Monetary Policy and the Stock Market in the COVID Era

Thomas B. King*
FRB Chicago

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Abstract

I decompose equity price movements between early 2020 and early 2022 into changes in risk-free rates, risk premia, and expected cash flows. Identifying the effects of monetary policy through a combination of high-frequency and sign restrictions, I show that the FOMC's policy actions supported the stock market through all three of these components throughout the COVID period. The largest effect came through a reduced equity premium, consistent with a substantial role for the risk-taking channel of monetary policy.

1 Introduction

In the first quarter of 2020, as the scale of the COVID-19 crisis became apparent, equity indices in the United States endured one of their most dramatic deteriorations in history. By August, however, the stock market was again hitting record highs, and this rally continued apace all the way into late 2021. While a number of developments likely contributed to the market rebound—including Federal Reserve liquidity support, fiscal stimulus, and the development of vaccines—one factor that has received particular attention is the extraordinarily accommodative monetary policy that the Fed adopted during this period. At the onset of the crisis, the FOMC slashed the federal funds target range to near zero, and it subsequently purchased over $4 trillion of Treasury and mortgage-backed securities. These actions lowered interest rates and

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*thomas.king@chi.frb.gov. The views expressed here do not reflect official positions of the Federal Reserve Bank of Chicago or the Federal Reserve System.

supported the economic recovery, while also likely having an outsized effect on asset prices, including the prices of equities. Similarly, when policymakers began to signal the removal of accommodation around the end of 2021, equity prices sputtered.

This article unpacks these developments and examines the effect of monetary policy on the stock market during the COVID period. In general, monetary policy has three distinct effects on stock prices. First, by stimulating the macroeconomy, accommodative policy raises corporate profits, increasing the expected cash flows of equity claims. Second, by lowering the term structure of interest rates, accommodation reduces the risk-free rate at which dividends are discounted, boosting their present value. Finally, easier monetary policy may lower risk premia by helping to remove tail risk and relieving financial institutions' balance-sheet constraints, through the "risk-taking channel" (e.g., Adrian and Shin, 2010; Borio and Zhu, 2012; Jimenez et al., 2014). I ask how important each of these mechanisms was in supporting the growth of equities during 2020 and 2021.

The analysis proceeds in two steps. First, using an extension of the Campbell-Shiller (1988) dividend-discount model, where expected profits are estimated by a vector autoregression (VAR), I decompose total stock market changes in each quarter since the peak of the market in early 2020 into changes resulting from expected earnings, risk-free rates, and risk premia. Consistent with evidence from this type of model from before the COVID period, I find that most stock-market fluctuations were not primarily driven by profit expectations but rather by discount factors. Drilling down further, I find that, while declines in risk-free discount rates boosted the stock market by more than 30% at times, most of the early drop and subsequent recovery in stock prices were due to fluctuations in risk premia.

This decomposition does not tell us how much of the stock-market recovery resulted from monetary policy, since monetary policy can affect all three components of stock prices. To answer that question, the second-stage of the analysis identifies monetary-policy shocks within the VAR. The identification uses changes in Treasury yields around FOMC announcements, similar to Gertler and Karadi (2015), and sign restrictions on expected GDP and inflation, similar to D'Amico and King (2017). I use the results to construct a counterfactual scenario in which the Fed maintained medium-term yields at their pre-COVID level throughout the COVID period. The difference between the path of the stock-market in this counterfactual world and the stock-market path actually observed is interpretable as the effect of monetary policy on stock prices during this time. By this metric, at the peak of its impact in late 2020, monetary policy was boosting the value of the stock market by about 80%. This support included significant effects (10 – 20 percentage points) through risk-free rates and profits, but the bulk of it reflected lower risk premia. Monetary support for the stock market gradually waned, and by early 2022 the market's pricing in of policy tightening was having a dampening effect on stock prices, again working mostly through risk premia.

These results are of interest for several reasons. First, they show that monetary policy was an effective tool in fighting the crisis. Although this article does not directly examine the macroeconomic effects of COVID-era monetary policy, the stock market is an important channel through which households accumulate purchasing power and businesses finance themselves, and I show that monetary policy supported it significantly. Second, however, the results highlight that monetary policy does not necessarily exert its effects through profits or risk-free rates as one might expect. Policy shocks do not have large effects on expected profits many years in the future or on long-term yields, but these distant-horizon objects are responsible for the bulk of equity valuations, especially when rates are low. Rather, my results are qualitatively consistent with previous studies, like Bernanke and Kuttner (2005), Bekaert et al. (2013), and Cieslak and Schrimpf (2019), that suggest big changes in the equity premium in response to FOMC actions and point to the importance of the risk-taking channel. Although these types of effects are sometimes ignored in high-frequency studies of monetary-policy shocks and are often absent from theoretical macroeconomic models of monetary transmission, the findings here suggest that they could at times be of first-order importance.

Several other papers have presented decompositions of the stock-market movements during the COVID crisis using various methodologies, with particular focus on the large gyration in the first half of 2020. Gormsen and Koijen (2020) and Knox and Vissing-Jorgensen (2022) use information from dividend strips, while Landier and Thesmar (2020) rely on analysts' earnings forecasts. Cox et al. (2020) use a method similar to that adopted below but with more structure on the discount rate. Broadly consistent with my findings, all of these papers conclude that the large movements in early 2020 were primarily due to discount rates. However, none of them explicitly examines the role of monetary policy in driving these changes. All of them also stop short of analyzing the significant further developments in the stock market and monetary policy through early 2022.

2 Unconditional Decomposition of Equity Prices

Consider an equity contract with a claim to an infinite future stream of profits $\{\Pi_t\}$. Let $\delta^{(n)}$ be the risk-free discount rate for cash flows n periods ahead. We can then define the risk-free present value of the cash flow stream as

$$V_t = \sum_{n=0}^{\infty} \delta_t^{(n)} \mathrm{E}_t[\Pi_{t+n}] \tag{1}$$

Then, letting p denote the log of the price of the equity claim, we can write

$$p_t = \log V_t - r_t \tag{2}$$

where r_t is the equity risk premium. This equation *defines* the equity risk premium for the purposes of this paper. It is the difference between the current price of future cash flows and their riskless discounted value.[1]

Substituting (1) into (2) and taking a first-order Taylor series expansion gives the approximate log change in the stock price over a period:

$$\Delta p_t \approx \frac{1}{V_{t-1}} \sum_{n=0}^{\infty} \Delta\delta_t^{(n)} \mathrm{E}_{t-1}[\Pi_{t+n}] + \frac{1}{V_{t-1}} \sum_{n=0}^{\infty} \delta_{t-1}^{(n)} (\mathrm{E}_t[\Pi_{t+n}] - \mathrm{E}_{t-1}[\Pi_{t+n-1}]) + \Delta r_t \tag{3}$$

This shows that stock returns can be decomposed into three parts. The first term is a change in risk-free discounting of a given expected profit stream; the second term is a change in expectations of the profit stream itself, holding the discount rate constant; and the third term is a change in the risk premium. Note that the approximation error in equation (3) only results from the nonlinear interaction between discount rates and cash flows in equation (1). The contribution of Δr_t to stock returns is exact in this equation.

To understand a change in stock prices over a given period, we can try to measure each of these components. The approach is reminiscent of Campbell and Shiller (1988a, 1988b), although in those papers the authors do not distinguish between risk-free discounting and risk premia. By definition, risk-free discount rates are given by $\delta_t^{(n)} = \exp(-ny_t^{(n)})$, where $y_t^{(n)}$ is

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[1] If $M_t^{(n)}$ is the stochastic discount factor for cash flows n periods hence, then under no-arbitrage stock prices are given by

$$\begin{aligned} \exp[p_t] = \sum_n \mathrm{E}_t[M_t^{(n)} \pi_{t+n}] &= \sum_n \mathrm{E}_t[M_t^{(n)}]\mathrm{E}_t[\pi_{t+n}] + \sum_n \mathrm{cov}_t[M_t^{(n)}, \pi_{t+n}] \\ &= V_t + \sum_n \mathrm{cov}_t[M_t^{(n)}, \pi_{t+n}] \end{aligned}$$

since $\mathrm{E}_t[M_t^{(n)}] = \delta_t^{(n)}$. Consequently, we can write $r_t = \log\left(1 + \sum_n \mathrm{cov}_t[M_t^{(n)}, \pi_{t+n}]/V_t\right)$, consistent with the intuition that greater comovement between cash flows and discount factors should require higher expected returns and thus lower asset prices.

the zero-coupon riskless bond yield. So risk-free discount rates $\delta_t^{(n)}$ can be computed directly from the nominal Treasury curve. To measure expected profits, I follow Campbell-Shiller and use forecasts from a VAR model. The same VAR will be used to identify and trace out the dynamic effects of monetary policy shocks, discussed in the next section.

The VAR includes measures of stock prices, profits, and yields. I assume that all variables contain a long-run component that is linear in the far-forward bond yield f_t^*, defined as

$$f_t^* \equiv \lim_{n \to \infty} n y_t^{(n)} - (n-1) y_t^{(n-1)} \tag{4}$$

The assumption that f_t^* constitutes a common trend in profit growth, interest rates, and stock prices solves a couple of practical problems. First, it handles the apparent non-stationarity of bond yields over the sample. Second, it allows me to deal with the troublesome possibility that if the long-run growth rate of corporate profits is greater than the long-term bond yield then the summation in equation (1) does not converge. That is, if investors expected the economy to grow faster than their discount rate in the long run they would bid up current stock prices to an infinite value—which, of course, we do not observe in the data. It must therefore be the case that $\lim_{n\to\infty} \mathrm{E}_t \left[\Delta \log \Pi_{t+n}\right] < f_t^*$ at all points in time, and I impose this restriction in the estimation.[2] Detrending growth by the far-forward rate still allows for an unobserved stochastic trend in the *levels* of profits and equity prices.

The specific variables used in the VAR are two quarterly lags of the log Wilshire 5000 Full Cap price index, log after-tax corporate profits from the NIPA data, and 1-, 5-, and 30-year bond yields from the Gurkayak-Sack-Wright (2007) dataset. I measure the far-forward rate as the longest available one-year forward, which is the one ending 30 years in the future; effectively, this assumes that all transitory shocks have negligible effects beyond a 29-year horizon. The model is estimated on data from 1990:1 through 2022:1. Yields and stock-price data are measured as of the *middle* of each quarter (February 15, May 15, etc.). Given that we will need daily observations of these series, this timing convention makes sense because it lines up asset prices with the mid-point of the period over which profits were accrued for each observation. It is also convenient intra-quarter timing for studying the pandemic, which began to affect asset markets just after the middle of the first quarter of 2020, and it aligns well with the schedule of the Survey of Professional Forecasters, which will be used below.

Using the observed yield curve and VAR-based profits forecasts at each point in time, I

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[2] Specifically, I assume that the steady-state profit growth rate is 100 bp per year less than the far forward rate (a value that is not rejected by the data). Because the steady-state is so far away, however, the exact value used makes little difference in the calculations that follow.

compute the first two sums in equation (3) through 800 quarters in the future.[3] Based on these calculations, Table 1 shows the decomposition of log changes in the stock market since February 2020, just before the pandemic began to weigh on U.S. markets. I focus on four subsequent points in time: (a) May 2020, in the immediate aftermath of the shock; (b) August 2020, by which point stock prices had recovered to their initial levels and medium-term Treasury yields were near their lowest point; (c) November 2021, by which point the economy and the yield curve had largely recovered to pre-pandemic levels and the stock market was near its local peak; and (d) February 2022, after the FOMC had signaled its plans to remove the accommodation it had provided (but before the actual removal had begun).[4] For reference, the blue lines in Figure 1 show the observed paths of stock prices and Treasury yields.

[TABLE 1 ABOUT HERE]

[FIGURE 1 ABOUT HERE]

Between February 15 and May 15, 2020, the Wilshire Index declined 15.8% on net, corresponding to a change in log prices of -0.172. (This net drop represents a partial recovery from the market's nadir in late March, which the model does not see, given the frequency of the data.) Meanwhile, as can be seen in the top panels of Figure 1, the yield curve fell significantly in response to accommodative monetary policy and expectations for lower nominal growth, with the 5-year yield, for example, dropping by 105 basis points. The effect of the decline in the yield curve, all else equal, was to boost stock prices; the calculation shows that lower yields raised log stock prices by 0.347. However, this improvement was almost entirely offset by an increase in risk premia that dragged log stock prices down by 0.306. Thus, on balance, discount factors had little net impact on the stock market during this three-month period. The net drop in the market could essentially be accounted for by the 0.187-point decline in profit expectations, consistent with the results of Landier and Thesmar (2020).

A similar story worked in reverse between May and August 2020. Yields rose a bit, undoing about 11 percentage points of the risk-free discounting effects, while risk premia declined, pushing stock prices up by a roughly offsetting amount. Meanwhile, expected profits recovered

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[3] Beyond the 30-year maturity, where data are not available, I assume that yields converge smoothly from 30-year spot rates to f^*.

[4] The sample ends just before the large stock-market drop associated with the Russian invasion of Ukraine in late February.

considerably. The result was a stock market that was left in almost exactly the same place it had been six months earlier, albeit embedding a substantially different mix of risk-free discount rates and risk premia.

Over the next year and a half, the stock market rose an additional 41% (0.340 log points). The model shows that very little of this growth can be attributed to higher expected profits, while the discounting effect of the rise in yields worked to *lower* equity prices by about 20% during this time. However, a decline in risk premia had dramatic effects in the opposite direction. According to the model, risk premia went from subtracting 0.167 from log stock prices in August 2020 (relative to the February 2020 level) to adding 0.352 in November 2021. In other words, by November 2021, the equity premium had fallen to a significantly lower level than it had been at before the pandemic began. Indeed, the falling equity premium can account for the entirety of the net increase in stock prices between early 2020 and late 2021.

Finally, the last row of the table shows where the stock market ended in February 2022. Over the last quarter of the sample, yields rose significantly in the wake of persistent inflation and expectations for the removal of policy accommodation. Indeed, except for very short maturities, the yield curve exceeded its level two years prior. Consequently, risk-free discounting subtracted substantially from stock prices. A small increase in risk premia also contributed to the decline during this quarter. The model projected strong growth in corporate profits, offsetting some of these effects. (Since all cash flows in the model are nominal, they increase with higher rates of inflation, all else equal.) Nonetheless, on net, the stock market fell about 7%, driven by the increase in discount rates.

3 Identifying the Effects of Monetary Policy

I next ask how much of the changes in equity prices documented above can be explained by monetary policy during the COVID period and through which channels. As noted earlier, monetary policy affects all three components of equity returns: corporate profits, risk-free discount rates, and risk premia. To examine how each of these components changed, the strategy will be to consider a counterfactual world in which policy held medium-term interest rates constant throughout the COVID period.

In order to simulate the effects of a counterfactual monetary-policy path, we need to identify monetary-policy shocks in the VAR. To do this, I adopt a version of the "external instruments" approach used by D'Amico and Farka (2011) and Gertler and Karadi (2015). In particular, I assume that the changes in Treasury yields on FOMC days are systematically related only to information about monetary policy. The set of days I use includes the final days of all regularly scheduled FOMC meetings over the 1990-2022 sample, plus unscheduled meetings where a statement was issued. Using a smaller set of event days that excludes observations with potentially confounding large market moves gives similar results. I accumulate these changes to the quarterly frequency. To be consistent with the timing of the data in the rest of the exercise, I accumulate from the middle of each quarter (so, for example, the surprise associated with Q2 2020 is the sum of the FOMC-day shocks between February 15 and May 15, 2020). The implicit assumption in doing this will be that any policy announcements in the second half of a calendar quarter do not have an effect on profits until the following quarter—i.e., there is a transmission lag of up to six weeks.[5]

If there were only one type of monetary-policy shock, the changes in yields on FOMC announcement days would be sufficient to identify its effects. However, Nakamura and Steinsson (2018) and others have argued that monetary policy communications convey different types of signals. In particular, they may reveal the Fed's private information about future economic performance to the market. To sweep out these effects, I follow D'Amico and King (2017) and impose on expected GDP and inflation sign restrictions that can only be consistent with exogenous policy shocks, not with information shocks. Similar approaches combining high-frequency rate movements with sign restrictions on the stock market have been taken by Matheson and Stavrev (2014), D'Amico et al. (2016), and Jarocinksi and Karadi (2020). Those papers impose restrictions on stock prices themselves, rather than on direct measures of expected or realized macroeconomic performance. It is indeed difficult to think of reasons that stock prices should fall in response to accommodative policy shocks, since, as discussed above, all three components of stock prices should respond positively to such shocks. However, the effects of *information* shocks on stock prices are ambiguous because risk-free discounting and profits move in opposite directions in response to such shocks while the effects on risk premia are unclear. It is thus likely that sign restrictions on stock prices alone are not adequate to isolate exogenous policy innovations. The D'Amico-King sign restrictions, in contrast, ensure that information shocks are excluded.

In detail, the estimation of the monetary-policy shocks proceeds in four steps. First, I estimate the VAR described in Section 2 and extract the vector of residuals. Second, I find the changes in 1-, 5-, and 30-year bond yields, log equity prices, and far forward rates on

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[5] In practice nearly all FOMC meetings in the second halves of calendar quarters occur near the end of the quarter. For example, the second FOMC meeting of the year is typically in the third week of March. Thus, the practical effect of the timing assumption is to enforce a lag of only about two weeks between monetary policy shocks and corporate profits in most quarters.

FOMC days, accumulated to a quarterly frequency, as just described, and I calculate quarterly revisions in one-year forecasts of real GDP and CPI inflation from the Survey of Professional Forecasters (which is conducted around the middle of each calendar quarter). I collect all of these innovations in a single vector and calculate its covariance matrix $\mathbf{S}$ over the sample. Third, I identify effects of a monetary-policy shock by drawing matrices $\mathbf{M}_i$ such that $\mathbf{M}_i'\mathbf{M}_i = \mathbf{S}$ for each i. Letting $\mathbf{m}_i$ denote the first row of $\mathbf{M}_i$, I keep only 100,000 draws that satisfy the following conditions:

- The elements of $\mathbf{m}_i$ corresponding to the changes in 1- and 5-year bond yields on FOMC days have the same sign.
- The element of $\mathbf{m}_i$ corresponding to the change in f^* on FOMC days is zero.
- The elements of $\mathbf{m}_i$ corresponding to revisions to GDP and inflation forecasts have the opposite sign of the elements corresponding to changes in 1- and 5-year bond yields.

The logic behind the first restriction is that, particularly during periods of unconventional monetary policy, policy actions may work on different segments of the yield curve. A shock that lowers short-term rates but raises medium-term rates, or vice versa, cannot unambiguously be considered an easing shock. The second restriction is consistent with the idea that monetary policy does not have long-run effects, either on expected short rates or on risk premia. The third restriction rules out information effects.

Finally, I estimate the multipliers on the monetary-policy shocks, which will be the key objects needed to conduct the counterfactual exercise. For this purpose, I largely follow Gertler and Karadi (2015). Like them, I take a medium-term bond yield—in this case, the 5-year—to be the indicator of the monetary-policy stance. The five-year yield has a correlation of 93% or higher with all other yields across the curve. It is affected significantly by changes in the contemporaneous target rate, expectations for the medium-term path of that rate (such as might result from forward guidance), and term premia that can be affected by QE or changes in rate volatility. Consequently, unlike very short-term or very long-term rates, it is likely to capture the effects of the full array of monetary-policy tools.[6] I estimate the monetary-policy-shock multipliers by regressing all of the elements of the draws $\mathbf{m}_i$ on the element of $\mathbf{m}_i$ corresponding to FOMC-day change in the the five-year yield.

Strictly speaking, the shocks identified are only the changes due to information released on FOMC days. Of course, the total effect of monetary policy includes the flow of information that

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[6] That said, the results below also generally hold if one-year yields are used as the measure of policy.

takes place through communications outside of these days as well. However, for the purposes of the counterfactual exercise below, it is not necessary to find the sum of all monetary policy shocks that occurred within any given quarter. All that is needed is the vector of multipliers identified from the procedure above. The maintained assumption is that monetary-policy shocks involve these same multipliers on yields, equities, and profits whether they occur on FOMC days or not.

4 Counterfactual Simulation

Based on the results of the structural identification, I calculate the series of quarterly monetary policy shocks that would have been sufficient to keep the five-year yield at the February 2020 level throughout the COVID period. Since observed yields fell dramatically, these are, on average, tightening shocks. The red lines in Figure 1 show the paths of yields and the stock market in the counterfactual scenario where these shocks are applied. By assumption, the counterfactual 5-year yield is flat at a value of 1.39%. Given the multipliers on policy shocks, the 1-year yield must first rise and then decline slightly from its initial value of 1.5% in order to be consistent with a flat 5-year path. Thus, the scenario imagines a monetary policy that kept the short-end of the yield curve approximately stable around its initial value during this time. In contrast, the counterfactual path for the 30-year yield is not much different from the actual path, reflecting the fact that the estimated multipliers on monetary shocks are relatively modest at the long end. Though it appears small on the scale of the graph, the policy shocks do raise the 30-year yield by about 30 basis points throughout most of the simulation. Nonetheless, the model attributes most of the observed movements in long-term yields during this time to non-monetary factors.

The red line in the bottom panel of Figure 1 shows the model-implied counterfactual path taken by the stock market during this period. If policy had held the five-year rate at 1.39%, rather than allowing it to fall to 0.35% as it did in reality, the model implies that the stock market would have fallen by 43% on net between February and May of 2020—more nearly three times the decline actually observed. Moreover, under this scenario stocks would have only very gradually recovered and only exceeded their February 2020 value in the fourth quarter of 2021. However, in the first quarter of 2022, the effects of (anticipated) monetary policy tightening, reflected in yields that exceeded their pre-COVID values, exerted a negative effect on the market; here the counterfactual value is about 11% *higher* that the observed value. Looked at another way, the solid line in Figure 2 shows the proportion by which observed stock prices exceeded the model-implied counterfactual values (the percentage difference between the blue and red lines in Figure 1), a measure of the size of support that policy easing during the pandemic was providing to the stock market. The figure shows that, at the peak of this support in late 2020, policy was boosting prices by about 80%

[FIGURE 2 ABOUT HERE]

Using the counterfactual paths of yields, stock prices, and profits, I recompute the decomposition presented earlier. I infer the entire yield curve, which is required for this decomposition, by first projecting the levels of yields, using all data from 1990 – 2021, onto the three yields that are included in the VAR. I then use the resulting factor loadings to compute complete quarter-by-quarter yield curves that are consistent with the counterfactual simulation. As is well known, three factors are sufficient to explain nearly all of the variation in the yield curve (98% or more across all maturities, in this case), so this procedure involves very little loss of accuracy.

Table 2 presents the results. By comparing the numbers to those in Table 1, we can see that monetary policy raised stock prices during the COVID era primarily by helping to keep the equity premium low. At the peak of this effect in August 2020, for example, monetary policy was boosting stock prices by 0.48 log points through the risk-premium channel. The dashed line in Figure 2 shows the amount of support that the model indicates monetary policy would have provided to the stock market if it had operated through the risk premium channel alone. Looked at this way, the risk-taking channel accounted for more than half of monetary policy's overall effect on the stock market in most quarters. Likewise, when policy began to subtract from equity prices in Q1 2022, the risk premium component was the primary culprit. The change in risk-free discount rates due to policy also had a sizable impact on the stock market over the COVID period, about 10 percentage points on average. But most of the effects of monetary policy on yields occurred at the short end of the curve and so had limited consequences for the discounting of longer-term cash flows.

[TABLE 2 ABOUT HERE]

In contrast, monetary policy's effects on the profits component of stock prices between February 2020 and November 2021 was only about 2 percentage points on average. To understand why this effect seems so small, the top panel of Figure 3 shows the dynamic response of log profits of the counterfactual policy shock shock that occurs in Q2 2020 (the largest shock in the simulation). The shock has a large and sustained negative effect on the expected path of profits. Initially, profits decline by nearly 30%, and they stay noticeably below their initial value for over ten years. Yet even this large move weighs relatively little in the overall composition of equity prices. The bottom panel of the figure shows the cumulative weight that each year's expected profits receives in the overall computation of V_t in equation (1), based on the discount curve in February 2020. The period over which profits are abnormally low following the shock—the first ten years or so of the projection—accounts for less than 20% of the overall value.

[FIGURE 3 ABOUT HERE]

5 Conclusion

This article has analyzed the behavior of the stock market during the two years following the onset of the COVID-19 pandemic. The stock market is important as a source of wealth for consumers, a source of financing for firms, a source of information for policymakers, and a source of interest for researchers. The analysis shows that the early decline and subsequent rally of equity prices was due in some part to shifting expectations for corporate profits but resulted mainly from a large swing in the equity risk premium. Meanwhile, the decline and rebound of the yield curve pushed against this tide, keeping prices somewhat higher that they otherwise would have been in early 2020 and somewhat lower in early 2022. Monetary policy helped prevent a much bigger catastrophe in stock prices, boosting the market by as much as 80% by the end of 2020. Although it worked through all three components of stock prices, its biggest effects were on the equity premium, consistent with a large risk-taking channel of monetary policy. Among other implications, the results suggest that monetary policy's effects on risk premia could be considered as a potentially key transmission channel in both empirical analyses and theoretical treatments of monetary policy.

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Table 1 – Decomposition of Stock Returns during the COVID period

	Cumulative log change in stock price after Feb. 15, 2020	Change due to expected profits	Change due to risk-free discounting	Change due to risk premium
May 15, 2020	-0.172	-0.187	+0.347	-0.306
Aug. 15, 2020	+0.008	-0.057	+0.238	-0.167
Nov. 15, 2021	+0.348	-0.040	+0.042	+0.352
Feb. 15, 2022	+0.276	+0.159	-0.188	+0.309

Note: Rows do not sum exactly because of a small approximation error.

Table 2 – Counterfactual Stock Returns Holding Monetary Policy Fixed

Cumulative changes under counterfactual

	Cumulative log change in stock price after Feb. 15, 2020	Change due to expected profits	Change due to risk-free discounting	Change due to risk premium
May 15, 2020	-0.555	-0.210	+0.250	-0.576
Aug. 15, 2020	-0.559	-0.086	+0.131	-0.644
Nov. 15, 2021	+0.103	-0.056	-0.037	+0.199
Feb. 15, 2022	+0.387	+0.163	-0.214	+0.441

Estimated effects of policy (difference from Table 1)

May 15, 2020	+0.383	+0.023	+0.097	+0.270
Aug. 15, 2020	+0.567	+0.029	+0.107	+0.477
Nov. 15, 2021	+0.245	+0.016	+0.079	+0.153
Feb. 15, 2022	-0.111	-0.004	+0.026	-0.132

Note: Rows do not sum exactly because of a small approximation error.

Figure 1. Observed and Counterfactual Paths of Bond Yields and Stock Prices

Blue lines – observed data

Red lines – counterfactual simulation

Figure 2. Cumulative Percentage Impact of Monetary Policy on Stock Prices since February 2020

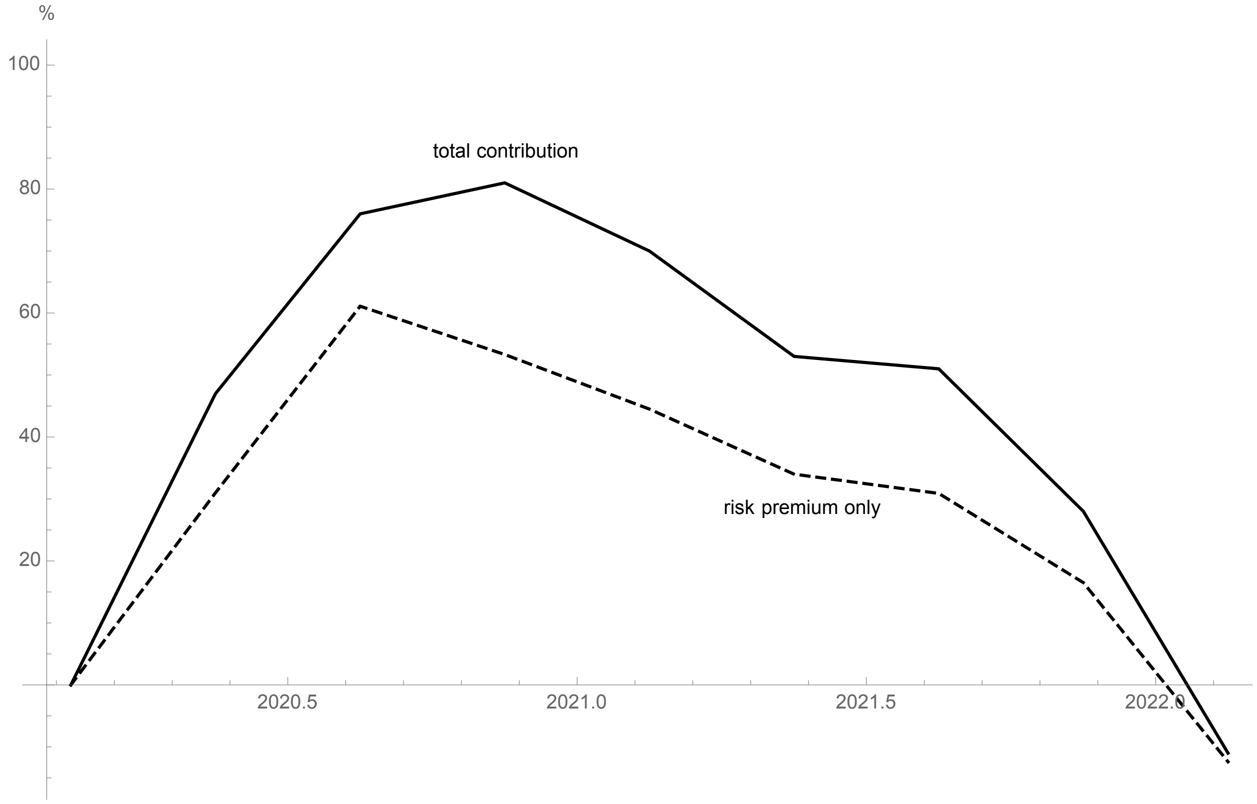
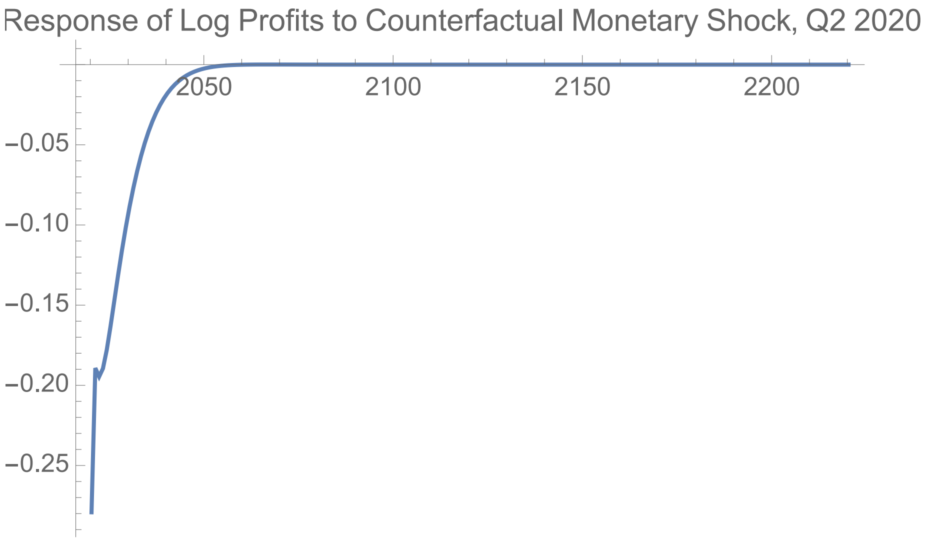
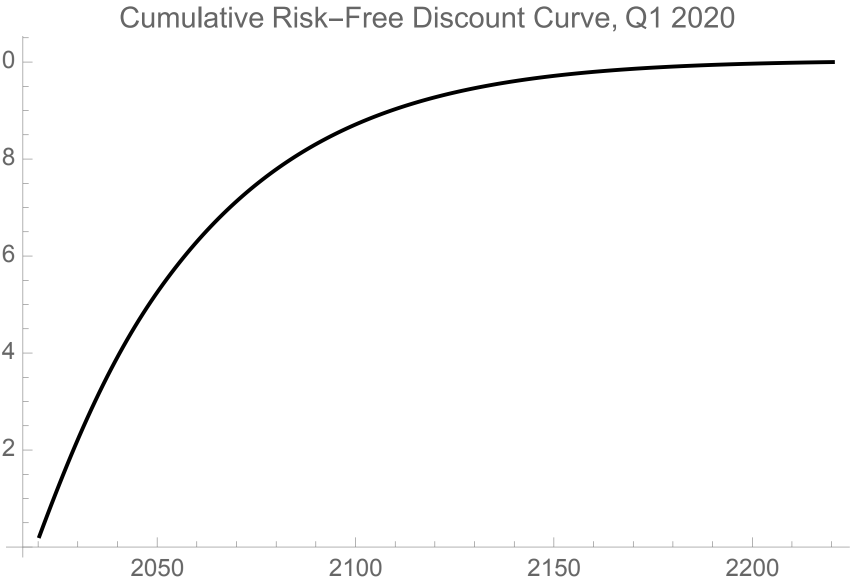


Figure 3. Components of the Effect of a Monetary Policy Shock on Risk-Free Discounted Profits


Response of Log Profits to Counterfactual Monetary Shock, Q2 2020


Cumulative Risk−Free Discount Curve, Q1 2020

Note: normalized to sum to 1.