FourYearRate - 2^{*}TwoYearRate)/(4-2)$. Later components of the yield curve are defined similarly.

Table 4: By Maturity (Combined)

Δ log Stock Index	(1)
Intercept	0.008
	(0.008)
Δ Non-Param YC Years 0-2	-2.699***
	(0.342)
Δ Non-Param YC Years 2-4	-0.567
	(0.354)
Δ Non-Param YC Years 4-6	-0.152
	(0.274)
Δ Non-Param YC Years 6-8	-0.448
	(0.241)
Δ Non-Param YC Years 8-10	0.199
	(0.240)
N	1629
R^2	0.106

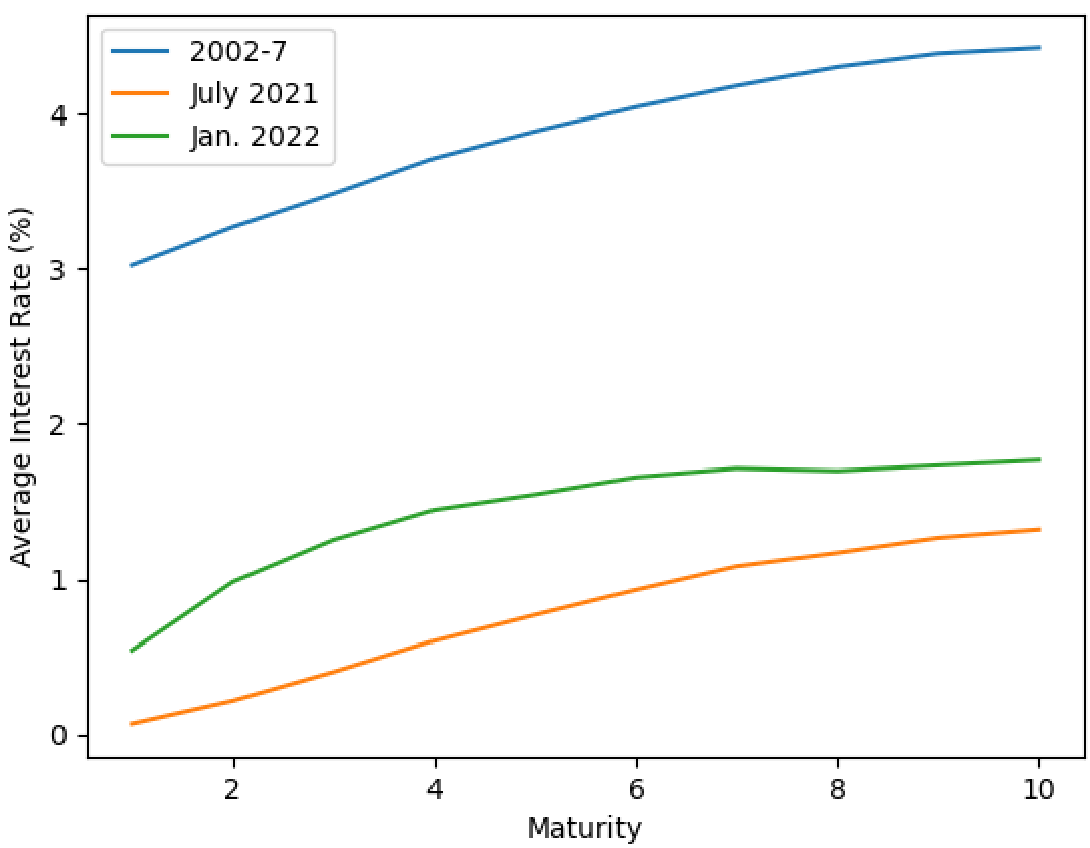
The table shows regressions of the change in the log of the domestic stock index on the change in different parts of the yield curve. The different parts of the yield curve are measured using the nonparametric method. The change in the zero- to two-year year part of the yield curve is measured using the two-year interest rate. The change in the two- to four-year part of the yield curve is measured by computing the two- to four-year forward interest rate corresponding to the two-year and four-year interest rates. Other forward rates are computed similarly. *, **, and *** correspond to a significance of < 0.05, < 0.01, and < 0.001, respectively. Sources: Bloomberg, GovPX, Refinitiv.

There are multiple explanations for the difference in the impact of short-term versus long-term rates. It could reflect the fact that financial markets do not respond to changes in the path of long-term interest rates as much as they do to the path of short-term interest rates. Another possibility is that the changes in long-term rates around monetary policy meetings are caused by changes in the term premium rather than changes in the expected path of interest rates. (Hanson and Stein, 2015) argue that happens because yield investors reallocate across maturities depending on which is cheaper, which would mean that if interest rates rise in the short term, this increase would transmit to long-term interest rates as well, even if investors do not believe the path of long-term rates has changed. In this case, a change in long-term interest rates would not capture a change in beliefs about the path of interest rates, so stock prices may not respond to it in the same way as they would to changes in short-term interest rates. This may explain why the relationship appears weaker at longer maturities than may be expected, especially considering how strong the relationship is at shorter maturities.

5 Policy Estimates

I consider two policy estimates using the measured relationship in section 4. First, I consider how the rise in interest rates from July 2021 to January 2022 may have impacted stock prices. Second, I consider how a rise in interest rates from their January 2022 level to the 2002–2007 average level would impact stock prices. Figure 4 shows the yield curves during the relevant periods for the policy experiments. The green, orange, and blue lines represent the average yield curves in January 2022, July 2021, and the 2002–2007 period, respectively. There was a rise in the yield curve particularly at shorter maturities from July 2021 to January 2022. However, the yield curve in January 2022 was much lower than it was in the 2002–2007 period.

Figure 4: Yield Curves in Policy Experiment Periods



The green, orange, and blue lines show the average yield curves for US nominal sovereign bonds measured using average Bloomberg daily interest rate data for January 2022, July 2021, and 2002 through 2007, respectively. Source: Bloomberg.

I estimate the two policy experiments using three different sets of coefficients, which are summarized in table 5. The idea is to estimate the impact of changes in the first 10 years of the yield curve. In the first case, I do this simply by looking at the change in the 10-year interest rate. The coefficient therefore comes from table 3 and represents the impact of a change in the 10-year interest rate on stock prices, that is, the coefficient in the sixth column of table 3. In the second case, I consider different parts of the yield curve separately. Therefore, I use the coefficients in table 4 representing the impact of a change in the zero- to two-year, two- to four-year, four- to six-year, six- to eight-year, and eight- to ten-year components of the yield curve on stock prices. In the third case, I take into account the fact that the degree to which long-term rates impact stock prices may be understated perhaps because a change in long-term rates around a monetary policy event may capture changes in term premia rather than changes in the expected path of interest rates. I do this by again considering the impact of different parts of the yield curve separately, but I adjust the later parts of the yield curve. Therefore, I model the impact of a rise of 1 percentage point in the two- to four-year, four- to six-year, six- to eight-year, and eight- to ten-year components of the yield curve as being equal to the impact of a rise of 1 percentage point in the zero- to two-year component of the yield curve discounted by 0.95^2, 0.95^4, 0.95^6, and 0.95^8, respectively.

Table 5: Coefficients for Policy Experiments

	0-10	0-2	2-4	4-6	6-8	8-10
Case 1	-3.84					
Case 2		-2.7	-0.57	-0.15	-0.45	0.2
Case 3		-2.7	-2.44	-2.2	-1.98	-1.79

This table summarizes the coefficients for the impact of monetary policy changes on stock prices for each of the three cases. Case 1 is the 10-year interest rate coefficient from table 3. Case 2 is the coefficients from table 4. Case 3 applies the zero- to two-year rate from table 4 to all maturities and adds a discount factor of 0.95 for each part of the yield curve; that is, for two to four years, the coefficient is the same as the zero- to two-year coefficient except that it is multiplied by a discount factor of 0.95^2. Source: Bloomberg.

Table 6 shows the impact on stock prices of the rise in interest rates from July 2021 to January 2022. The first row in the table shows the change in interest rates for different parts of the yield curve from July 2021 to January 2022. For example, the first column shows there was a rise of 0.45 percentage point in the 10-year interest rate. The second row shows that under the case 1 coefficients, I find the impact of the rise in interest rates from July 2021 to January 2022 lowered stock prices by 1.73 percentage points. I obtain this number by multiplying the change in the zero- to ten-year rate in the first row of table 6 (0.45) by the corresponding zero- to ten-year number in the case 1 row of table 5. The processes for the case 2 and case 3 coefficients are the same except that we have to run them for each part of the yield curve separately. For example, we compute that the change in the zero- to two-year part of the yield lowered stock prices by 2.05 percentage points by multiplying the rise in the zero- to two-year part of the yield curve (0.76) by the coefficient for the zero- to two-year part of the yield curve (-2.7). We can sum each of the different parts of the yield curve to find the overall effect. The rise in interest rates lowered stock prices by 1.73, 2.6, and 5.51 percentage points under the first, second, and third coefficient cases, respectively. The third case is largest because the impact of rises in the long-term part of the yield curve is magnified. The second case is larger than the first because the second set of coefficients emphasizes the effects of the short-term part of the yield curve, where interest rates rose the most from July 2021 to January 2022.

Table 6: Policy Experiment 1 Results

	0-10	0-2	2-4	4-6	6-8	8-10	Sum
Change in Forward	0.45	0.76	0.94	0.49	-0.07	0.13	
Case 1 Impact	-1.73						-1.73
Case 2 Impact		-2.05	-0.53	-0.07	0.03	0.03	-2.6
Case 3 Impact		-2.05	-2.29	-1.08	0.14	-0.23	-5.51

This table shows the effects of the rise in interest rates from July 2021 to January 2022 on stock prices. The first row shows the change in different parts of the yield curve. For example, the 0-10 column in the first row shows the change in the zero- to ten-year part of the yield curve from July 2021 to January 2022. Rows 2 through 4 show the effects under coefficient cases 1 through 3, respectively. The number in column 0-2 represents the impact of the rise in the zero- to two-year part of the yield curve on stock prices, which is found by multiplying the coefficient for that part of the yield curve in table 5 by the change in that part of the yield curve from July 2021 to January 2022 in row 1. Sources: Bloomberg, GovPX, Refinitiv.

Table 7 shows the potential impact on stock prices if interest rates were to rise from their level in January 2022 to the average level in 2002 through 2007. The table is constructed in a manner similar to table 6. I consider interest rates in 2002 through 2007, because it is the period immediately before the Great Recession when interest rates were last at higher, stable levels. Such a rise in interest rates would lower stock prices by 10.17, 8.74, and 28.94 percentage points under the first, second, and third coefficients, respectively. The third case is much larger than the other two because the long-term part of the yield curve would rise substantially if interest rates were to return to their 2002–2007 levels, and that is where the third set of coefficients are larger.

Table 7: Policy Experiment 2 Results

	0-10	0-2	2-4	4-6	6-8	8-10	Sum
Change in Forward	2.65	2.29	2.23	2.62	3.26	2.85	
Case 1 Impact	-10.17						-10.17
Case 2 Impact		-6.18	-1.26	-0.4	-1.46	0.57	-8.74
Case 3 Impact		-6.18	-5.43	-5.76	-6.47	-5.1	-28.94

This table is constructed similarly to table 6 except that it considers the interest rate changes from the average in January 2022 to the average in 2002 through 2007. Sources: Bloomberg, GovPX, Refinitiv.

The policy experiments in this section focus on how a change in monetary policy affects stock prices without considering underlying causes. My analysis and the policy estimates look at how surprise changes to monetary policy affect interest rates, as opposed to how movements in monetary policy in response to changes in the economic environment affect interest rates. Therefore, I effectively abstract from the underlying causes that might lead interest rates to rise. For example, in the second policy estimate, I consider what would happen to stock prices if interest rates rise to their 2002–2007 level without the underlying economic situation changing. This seems unlikely. Instead, we might expect that interest rates would rise if there continues to be releases showing above-target inflation or sustained GDP growth. However, there are many potential scenarios in which interest rates could rise, and it's unclear exactly how monetary policy would respond to these. Therefore, in these policy experiments, I focus only on the impact of the monetary policy changes on stock prices and don't consider whether there could be any additional impact on stock prices through the underlying causes of the rise in interest rates.

6 Impact of Current Conditions on the Relationship

Next, I assess how current conditions affect the relationship between interest rates and stock prices. First, I consider how the shape of the yield curve might affect the strength of the relationship. I measure the shape of the yield curve using the intercept and gradient parameters from a linear line of best fit for the yield curve. To fit a comparable line of best fit, I need to be able to consider similar maturities across different monetary policy events. Therefore, I fit a linear slope to the estimated Nelson-Siegel yield curve (for yearly points from the first year to the 10th). Table 8 shows the results. The first column reports the results of the standard regression without controlling for shape, that is, the basis point change in stock prices when the five-year interest rate rises by 1 basis point around a monetary policy event, which was reported in table 2. The second column includes additional regressors where the five-year interest rate is interacted with the intercept and gradient parameters from the linear regression. The regression reveals that when the yield curve has a shallower slope, the relationship between interest rates and stock prices is more negative. One potential explanation for this finding is that with a flatter yield curve, agents discount the future less, so changes in long-term interest rates should have stronger effects. The yield curve during the 2002–2007 period had an intercept of 3.00 and a slope of 0.16, which implies that a 1 percentage point rise in the five-year component of the yield curve would lower stock prices by 1.84 percentage points. The yield curve in January 2022 had an intercept of 0.79 and a slope of 0.12, which implies that a 1 percentage point rise in the five-year component of the yield curve would lower stock prices by 3.98 percentage points. Therefore, these results imply that raising interest rates in the current environment may cause stock prices to fall more than rate hikes in past periods did.

Table 8: Shape of Yield Curve

Δ log Stock Index	(1)	(2)
Δ 5-Year Bond Non-Param	-3.560***	-5.285***
	(0.253)	(0.794)
Δ 5-Year Bond Non-Param * YC alpha		0.212
		(0.174)
Δ 5-Year Bond Non-Param * YC beta		9.483**
		(3.175)
N	1808	1520

The table shows regressions of the change in the log of the domestic stock index on a measure of the five-year interest rate. The coefficient represents the percentage change in stock prices in response to a 1 percentage point rise in the five-year interest rate. *, **, and *** correspond to a significance of < 0.05, < 0.01, and < 0.001, respectively. The first column shows the baseline regression. The second column also includes regressors for the change in the five-year interest rate interacted with measures of the intercept and gradient of the yield curve immediately before the monetary policy event. I measure the intercept and gradient by fitting a line of best fit to the first 10 years of points for the estimated Nelson-Siegel yield curve. Sources: Bloomberg, GovPX, Refinitiv.

Market participants expect the Federal Reserve to engage in sustained policy rate rises in the current above-target inflation environment. Therefore, it is useful to know whether periods with policy rate changes show a stronger relationship between interest rates and stock prices perhaps because more attention is paid to interest rates during periods with rate changes. Table 9 reports these results. The first column reports the standard results. The second column reports results including a control for whether the policy rate changed during the monetary policy event interacted with the change in the yield curve measure. However, there is no significant difference. This implies that the relationship between interest rates and stock prices will not be stronger because the Federal Reserve is actively raising rates.

Table 9: Impact of Policy Rate Change

Δ log Stock Index	(1)	(2)
Δ 5-Year Bond Non-Param	-3.560***	-3.360***
	(0.253)	(0.375)
Δ 5-Year Bond Non-Param * 1{Rate Changed}		-0.310
		(0.508)
N	1808	1808

The table shows regressions of the change in the log of the domestic stock index on a measure of the five-year interest rate. The coefficient represents the percentage change in stock prices in response to a 1 percentage point rise in the five-year interest rate. *, **, and *** correspond to a significance of < 0.05, < 0.01, and < 0.001, respectively. The first column shows the standard regression. The second column includes an additional regressor, which is the change in the five-year interest rate interacted with a dummy variable for whether or not the policy rate changed during the monetary policy event. Sources: Bloomberg, GovPX, Refinitiv.

7 Conclusion

The results I have presented in this memo suggest there is a strong negative relationship between interest rates and stock prices. Increased expectations of rate increases in recent months have already lowered stock prices. If interest rate expectations continue to rise, stock prices could fall substantially. Moreover, current conditions could strengthen this relationship, because the economy is starting from a flat yield curve. Stock price declines could have a contractionary effect on the economy. Such a contractionary effect may help to lower inflation, which is currently substantially above target, but it may also reduce consumption and investment. This reflects the broader challenge facing policymakers as they attempt to lower inflation without causing a recession.

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