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Business Cycles, Stock Returns and the Transmission Channels of Conventional and Unconventional Monetary Policy

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Business Cycles, Stock Returns and the Transmission Channels of Conventional and Unconventional Monetary Policy[1]

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Abstract

The zero lower bound (ZLB) may constrain the ability of Federal Reserve (Fed) to influence financial markets and the economy. This note examines the effectiveness of the interest rate channel and the credit channel of conventional and unconventional monetary policy while accounting for business cycle fluctuations. We use intraday industry returns and a number of industry-specific and firm-specific indicators to capture the sensitivity of firms' demand to interest rates (interest rate channel) and firms' financial constraints (credit channel). Our results indicate a dramatic change in the effectiveness of the transmission channels across business cycles and across periods. We find that the interest rate channel operates equally well during recessions and expansions pre-ZLB, but that this channel has ceased to function during the ZLB regardless of the stage of the business cycle. In contrast, the credit channel operates only during recessions in the conventional period, while it has been remarkably effective during both recessions and expansions in the ZLB era.

JEL Classification: G14, E44, E52, E58.

Key Words: interest rate channel, credit channel, zero lower bound, LSAPs, forward guidance.

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I. Introduction

The impact of unconventional monetary policy measures (Large Scale Asset Purchases (LSAPs) and forward guidance) on asset prices has been studied extensively by an active and growing literature. However, there is conflicting evidence regarding the effectiveness of monetary policy at the zero-lower bound (ZLB), and in particular, there is uncertainty as to whether the standard transmission channels – the *interest rate channel* and the *credit channel* – are as relevant as in the past.[1]

An additional complication arises because the response of stock returns to both conventional and unconventional shocks is significantly larger in recessions than expansions (Basistha and Kurov (2008), Ehrmann and Fratzscher (2004), Farka (2022)). This raises the possibility that the transmission channels of monetary policy may themselves be state-dependent. Focusing on conventional monetary policy, Peersman and Smets (2005) find that the interest rate channel has no differential impact on sectoral production across the business cycle, whereas the credit channel operates mainly during recessions. Despite these obvious cyclical dependencies, we are not aware of any studies that provide a systematic analysis on business cycle variations and the transmission channels of monetary policy, particularly during the ZLB.

In this article, we aim to bridge this gap and assess the importance of the interest rate channel and the credit channel before and after the ZLB while accounting for business cycle fluctuations. Our findings for the conventional period show that the interest rate channel operates just as well during recessions as it does in expansions, while the credit channel functions primarily in recessions, confirming the results of Peersman and Smets (2005). However, during the ZLB, the interest rate channel is generally not relevant regardless of the stage of the business cycle, whereas the credit channel operates equally well during recessions and expansions.

We make several contributions to the literature. First, unlike Wu (2018) and Farka (2022) which focus solely on the credit channel, we examine both channels. Second, we extend the work of Peersman and Smets (2005) and Ehrmann and Fratzscher (2004) in two dimensions: a) by including forward guidance surprises pre-ZLB, and b) by examining the transmission channels during the ZLB. Third, as we show in this article, the relative importance of each transmission channel depends crucially on the macro cycle, indicating that previous studies which fail to account for these cyclical variations may have missed important aspects on the propagation of policy shocks, particularly during the unconventional period.

[1] See, for example, Kontonikas, et al. (2013), Wu (2018) and Farka (2022).

II. Data and Methodology

We follow Swanson (2021) and construct monetary policy shocks by estimating the following factor model with intraday interest rate data around policy announcements:[2]

$$X = Z\lambda + \varepsilon \quad (1)$$

where Z is a $T\ x\ r$ matrix of latent factors such that $(r < p)$, λ is a matrix of factor loadings with dimensions $r \times n$, and ε is a $T \times n$ matrix of error terms.[3] We estimate three factors from principle components of the data. Following Swanson (2021), we perform a rotation to obtain another set of orthogonal factors so that the conventional period is characterized by target rate surprises TS, $(TS = \frac{m}{m-d}(FFR_t^{fut} - FFR_{t-1}^{fut}))$ and forward guidance surprises, FG, and the unconventional period by forward guidance (FG) and asset purchases, $LSAP$.

As is standard in the literature, we use industry-specific data to assess the interest rate channel and firm-specific data for the credit channel.[4] According to the interest rate channel, monetary policy has a heterogeneous impact on firms across industries both because the interest-elasticity of demand varies widely from sector to sector and because industry-specific production processes exhibit different sensitivities to the user cost of capital. To this end, we rely on industry-specific variables – such as **durability**, **cyclicality** and **capital intensity** – to assess the strength of the interest rate channel across conventional/unconventional periods.[5] On the other hand, the credit channel postulates that monetary policy has large heterogeneous impact across firms depending on their financial structure and financial constraints. Therefore, to evaluate the role of the credit channel, we construct a number of firm-specific indicators that capture the degree of firms' financial constraints: **book-to-market ratio**, **earnings-to-price ratio**, **size**, **cash flow ratio**, and **financial leverage**.[6]

We aggregate individual firm financial and accounting data at the industry level based on the industry taxonomy and use intraday data in E-mini S&P500 Sector Select Futures to esti-

[2]The conventional period is from May 1999 (when the first forward guidance statement was issued) to October 2008. The unconventional period is from November 2008 (when the Fed first signaled its intention to purchase bonds) to October 2015 (the end of the ZLB era).

[3]We use intraday changes 15 minutes before and 1 hour and 45 minutes after a policy announcement in the first and third federal funds futures contracts (ΔFFR_1, ΔFFR_3), the second, third and fourth Eurodollar futures (ΔEUR_2, ΔEUR_3, ΔEUR_4), and the 2-, 5-,10-, and 30-year Treasury yields.

[4]See, for example, Ehrmann and Fratzscher (2004), Peersman and Smets (2005), Wu (2018), and Farka (2022).

[5]For durability, we follow Eijffinger et al. (2017) and regress sector returns on industrial production, ranking industries based on their industrial production growth beta. Capital intensity is computed as the ratio of investments over total capital, whereas the cyclicality measure is based on industry sensitivity to the Chicago Fed National Activity Index.

[6]Firm size is measured by market capitalization. Financial leverage is computed as the ratio of debt to total capital, whereas cash flow is measured as the ratio of cash flow to income. All data are obtained from Compustat.

mate our event-study analysis.[7] Industry returns are sorted into three groups (*high*, *medium* and *low*) according to their position in the cross-sectional distribution of each indicator at the start of each year. Industry data are an appropriate laboratory when investigating both transmission channels because they reflect sector characteristics while preserving the heterogeneous firm-specific profile of each industry. They also mitigate measurement error issues that arise with individual stocks.

The following panel estimation is carried out during announcement times:

$$\begin{aligned} r_{i,t} &= \sum_{k=high,med,low} (\theta_1^k + \alpha_1^k TS_t^k + \beta_1^k FG_t^k) I^{\mathrm{Rec}} + \\ &+ \sum_{k=high,med,low} (\theta_2^k + \alpha_2^k TS_t^k + \beta_2^k FG_t^k)(1 - I^{\mathrm{Rec}}) + \\ &+ I_t^u \sum_{k=high,med,low} (\theta_3^k + \beta_3^k FG_t^k + \gamma_1^k LSAP_t^k) I^{\mathrm{Rec}} + \\ &+ I_t^u \sum_{k=high,med,low} (\theta_4^k + \beta_4^k FG_t^k + \gamma_2^k LSAP_t^k)(1 - I^{\mathrm{Rec}}) + \varepsilon_{i.t} \qquad (2) \end{aligned}$$

where r_t^i represents the excess return on announcement day t on industry stock return, I^{Rec} is an indicator variable capturing business cycles,[8]and I_t^u is equal to unity during the unconventional period and zero otherwise. The total impact of conventional policy is captured by $\alpha_1 + \beta_1$ in recessions and $\alpha_2 + \beta_2$ in expansions, whereas unconventional policy effects are given by $\beta_1 + \beta_3 + \gamma_1$ and by $\beta_2 + \beta_4 + \gamma_2$, respectively.

III. Results

As a preliminary analysis, we first document the cross-section impact of monetary policy shocks on various industry returns by estimating the following regression:

$$\begin{aligned} r_t^i &= \alpha_0 + (\alpha_1 TS_t + \beta_1 FG_t) I^{\mathrm{Rec}} + (\alpha_2 TS_t + \beta_2 FG_t)(1 - I^{\mathrm{Rec}}) + \qquad (3) \\ &+ I_t^u (\alpha_3 + \beta_3 FG_t + \gamma_1 LSAP_t) I^{\mathrm{Rec}} + I_t^u (\alpha_4 + \beta_4 FG_t + \gamma_2 LSAP_t)(1 - I^{\mathrm{Rec}}) + \varepsilon_t \end{aligned}$$

Results are summarized in Table 1. In line with previous literature, we find strong evidence of business cycle asymmetries during both periods, with industry returns reacting significantly more strongly to monetary policy shocks during recessions. For the conventional period, the asymmetry is driven by both target shocks and forward guidance surprises, while during the ZLB the primary source of cyclical variations comes from LSAP shocks.

[7] Sector returns are computed by taking the log difference of average future prices 15 minutes before and 1 hour and 45 minutes after a policy announcement. Excess returns are computed by subtracting the 1-month Treasury rate from the intradaily returns.

[8] We follow Basistha and Kurov (200) and use the Chicago Fed National Activity Index as a proxy for the state of the economy.

Importantly, we find that the pattern of sectoral heterogeneity has shifted across the two policy regimes. Irrespective of the business cycle, capital-intensive and cyclical industries (technology, telecommunication and consumer discretionary) display the highest sensitivity to policy shocks in the conventional era, while financials and real estate are the most sensitive during the ZLB. This does not come as a surprise given that these two sectors were the most impacted by the global financial crisis.

Our main empirical findings on the transmission channels are summarized in Table 2. We find that high capital intensive, cyclical industries and those that produce durable goods react more strongly to conventional policy shocks during both recessions and expansions, with the spread differential ($High - Low$ for $\alpha_1 + \beta_1$ and $\alpha_1 + \beta_2$) highly significant across both stages of the business cycle (panel A). Our estimates also reveal that the source of heterogeneity is driven by target rate shocks during recessions and by both target and forward guidance shocks in expansions. In contrast, we find no evidence that the interest rate channel is operational during the ZLB based on both durability and capital-intensity rankings as the spread differentials for $\beta_1 + \beta_3 + \gamma_1$ and $\beta_2 + \beta_4 + \gamma_2$ are either insignificant or have the wrong sign. Cyclical firms display more sensitivity to unconventional policy shocks but the spread differential is significant only during recessions. Taken together, these findings imply that while the interest rate channel operated equally well across business cycles during the conventional era, this channel is no longer effective at the ZLB.

Our estimates for the credit channel paint a different picture (Table 2, panel B). We find that during the conventional period, financially-constrained firms generally respond in a statistically significant way to policy shocks only during recessions This suggests that, over this period, the credit channel operated primarily during economic downturns, in line with theoretical predictions that informational frictions related to the external finance premium are amplified in times of economic stress.[9] In contrast, the credit channel shows no cyclical variations during the ZLB, with financially constrained firms reacting more strongly to policy shocks than less financially constrained firms during both recessions and expansions.

We attribute these findings to the unusual nature of the expansion post financial crisis: Even when the economy was officially out of the recession, the ensuing recovery was weak, necessitating additional rounds of quantitative easing by the Fed. As such, the cost of external funds remained elevated throughout the unconventional period especially for firms with weak balance sheets and those facing more onerous credit terms. Results also show that the credit channel was propagated by both forward guidance and LSAP shocks during

[9] As argued by Bernanke and Gerlter (1989), the cost of external finance is larger during recessions when firms collateral values are depressed and cash flows are low.

the financial crisis, but only by forward guidance surprises during the ensuing recovery. This suggests that subsequent rounds of LSAPs became increasingly less effective as the distance to the crisis grew, while forward guidance assumed a more prominent role in guiding market expectations.

IV. Conclusions

In this article, we use an event-study approach and intraday industry stock returns to examine the effectiveness of the transmission channel of conventional and unconventional monetary policy across business cycles. We find that the interest rate channel works equally well during recessions and expansions in the conventional period, but that its effect has completely dissipated during the ZLB. In contrast, the credit channel operates only during recessions before the ZLB, but has been in effect during both recessions and expansions since the financial crisis.

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Table 1
Monetary Policy Surprises, Industry Characteristics and Firm Financial Constraints

	Cons Discretionary	*Cons Staples*	*Energy*	*Financials*	*Health*	*Industrials*	*Materials*	*Real Estate*	*Technology*	*Telecom*	*Utilities*
(1) I^{Rec} * TS (α_1)	-0.82***	-0.08	-0.26***	-0.77***	-0.56***	-0.53***	-0.67***	-0.65***	-1.19***	-1.17***	-0.20***
	(0.077)	(0.053)	(0.086)	(0.108)	(0.063)	(0.074)	(0.090)	(0.166)	(0.101)	(0.108)	(0.069)
(2) I^{Exp} * TS (α_2)	-0.26***	-0.06	0.08	-0.21	-0.18**	-0.19**	-0.16	-0.28*	-0.36***	-0.28*	-0.05
	(0.101)	(0.070)	(0.112)	(0.142)	(0.082)	(0.098)	(0.119)	(0.159)	(0.132)	(0.148)	(0.091)
(3) I^{Rec} * FG (β_1)	0.25**	0.13*	0.18	0.39**	0.33***	0.21*	0.31**	0.10	0.44***	0.45***	0.17*
	(0.116)	(0.080)	(0.128)	(0.163)	(0.094)	(0.112)	(0.136)	(0.196)	(0.151)	(0.162)	(0.104)
(4) I^{Exp} * FG (β_2)	-0.18***	-0.16***	-0.27***	-0.23*	-0.25***	-0.24***	-0.29***	-0.27**	-0.36***	-0.38***	-0.13**
	(0.066)	(0.058)	(0.074)	(0.119)	(0.054)	(0.064)	(0.078)	(0.128)	(0.087)	(0.106)	(0.060)
(5) I^U * I^{Rec} * FG (β_3)	-0.79***	-0.30***	-0.54***	-1.09***	-0.46***	-0.47***	-0.51***	-0.88***	-0.58***	-0.62***	-0.40***
	(0.133)	(0.073)	(0.154)	(0.212)	(0.097)	(0.127)	(0.166)	(0.243)	(0.192)	(0.211)	(0.114)
(6) I^U * I^{Exp} * FG (β_4)	-0.20*	-0.06	0.14	-0.35**	-0.01	0.03	-0.07	-0.18	-0.05	0.05	-0.16
	(0.121)	(0.083)	(0.134)	(0.170)	(0.098)	(0.117)	(0.142)	(0.196)	(0.158)	(0.177)	(0.109)
(7) I^U * I^{Rec} * LSAP (γ_1)	-0.45***	-0.17**	-0.39***	-0.54***	-0.22***	-0.39***	-0.37***	-0.77***	-0.27**	-0.29**	-0.42***
	(0.098)	(0.068)	(0.109)	(0.138)	(0.080)	(0.095)	(0.115)	(0.142)	(0.128)	(0.138)	(0.089)
(8) I^U * I^{Exp} * LSAP (γ_2)	-0.27***	-0.13**	-0.11	-0.29**	-0.12**	-0.01	-0.09	-0.38***	-0.13	-0.13	-0.19***
	(0.080)	(0.046)	(0.100)	(0.115)	(0.059)	(0.076)	(0.099)	(0.134)	(0.113)	(0.124)	(0.071)
(9) $\beta_1 + \beta_3$	-0.53***	-0.17***	-0.36***	-0.70***	-0.14*	-0.26**	-0.20	-0.77***	-0.14	-0.16	-0.23**
	(0.106)	(0.060)	(0.123)	(0.168)	(0.078)	(0.101)	(0.132)	(0.098)	(0.152)	(0.167)	(0.091)
(10) $\beta_2 + \beta_4$	-0.38***	-0.22***	-0.13	-0.58***	-0.27***	-0.21**	-0.35***	-0.45***	-0.41***	-0.34**	-0.29***
	(0.101)	(0.076)	(0.112)	(0.156)	(0.082)	(0.097)	(0.118)	(0.144)	(0.132)	(0.142)	(0.091)
(11) $\alpha_1 - \alpha_2$	-0.56***	-0.02	-0.34**	-0.56***	-0.38***	-0.34***	-0.51***	-0.37	-0.83***	-0.89***	-0.15
	(0.126)	(0.087)	(0.140)	(0.177)	(0.103)	(0.122)	(0.148)	(0.230)	(0.164)	(0.181)	(0.114)
(12) $\beta_1 - \beta_2$	0.44***	0.29***	0.46***	0.62***	0.58***	0.46***	0.60***	0.37	0.80***	0.84***	0.30**
	(0.134)	(0.099)	(0.149)	(0.203)	(0.110)	(0.130)	(0.158)	(0.234)	(0.175)	(0.195)	(0.121)
(13) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	-0.15	0.05	-0.22	-0.11	0.13	-0.05	0.15	-0.33**	0.26	0.17	0.06
	(0.145)	(0.094)	(0.164)	(0.226)	(0.111)	(0.138)	(0.176)	(0.160)	(0.200)	(0.218)	(0.127)
(14) $\gamma_1 - \gamma_2$	-0.18	-0.04	-0.28*	-0.25	-0.10	-0.38***	-0.28*	-0.39**	-0.15	-0.16	-0.23**
	(0.127)	(0.082)	(0.148)	(0.180)	(0.100)	(0.122)	(0.152)	(0.196)	(0.172)	(0.186)	(0.114)
(15) $\alpha_1 + \beta_1$	-0.57***	0.05	-0.07	-0.39**	-0.23**	-0.32**	-0.36**	-0.55**	-0.75***	-0.72***	-0.03
	(0.134)	(0.092)	(0.148)	(0.188)	(0.109)	(0.129)	(0.156)	(0.274)	(0.174)	(0.188)	(0.120)
(16) $\alpha_2 + \beta_2$	-0.44***	-0.23**	-0.19	-0.45**	-0.43***	-0.44***	-0.45***	-0.55**	-0.73***	-0.66***	-0.18
	(0.129)	(0.096)	(0.143)	(0.197)	(0.105)	(0.124)	(0.151)	(0.225)	(0.168)	(0.197)	(0.116)
(17) $\beta_1 + \beta_3 + \gamma_1$	-0.98***	-0.34***	-0.75***	-1.24***	-0.36***	-0.65***	-0.57***	-1.55***	-0.42***	-0.46***	-0.65***
	(0.114)	(0.067)	(0.130)	(0.176)	(0.085)	(0.108)	(0.140)	(0.099)	(0.161)	(0.176)	(0.098)
(18) $\beta_2 + \beta_4 + \gamma_2$	-0.65***	-0.35***	-0.25	-0.87***	-0.39***	-0.22	-0.44**	-0.83***	-0.53***	-0.47**	-0.48***
	(0.148)	(0.103)	(0.170)	(0.221)	(0.118)	(0.142)	(0.176)	(0.233)	(0.198)	(0.215)	(0.133)

Note: This table presents the response of industry excess returns to policy surprises. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Robust standard errors are in parentheses. Sample period is May 1999–December 2015. *p < 0.10; **p < 0.05; ***p < 0.01.

Table 2
Monetary Policy Surprises, Industry Characteristics and Firm Financial Constraints

Panel A: Interest Rate Channel

	Durability				**Capital Intensity**				**Cyclicality**			
	High	*Medium*	*Low*	*High-Low*	*High*	*Medium*	*Low*	*High-Low*	*High*	*Medium*	*Low*	*High-Low*
(1) I^{Rec} * TS (α_1)	**-0.79*****	**-0.53*****	**-0.46*****	**-0.32*****	**-0.83*****	**-0.53*****	**-0.44*****	**-0.39*****	**-0.89*****	**-0.65*****	**-0.26*****	**-0.62*****
	(0.048)	(0.053)	(0.055)	(0.073)	(0.048)	(0.052)	(0.055)	(0.073)	(0.052)	(0.047)	(0.054)	(0.075)
(2) I^{Exp} * TS (α_2)	**-0.22*****	**-0.18*****	**-0.07**	**-0.15**	**-0.31*****	**-0.18*****	**-0.13***	**-0.18***	**-0.22*****	**-0.18*****	**-0.08**	**-0.15**
	(0.063)	(0.064)	(0.072)	(0.096)	(0.064)	(0.061)	(0.071)	(0.097)	(0.062)	(0.062)	(0.072)	(0.094)
(3) I^{Rec} * FG (β_1)	**0.30*****	**0.25*****	**0.26*****	**0.04**	**0.37*****	**0.26*****	**0.24*****	**0.12**	**0.36*****	**0.29*****	**0.17****	**0.19***
	(0.072)	(0.075)	(0.083)	(0.109)	(0.071)	(0.076)	(0.082)	(0.109)	(0.074)	(0.070)	(0.081)	(0.110)
(4) I^{Exp} * FG (β_2)	**-0.27*****	**-0.28*****	**-0.19*****	**-0.08**	**-0.33*****	**-0.26*****	**-0.25*****	**-0.07**	**-0.29*****	**-0.27*****	**-0.19*****	**-0.10***
	(0.041)	(0.044)	(0.047)	(0.063)	(0.044)	(0.041)	(0.047)	(0.064)	(0.041)	(0.042)	(0.046)	(0.060)
(5) I^{U} * I^{Rec} * FG (β_3)	**-0.72*****	**-0.66*****	**-0.69*****	**-0.03**	**-0.65*****	**-0.67*****	**-0.77*****	**0.12**	**-0.85*****	**-0.72*****	**-0.45*****	**-0.40*****
	0.100	0.102	0.118	0.155	(0.099)	(0.101)	(0.117)	(0.154)	(0.099)	(0.097)	(0.115)	(0.152)
(6) I^{U} * I^{Exp} * FG (β_4)	**0.05**	**-0.03**	**0.09**	**-0.04**	**-0.01**	**0.04**	**0.07**	**-0.08**	**0.09**	**0.06**	**-0.08**	**0.16**
	(0.075)	(0.076)	(0.086)	(0.114)	(0.076)	(0.074)	(0.086)	(0.115)	(0.074)	(0.074)	(0.085)	(0.112)
(7) I^{U} * I^{Rec} * LSAP (γ_1)	**-0.35*****	**-0.48*****	**-0.37*****	**0.02**	**-0.32*****	**-0.32*****	**-0.51*****	**0.19****	**-0.51*****	**-0.36*****	**-0.27*****	**-0.24*****
	(0.061)	(0.061)	(0.070)	(0.093)	(0.060)	(0.062)	(0.071)	(0.092)	(0.061)	(0.060)	(0.069)	(0.091)
(8) I^{U} * I^{Exp} * LSAP (γ_2)	**-0.10**	**-0.20*****	**-0.17****	**0.07**	**-0.14****	**-0.14****	**-0.20****	**0.05**	**-0.19*****	**-0.11**	**-0.16****	**-0.03**
	(0.068)	(0.068)	(0.078)	(0.104)	(0.067)	(0.069)	(0.077)	(0.103)	(0.067)	(0.067)	(0.077)	(0.102)
(9) $\beta_1 + \beta_3$	**-0.42*****	**-0.41*****	**-0.42*****	**0.01**	**-0.28*****	**-0.41*****	**-0.53*****	**0.25****	**-0.49*****	**-0.43*****	**-0.28*****	**-0.21***
	(0.079)	(0.079)	(0.094)	0.123)	(0.079)	(0.080)	(0.093)	(0.122)	(0.077)	(0.077)	(0.092)	(0.120)
(10) $\beta_2 + \beta_4$	**-0.21*****	**-0.31*****	**-0.10**	**-0.11**	**-0.33*****	**-0.22*****	**-0.18****	**-0.15**	**-0.21*****	**-0.21*****	**-0.27*****	**0.06**
	(0.062)	(0.062)	(0.072)	(0.095)	(0.061)	(0.062)	(0.073)	(0.094)	(0.061)	(0.061)	(0.071)	(0.093)
(11) $\alpha_1 - \alpha_2$	**-0.57*****	**-0.34*****	**-0.39*****	**-0.17**	**-0.52*****	**-0.35*****	**-0.31*****	**-0.21***	**-0.66*****	**-0.46*****	**-0.18****	**-0.48*****
	(0.078)	(0.082)	(0.090)	(0.119)	(0.079)	(0.081)	(0.089)	(0.118)	(0.080)	(0.077)	(0.088)	(0.119)
(12) $\beta_1 - \beta_2$	**0.57*****	**0.53*****	**0.45*****	**0.12**	**0.70*****	**0.52*****	**0.50*****	**0.20**	**0.65*****	**0.56*****	**0.36*****	**0.29****
	(0.083)	(0.088)	(0.096)	(0.127)	(0.084)	(0.086)	(0.096)	(0.128)	(0.085)	(0.082)	(0.094)	(0.127)
(13) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**-0.20****	**-0.10**	**-0.32*****	**0.12**	**0.05**	**-0.19***	**-0.35*****	**0.40*****	**-0.28*****	**-0.22****	**-0.02**	**-0.27***
	(0.100)	(0.100)	(0.118)	(0.155)	(0.110)	(0.100)	(0.117)	(0.154)	(0.098)	(0.098)	(0.115)	(0.151)
(14) $\gamma_1 - \gamma_2$	**-0.26*****	**-0.28*****	**-0.21***	**-0.05**	**-0.18****	**-0.18****	**-0.32*****	**0.14**	**-0.31*****	**-0.25*****	**-0.10**	**-0.21**
	(0.091)	(0.091)	(0.106)	(0.140)	(0.092)	(0.091)	(0.105)	(0.139)	(0.090)	(0.090)	(0.103)	(0.137)
(15) $\alpha_1 + \beta_1$	**-0.49*****	**-0.28*****	**-0.20****	**-0.28****	**-0.46*****	**-0.28*****	**-0.20****	**-0.26****	**-0.53*****	**-0.36*****	**-0.10**	**-0.43*****
	(0.083)	(0.089)	(0.095)	(0.126)	(0.082)	(0.088)	(0.095)	(0.125)	(0.087)	(0.081)	(0.093)	(0.128)
(16) $\alpha_2 + \beta_2$	**-0.49*****	**-0.46*****	**-0.26*****	**-0.23***	**-0.64*****	**-0.44*****	**-0.39*****	**-0.25****	**-0.52*****	**-0.45*****	**-0.27*****	**-0.25****
	(0.080)	(0.083)	(0.092)	(0.122)	(0.083)	(0.079)	(0.093)	(0.124)	(0.080)	(0.080)	(0.090)	(0.120)
(17) $\beta_1 + \beta_3 + \gamma_1$	**-0.77*****	**-0.90*****	**-0.80*****	**0.02**	**-0.61*****	**-0.73*****	**-1.04*****	**0.44*****	**-1.00*****	**-0.78*****	**-0.55*****	**-0.45*****
	(0.082)	(0.082)	(0.097)	(0.127)	(0.083)	(0.083)	(0.098)	(0.128)	(0.080)	(0.080)	(0.095)	(0.124)
(18) $\beta_2 + \beta_4 + \gamma_2$	**-0.31*****	**-0.51*****	**-0.27****	**-0.04**	**-0.47*****	**-0.36*****	**-0.38*****	**-0.10**	**-0.40*****	**-0.31*****	**-0.43*****	**0.03**
	(0.102)	(0.102)	(0.118)	(0.156)	(0.102)	(0.101)	(0.117)	(0.155)	(0.100)	(0.100)	(0.115)	(0.153)

Panel B: Credit Channel

	Book-to-Market				***Earnings-to-Price***				***Size***			
	High	*Medium*	*Low*	*High-Low*	*High*	*Medium*	*Low*	*High-Low*	*High*	*Medium*	*Low*	*High-Low*
(1) I^{Rec} * TS (α_1)	**-0.77*****	**-0.59*****	**-0.33*****	**-0.44*****	**-0.81*****	**-0.54*****	**-0.33*****	**-0.48*****	**-0.38*****	**-0.98*****	**-0.90*****	**-0.52*****
	(0.048)	(0.048)	(0.064)	(0.080)	(0.053)	(0.048)	(0.055)	(0.076)	(0.047)	(0.047)	(0.062)	(0.078)
(2) I^{Exp} * TS (α_2)	**-0.25*****	**-0.20*****	**-0.17****	**-0.08**	**-0.25*****	**-0.19*****	**-0.10**	**-0.15**	**-0.12****	**-0.21*****	**-0.20****	**-0.08**
	(0.064)	(0.063)	(0.072)	(0.096)	(0.064)	(0.063)	(0.072)	(0.097)	(0.062)	(0.062)	(0.071)	(0.094)
(3) I^{Rec} * FG (β_1)	**0.34*****	**0.30*****	**0.24*****	**0.10**	**0.37*****	**0.25*****	**0.20****	**0.17**	**0.24*****	**0.27*****	**0.30*****	**0.06**
	(0.072)	(0.071)	(0.088)	(0.114)	(0.075)	(0.072)	(0.083)	(0.112)	(0.070)	(0.070)	(0.087)	(0.111)
(4) I^{Exp} * FG (β_2)	**-0.26*****	**-0.33*****	**-0.22*****	**-0.04**	**-0.27*****	**-0.28*****	**-0.20*****	**-0.07**	**-0.22*****	**-0.27*****	**-0.27*****	**-0.05**
	(0.044)	(0.041)	(0.047)	(0.064)	(0.041)	(0.044)	(0.047)	(0.063)	(0.041)	(0.040)	(0.048)	(0.063)
(5) I^U * I^{Rec} * FG (β_3)	**-0.69*****	**-0.55*****	**-0.34*****	**-0.35****	**-0.73*****	**-0.58*****	**-0.40*****	**-0.33****	**-0.48*****	**-0.54*****	**-0.87*****	**-0.39****
	(0.100)	(0.099)	(0.118)	(0.155)	(0.102)	(0.100)	(0.118)	(0.156)	(0.097)	(0.097)	(0.119)	(0.153)
(6) I^U * I^{Exp} * FG (β_4)	**-0.20*****	**-0.14***	**-0.10**	**-0.10**	**-0.15***	**-0.11**	**-0.05**	**-0.10**	**-0.03**	**-0.10**	**-0.19****	**-0.16**
	(0.076)	(0.075)	(0.086)	(0.115)	(0.076)	(0.075)	(0.086)	(0.115)	(0.074)	(0.073)	(0.085)	(0.113)
(7) I^U * I^{Rec} * LSAP (γ_1)	**-0.52*****	**-0.49*****	**-0.32*****	**-0.20****	**-0.52*****	**-0.40*****	**-0.25*****	**-0.27*****	**-0.48*****	**-0.34*****	**-0.40*****	**0.08**
	(0.061)	(0.061)	(0.070)	(0.093)	(0.061)	(0.061)	(0.070)	(0.093)	(0.060)	(0.060)	(0.069)	(0.091)
(8) I^U * I^{Exp} * LSAP (γ_2)	**-0.25*****	**-0.10**	**-0.09**	**-0.16**	**-0.32*****	**-0.16****	**-0.18****	**-0.14**	**-0.15****	**-0.14****	**-0.22*****	**-0.07**
	(0.068)	(0.068)	(0.078)	(0.104)	(0.068)	(0.068)	(0.078)	(0.104)	(0.066)	(0.066)	(0.077)	(0.101)
(9) $\beta_1 + \beta_3$	**-0.35*****	**-0.26*****	**-0.10**	**-0.25****	**-0.36*****	**-0.33*****	**-0.20****	**-0.16**	**-0.24*****	**-0.26*****	**-0.57*****	**-0.33*****
	(0.079)	(0.079)	(0.092)	(0.121)	(0.079)	(0.078)	(0.094)	(0.123)	(0.077)	(0.077)	(0.091)	(0.120)
(10) $\beta_2 + \beta_4$	**-0.46*****	**-0.48*****	**-0.32*****	**-0.14**	**-0.42*****	**-0.39*****	**-0.25*****	**-0.17***	**-0.25*****	**-0.38*****	**-0.46*****	**-0.21****
	(0.062)	(0.062)	(0.072)	(0.095)	(0.063)	(0.061)	(0.073)	(0.096)	(0.061)	(0.061)	(0.070)	(0.093)
(11) $\alpha_1 - \alpha_2$	**-0.52*****	**-0.39*****	**-0.15**	**-0.36*****	**-0.55*****	**-0.35*****	**-0.22****	**-0.33*****	**-0.26*****	**-1.20*****	**-0.70*****	**-0.44*****
	(0.079)	(0.078)	(0.096)	(0.124)	(0.082)	(0.078)	(0.090)	(0.122)	(0.077)	(0.076)	(0.094)	(0.121)
(12) $\beta_1 - \beta_2$	**0.60*****	**0.63*****	**0.46*****	**0.14**	**0.64*****	**0.53*****	**0.40*****	**0.24***	**0.46*****	**0.55*****	**0.57*****	**0.10**
	(0.085)	(0.083)	(0.101)	(0.131)	(0.088)	(0.083)	(0.096)	(0.130)	(0.082)	(0.081)	(0.100)	(0.129)
(13) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**0.11**	**0.22****	**0.22***	**-0.11**	**0.06**	**0.06**	**0.05**	**0.01**	**0.02**	**0.11**	**-0.11**	**-0.12**
	(0.100)	(0.100)	(0.116)	(0.153)	(0.100)	(0.110)	(0.118)	(0.155)	(0.098)	(0.098)	(0.115)	(0.151)
(14) $\gamma_1 - \gamma_2$	**-0.27*****	**-0.39*****	**-0.23****	**-0.04**	**-0.20****	**-0.24*****	**-0.07**	**-0.13**	**-0.33*****	**-0.20****	**-0.17***	**0.16**
	(0.091)	(0.091)	(0.105)	(0.139)	(0.092)	(0.091)	(0.106)	(0.140)	(0.089)	(0.089)	(0.103)	(0.136)
(15) $\alpha_1 + \beta_1$	**-0.43*****	**-0.29*****	**-0.09**	**-0.34****	**-0.44*****	**-0.28*****	**-0.13**	**-0.31****	**-0.14***	**-0.71*****	**-0.60*****	**-0.46*****
	(0.083)	(0.083)	(0.105)	(0.134)	(0.089)	(0.083)	(0.095)	(0.131)	(0.081)	(0.081)	(0.104)	(0.131)
(16) $\alpha_2 + \beta_2$	**-0.51*****	**-0.53*****	**-0.40*****	**-0.12**	**-0.52*****	**-0.47*****	**-0.30*****	**-0.22***	**-0.34*****	**-0.06**	**-0.47*****	**-0.12**
	(0.083)	(0.080)	(0.092)	(0.124)	(0.082)	(0.081)	(0.093)	(0.124)	(0.079)	(0.078)	(0.092)	(0.122)
(17) $\beta_1 + \beta_3 + \gamma_1$	**-0.87*****	**-0.74*****	**-0.42*****	**-0.45*****	**-0.89*****	**-0.73*****	**-0.45*****	**-0.43*****	**-0.72*****	**-0.61*****	**-0.97*****	**-0.25****
	(0.082)	(0.082)	(0.095)	(0.126)	(0.082)	(0.083)	(0.097)	(0.127)	(0.080)	(0.080)	(0.095)	(0.124)
(18) $\beta_2 + \beta_4 + \gamma_2$	**-0.71*****	**-0.58*****	**-0.42*****	**-0.30***	**-0.74*****	**-0.55*****	**-0.43*****	**-0.31****	**-0.40*****	**-0.52*****	**-0.68*****	**-0.28***
	(0.102)	(0.102)	(0.118)	(0.156)	(0.103)	(0.101)	(0.116)	(0.155)	(0.100)	(0.100)	(0.115)	(0.152)

Panel B: Credit Channel (Cont'd)								
	Cash Flows				***Financial Leverage***			
	High	*Medium*	*Low*	*Low-High*	*High*	*Medium*	*Low*	*High-Low*
(1) I^{Rec} * **TS** (α_1)	**-0.32*** **	**-0.45*** **	**-0.68*** **	**-0.36*** **	**-0.54*** **	**-0.35*** **	**-0.98*** **	**-0.44*** **
	(0.048)	(0.054)	(0.056)	(0.074)	(0.047)	(0.052)	(0.054)	(0.071)
(2) I^{Exp} * **TS** (α_2)	**-0.07**	**-0.08**	**-0.12**	**-0.05**	**-0.10***	**-0.17*** **	**-0.22*** **	**-0.12**
	(0.063)	(0.063)	(0.075)	(0.098)	(0.061)	(0.062)	(0.072)	(0.094)
(3) I^{Rec} * **FG** (β_1)	**0.32*** **	**0.27*** **	**0.23*** **	**-0.09**	**0.17** **	**0.23*** **	**0.30*** **	**0.13**
	(0.072)	(0.076)	(0.084)	(0.110)	(0.070)	(0.073)	(0.082)	(0.108)
(4) I^{Exp} * **FG** (β_2)	**-0.21*** **	**-0.27*** **	**-0.30*** **	**-0.09**	**-0.36*** **	**-0.27*** **	**-0.29*** **	**0.07**
	(0.041)	(0.041)	(0.052)	(0.067)	(0.040)	(0.041)	(0.048)	(0.063)
(5) I^U * I^{Rec} * **FG** (β_3)	**-0.50*** **	**-0.67*** **	**-0.69*** **	**-0.19**	**-0.72*** **	**-0.60*** **	**-0.55*** **	**-0.17**
	(0.103)	(0.119)	(0.118)	(0.157)	(0.097)	(0.099)	(0.116)	(0.151)
(6) I^U * I^{Exp} * **FG** (β_4)	**-0.12**	**-0.32*** **	**-0.22** **	**-0.11**	**-0.12**	**-0.04**	**-0.08**	**-0.04**
	(0.075)	(0.075)	(0.089)	(0.117)	(0.073)	(0.074)	(0.086)	(0.113)
(7) I^U * I^{Rec} * **LSAP** (γ_1)	**-0.31*** **	**-0.37*** **	**-0.52*** **	**-0.21** **	**-0.53*** **	**-0.37*** **	**-0.21*** **	**-0.32*** **
	(0.062)	(0.062)	(0.071)	(0.094)	(0.060)	(0.060)	(0.069)	(0.091)
(8) I^U * I^{Exp} * **LSAP** (γ_2)	**-0.12***	**-0.18** **	**-0.24*** **	**-0.12**	**-0.28*** **	**-0.11***	**-0.09**	**-0.19***
	(0.069)	(0.069)	(0.079)	(0.105)	(0.067)	(0.067)	(0.077)	(0.102)
(9) $\beta_1 + \beta_3$	**-0.18** **	**-0.40*** **	**-0.46*** **	**-0.28** **	**-0.55*** **	**-0.36*** **	**-0.25*** **	**-0.30** **
	(0.080)	(0.080)	(0.095)	(0.124)	(0.079)	(0.079)	(0.094)	(0.123)
(10) $\beta_2 + \beta_4$	**-0.33*** **	**-0.59*** **	**-0.52*** **	**-0.19** **	**-0.48*** **	**-0.32*** **	**-0.37*** **	**-0.11**
	(0.063)	(0.063)	(0.073)	(0.096)	(0.062)	(0.062)	(0.072)	(0.095)
(11) $\alpha_1 - \alpha_2$	**-0.26*** **	**-0.37*** **	**-0.56*** **	**-0.30** **	**-0.44*** **	**-0.18** **	**-0.76*** **	**-0.32*** **
	(0.079)	(0.082)	(0.093)	(0.122)	(0.078)	(0.082)	(0.090)	(0.119)
(12) $\beta_1 - \beta_2$	**0.53*** **	**0.54*** **	**0.53*** **	**-0.01**	**0.53*** **	**0.51*** **	**0.59*** **	**0.06**
	(0.084)	(0.087)	(0.099)	(0.130)	(0.083)	(0.088)	(0.096)	(0.127)
(13) $(\beta_1 + \beta_3) - (\beta_2 + \beta_4)$	**0.15**	**0.20***	**0.06**	**-0.09**	**-0.07**	**-0.05**	**0.12**	**-0.19**
	(0.101)	(0.100)	(0.119)	(0.156)	(0.100)	(0.100)	(0.118)	(0.155)
(14) $\gamma_1 - \gamma_2$	**-0.18** **	**-0.19** **	**-0.28*** **	**-0.09**	**-0.26*** **	**-0.26*** **	**-0.12**	**-0.14**
	(0.092)	(0.092)	(0.107)	(0.141)	(0.091)	(0.091)	(0.106)	(0.140)
(15) $\alpha_1 + \beta_1$	**0.00**	**-0.18** **	**-0.45*** **	**-0.45*** **	**-0.37*** **	**-0.12**	**-0.68*** **	**-0.31** **
	(0.083)	(0.090)	(0.097)	(0.128)	(0.083)	(0.089)	(0.095)	(0.126)
(16) $\alpha_2 + \beta_2$	**-0.28*** **	**-0.36*** **	**-0.42*** **	**-0.14**	**-0.46*** **	**-0.45*** **	**-0.51*** **	**-0.05**
	(0.081)	(0.081)	(0.099)	(0.127)	(0.080)	(0.083)	(0.092)	(0.122)
(17) $\beta_1 + \beta_3 + \gamma_1$	**-0.49*** **	**-0.76*** **	**-0.98*** **	**-0.50*** **	**-1.08*** **	**-0.74*** **	**-0.46*** **	**-0.62*** **
	(0.083)	(0.082)	(0.098)	(0.129)	(0.082)	(0.082)	(0.097)	(0.127)
(18) $\beta_2 + \beta_4 + \gamma_2$	**-0.45*** **	**-0.77*** **	**-0.76*** **	**-0.31** **	**-0.76*** **	**-0.43*** **	**-0.46*** **	**-0.29***
	(0.103)	(0.103)	(0.119)	(0.157)	(0.102)	(0.102)	(0.118)	(0.156)

Note: Excess returns are ranked by industry-specific and firm-specific indicators, as follows: a ranking of "low" if it is in the bottom 33% of the indicator's distribution, "high" if it is in the top 33%, and "medium" otherwise. Coefficients are in percentage points per standard deviation change in the monetary policy surprise. Robust standard errors are in parentheses. Sample period is May 1999–December 2015. **p* < 0.10; ***p* < 0.05; ****p* < 0.01.