Master Degree in Economics and Finance

The Effect of Monetary Policy on Corporate Share Repurchases in the United States

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ABSTRACT IN ENGLISH: In the wake of the global financial crisis that began in 2007, central banks throughout the world engaged in unprecented amounts of monetary policy aimed at stimulating their respective economies. One frequent comment from financial operators during this period is that the effectiveness of these efforts was reduced by the fact that central banks policies were also encouraging firms to borrow in order to repurchase their own shares rather than investing. In this paper, we put the hypothesis that loose monetary encourages share repurchases to the test by analyzing the response of S&P500 firms to perceived changes in Federal Reserve Bank policies. We find significant evidence supporting this hypothesis, and find some evidence supporting the hypothesis that firms may be borrowing in order to finance these repurchases.

ABSTRACT IN CATALAN: Com a conseqüència de la crisi financera mundial que va començar el 2007, els bancs centrals de tot el món van emprendre una quantitat important de política monetària per estimular les seves respectives economies. Un comentari freqüent dels operadors financers durant aquest període és que l'efectivitat d'aquests esforços es va veure reduït pel fet que les polítiques dels bancs centrals també estaven encoratjant a les empreses a demanar prestat per recomprar les seves pròpies accions en comptes d'invertir. En aquest article, vam posar la hipòtesi que els guanyadors monetaris solen compartir les recompenses a la prova analitzant la resposta de les empreses S&P500 a canvis percebuts en les polítiques del Banc Federal de la Reserva. Trobem proves significatives que donen suport a aquesta hipòtesi, i troben evidències que donen suport a la hipòtesi que les empreses poden prestar per finançar aquestes recompenses.

BARCELONA GRADUATE SCHOOL OF ECONOMICS

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Abstract

In the wake of the global financial crisis that began in 2007, central banks throughout the world engaged in unprecented amounts of monetary policy aimed at stimulating their respective economies. One frequent comment from financial operators during this period is that the effectiveness of these efforts was reduced by the fact that central banks policies were also encouraging firms to borrow in order to repurchase their own shares rather than investing. In this paper, we put the hypothesis that loose monetary encourages share repurchases to the test by analyzing the response of S&P500 firms to perceived changes in Federal Reserve Bank policies. We find significant evidence supporting this hypothesis, and find some evidence supporting the hypothesis that firms may be borrowing in order to finance these repurchases.

Contents

Introduction

Though share repurchases had in theory long been legal in the United States, these programs only became genuinely popular among U.S. corporations upon the introduction of the Securities and Exchange Commission (SEC) rule 10b-18 in the 1980s. As buyback programs grew in importance, so did the attention dedicated to them among academics. The causes and effects of this element of corporate activity are still imperfectly understood, however, and the research continues to evolve.

Research and theory on share repurchases have so far advanced two major hypotheses about what drives buybacks. The first is the Information Signaling hypothesis; the second is the Free Cash Flow hypothesis. The Information Signaling hypothesis is based on the notion that asymmetric information between firm insiders and outsiders causes the firm's stock to be mispriced, and that when a share is undervalued, repurchase announcements can transmit positive signals to the market. The Free Cash Flow hypothesis proposes that when firms have excess cash flows relative to their investment opportunities, they purchase their shares back in order to maximize shareholder value and reduce their exposure to opportunistic investment risks.

In this work, we rely on these two hypotheses to measure the effect of the Federal Reserve's monetary policy on S&P 500 corporations' share repurchase activities between 2000 and 2015.

Starting in 2000, the Federal Reserve Bank of the United States (FRB) pursued an expansionary monetary policy that kept interest rates low except during the period of housing bubble from 2005 to 2007. Since the financial crisis started in 2007, the FRB embarked on an aggressively expansionary monetary policy path that drove down the policy rates to zero from 2008 to 2015. The FRB also pursued quantitative easing (QE) in different episodes starting with QE1 in December 2008 and ending with QE3 in October 2014. One purpose of this type of unconventional policy was to drive up risk appetite and spur economic growth by stimulating borrowing and investment by businesses and households.

In this regard, whether loose policy actually translated into investment by firms is a crucial point. Did the Federal Reserve Bank's loose monetary policy instead encourage corporations to spend for the sake of repurchasing their stock rather than for the sake of investing? Should loose monetary policy have a significant stimulating effect on corporate buybacks, this would suggest greater frictions in monetary policy transmission than expected.

In order to determine whether this was the case, we employ disaggregated monetary policy shocks corresponding to changes in the Federal Funds Rate (FFR), changes in Forward Guidance (FG), and changes in Large Scale Asset Repurchases (LSAP) over the period of interest.

Literature Review

Among the numerous studies dealing with the implications and determinants of corporate share repurchases, the most widely accepted theories are the Information Signaling hypothesis and the Free Cash Flow hypothesis. The former suggests that firms have an incentive to buy their own shares as a positive self-investment signal when they believe stock price is undervalued, whereas the latter presents the repurchase of shares as a way to distribute a firm's excess cash flow that could not productively be invested.

A wealth of studies have found evidence that firms repurchase their shares to signal their undervaluation (e.g., Ikenberry et al., 1995, 2000; Stephens and Weisbach, 1998; Chan et al., 2004; Brav et al., 2005; Lie 2005; Ginglinger and L'Her, 2006; and Vermaelen et al., 2002, 2008). The main premise of this hypothesis is that firm insiders consider their shares are undervalued because they find the market price given public information unfair, or because the market undervalues the firm's prospects. (Ikenberry et al.,1995; Lie, 2005). Stephens and Weisbach (1998) show that higher prior-quarter returns negatively predict the percentage of announced shares actually repurchased. In the same direction, over 86% of the managers surveyed by Brav et al. (2005) agreed that the motivation for repurchasing their own stock was to show that the stock is a 'good deal'. Empirically, much of the literature supporting undervaluation as a motive for stock repurchase arrives at the conclusion by observing returns subsequent to the repurchase announcement. Ikenberry, et al., (1995, 2000), Ali et al. (2003) and Chan et al., (2004) use the book-to-market (B/M) ratio as a proxy for firm valuation and find that stock repurchases follow periods of high B/M ratio and that the B/M ratio positively correlates with long-run returns of repurchase firms. The implication is that since the high B/M ratio firms tend to be undervalued, managers seek to correct or take advantage of this situation, resulting in investors responding more positively to such stocks perceiving repurchase decision as signal. As the B/M ratio is the inverse of the average Tobin's Q, the concept will also be referred to as such for intuitive ease.

Alternatively, many research works establish positive relationship between excess cash-flow and share repurchase decisions (e.g., Easterbrook, 1984; Jensen, 1986; Nohel and Tarhan, 1998; Guay and Harford, 2000; Dittmar, 2000; Grullon and Michaely, 2004; Brav et al., 2005; Mitchell and Dharmawan, 2007; Skinner, 2008). In the survey work by Brav et al., (2005), managers suggest that investment policies are set before repurchase policy, and that a major determinant of their repurchase policy is to distribute excess cash. Managers are reluctant to cut dividends and, as a consequence, much of the variation in cash distributions is likely to be observed through repurchases. Guay and Harford (2000) show that share buybacks usually follow less permanent changes in cash flows, as they are a more flexible form of cash distribution than dividends. Dittmar (2000) and Mitchell and Dharmawan (2007) confirms that firms use repurchases as a mechanism to distribute surplus cash. Li and McNally (2007) find that firms with more excess cash, a lower Q ratio, more insider holdings and negative returns before announcement tend to perform more share repurchases. Skinner (2008) argues that it is market liquidity that generates a substitution effect between repurchases and dividends for large firms with a strong dividend tradition. Feng (2013) also finds that companies with a higher free cash flow and less debt tend to repurchase stocks more than other matched companies.

Studies have further shown that firms may also repurchase their stock to alter their leverage ratio, fend off takeovers, or manage their ESOP programs. According to Bagwell and Showen (1988) and Hovakimian et al. (2001), firms repurchase their stocks to perform capital structure adjustments. Fenn and Liang (1998) and Jolls (1998) have shown that firms engage in share repurchase activities to change corporate control. However, Dittmar (2000) shows that though leverage and takeovers prompt some firms in some years to repurchase stock, these are not the primary motives.

While most of the literature outlined above favors either the information signaling hypothesis or the free cash flow hypothesis, certain works, such as, Dittmar and Dittmar (2008) and Liang et al. (2012), reconcile these theories by proposing that the motives of share repurchase decisions might depend on the stage of the business cycle and the firm's life cycle. Indeed, Dittmar and Dittmar (2008) argues, on the basis of their analysis of financing waves recorded from 1971 to 2004, that the manifestation of share repurchases over time is influenced by the life cycle of the firm as well as business cycle of the economy. They found that firms are more inclined to perform a

repurchase of their own shares when they are in a mature stage (and have enough financial resources) and the economy is in an expansionary mode. Bonaime et al. (2016) find that firms are more likely to repurchase stocks in those quarters in which stock prices are higher and other valuation variables are not favorable. Overall, the evidence on the influence of market timing opportunities on share repurchase decisions is mixed. According to Dittmar (2000) although the market timing explanation appears to be statistically significant, its economic significance is not well established in the literature. Liang et al. (2012) also suggest that the undervaluation of shares is not the reason why a company decides to buy back shares, but the development phase of the firm is. The paper concludes that growing firms repurchase shares to signal better performance to investors while mature firms may repurchase to prevent infusing free cash flows into negative net present value projects.

Data collection, discussion, and cleaning

We source quarterly firm-level data on the constituents of the S&P 500 index from FactSet and Compustat NA from Q3 1999 to Q2 2016. This information is collected from firms' quarterly financial statements, as well as analysts' assessments in the case of credit rating data.

These data items were collected as follows: share repurchase expenditures, share issuance revenue, capital expenditure, cash flows before depreciation, percentage of international sales, price to book were collected from FactSet. Credit ratings, and firms' market valuations are obtained from Compustat NA. Credit ratings are transformed such that higher values correspond to higher ratings. Summary statistics can be found in Table 1.

Macroeconomic U.S. data and government bonds' yields are taken from Federal Reserve Economic Data (FRED). In particular, we used the secondary market rate for the 3-month yield and the constant maturity rate for the 10-year yield. Real GDP is measured in billions of chained 2009 dollars. Other values are deflated to be brought in accordance with Q1 2000 U.S. dollars.

The major independent variables in our estimation equation are the three differentiated components of monetary policy shocks as we aim to identify the effect of monetary policy shocks on share repurchase decisions of S&P 500 companies. Identification of the effect of monetary

policy became more challenging after 2008 financial crisis due to challenges in estimating the effects of unconventional monetary policy announcements. One of these challenges is that firms and financial markets are forward-looking, and thus do not react to the component of an FOMC announcement that is expected ex-ante. What we can observe as a reaction of the firms and financial markets comes from the unanticipated component of the monetary policy. But determining the size of the unexpected component of each announcement is not straightforward, as it is difficult to measure what financial markets and firms expected of each FOMC announcement.

In order to overcome these challenges, Swanson (2017) looks at the high-frequency (30-minute) response of asset prices to FOMC announcements in order to identify the immediate causal effect of those announcements on financial markets. He uses federal funds futures, euro-dollar futures, treasury bond yields (for the 3-month, 6-month and 2, 5, 10, and 30 year maturities), the stock market returns (as measured by the S&P 500), exchange rates (yen/dollar and dollar/Euro) as asset prices. He not only identifies the monetary policy shocks but also decomposes each FOMC announcement into shocks corresponding to changes in the federal funds rate, changes in forward guidance and changes in large-scale asset repurchases.

Swanson employs following factor model and uses principal component analysis to estimate the surprise component of each monetary policy announcement.

$$X = F\Lambda + \varepsilon$$

Each element of X reports the 30-minute response of the asset to the FOMC announcement. F contains unobserved factors, Λ is matrix of loadings of the asset price responses, and ε is white noise residuals. Swanson proposes that the columns of F as corresponding to the surprise component of the change in the federal funds rate after each FOMC meeting, the surprise component of the change in forward guidance, the surprise component of any LSAP announcements, and any additional dimensions of news about monetary policy or the economy that are systematically revealed in FOMC announcements. He divides the whole sample into two periods: the pre-ZLB period from 1991–2008 and the ZLB period from 2009–2015. He performs the factor estimation and identification separately on each period assuming that there are only two factors (changes in the federal funds rate and forward guidance) in the first period and two factors (changes in forward guidance and LSAPs) in the second.

We use estimated factors from Swanson's split-sample identification normalized to have unit variance. Since our analysis is done on quarterly repurchases, we sum these factors to have a quarterly measure for the monetary policy shocks. We also transform these factors, which were originally negative for policy loosening and positive for policy tightening, such that they are all positive, and that higher values represent loosening and lower values represent tightening, which facilitates their interpretation. A plot of these shocks can be found in Chart 1.

Empirical Methodology and Discussion

In order to determine the mechanisms by which the growth in stock repurchases is affected by monetary policy shocks we run the following regression:

$$\Delta BB_{i,t} = \beta_0 + \beta_3 FG_{t-h} + \beta_1 FFR_{t-h} + \beta_2 LSAP_{t-h}$$

$$+ \beta_4 \Delta BB_{i,t-1} + \beta_5 \Delta CF_{i,t-1} + \beta_6 \Delta Cap_{it-1} + \beta_7 Q_{i,t-1}$$

$$+ \beta_8 FCast_{i,t-1} + \beta_9 \Delta GDP_{t-1} + \beta_{10} Recession_t + \epsilon_t$$

Where ΔBB_{it} is the change in log real buybacks for a given firm, ΔCF_{it} is the change in its log real cash flows, ΔCap_t is the change in its capital expenditures, Q_{it} is the firm's Tobin's Q as proxied by the price to book ratio, MV_{it} is the firm's market valuation, $IntAvg_{it}$ is the percentages of its sales from abroad, $Rating_{it}$ is its Standard and Poor's credit rating, $FCast_t$ is the market expectation of real GDP growth, ΔGDP_t is the growth rate of real GDP, FFR_t is shocks in the Federal Funds Rate, $LSAP_t$ is shocks concerning the Large Scale Asset Purchase program (a.k.a. QE), FG_t is shocks to Forward Guidance, and $Recession_t$ is a dummy taking a value of 1 if the U.S. economy is undergoing a recession as is defined by the NBER.

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$Recession_t$ is a dummy taking a value of 1 if the U.S. economy is undergoing a recession as is defined by the NBER. The inclusion of four time indices for the monetary policy shocks reflect the idea that monetary policies do not do not generally have an immediate effect on the real economy, but do, as a result of their unexpectedness, cause shocks to the financial markets, which affects firms contemporaneously to the policy shocks.

As noted earlier, we also use market-based expectations of real GDP growth in the following three years (12 quarters) as regressors. It is clear that expected growth is one of the factors that affect the investment decision and is in turn tied to buybacks. To estimate these expectations of real GDP growth, we employ a model described by Abdymomunov (2013), which exploits the information contained in the yield curve relative to U.S. government bonds. The expectations computed from this model can be seen in Chart 2. In particular, the model takes into account the spread between the long-term and short-term interest rates. The economic reason that allows us to use the yield curve as a predictor of the expectation of the GDP growth lies in the term structure of interest rates. Long-term interest rates represent the market's expectation of future short-term interest rates. We know that short-term interest rates are theoretically tied to the economy's growth: recessions are linked to low interest rates while the opposite holds in case of boom periods. Therefore, we can infer that expectations of economic decline in the future should reduce the long-term interest rate. Therefore, the changes in the expected real GDP growth can be captured by the premium obtained in holding long- term bonds. In order to minimize any other component of the premium, we use U.S. government bond yields, which are considered to be nearly riskless. The model is represented by:

$$g_{t+h} = \beta_0 + \beta_1 s_t + u_t, \quad u_t \sim N(0, \sigma_u^2)$$

Where g_{t+h} is the growth rate in h periods, that is:

$$g_{t+h} = \frac{400}{h}[ln(RGDP_{t+h}) - ln(RGDP_t)]$$

$RGDP_t$ represents the real GDP at a given time. As specified previously, data are quarterly and hence we set h=12 as we want to obtain an expectation for three years. S_t symbolizes the spread between the long- and short-run interest rates, or, in other terms:

$$s_t = y_t(120) - y_t(3)$$

where $y_t(120)$ and $y_t(3)$ are the monthly yields of the bonds with maturity of 10 years and 3 months respectively. We use an AR(1) model to obtain the spread:

$$s_t = \mu + \alpha s_{t-1} + \varepsilon_t, \quad \varepsilon_t \sim N(0, \sigma_\varepsilon^2)$$

According to the Free Cash Flow hypothesis, we expect repurchasing activity to respond to the availability of surplus cash flow and the state of the aggregate economy, controlling for investment opportunities. Therefore, the regression model incorporates variables that capture the impact of excess cash flow and investment opportunities. The signaling hypothesis suggests that stock repurchase activities are reactions to aggregate or firm level under-valuations. We use the average Tobin's Q ratio, also known as the price-to-book (P/B) ratio, as the proxy for firm valuation in the regression. A low Q ratio could indicate potential extent of under-valuation of the stock a firm. Further, the ratio is also associated with growth opportunity of the firm as proposed by Wiley et al. (2011) etc. where firms with high Q ratio are usually regarded as firms with growth potential.

As, according to Bagwell and Shoven (1988), firms achieve their leverage ratio goal by stock repurchase, we include firms' long term debt rating by Standard and Poor's. Dittmar (2000) proposes that firms with low leverage ratio have a high probability to repurchase, because their leverage ratio is below their target, and that firms faced with low borrowing costs often take advantage of the scenario, by issuing bonds or by increasing their leverage and using these funds to repurchase a part of their outstanding shares. Specifically, through the repurchase of shares, firms no longer create commitments to investors, as they would be required to by adopting a clear dividend policy. We expect that this tendency would be higher among better rated firms during the period under consideration (2000-2015) as the Federal Reserve kept a loose monetary policy. We also anticipate that the shift in portfolio balances, generated by the FRB's introduction of quantitative easing (QE) since 2008, would causes a further reduction in the borrowing cost experienced by higher rated firms, which would amplify this phenomenon.

Empirical Results and Robustness, and Identification

In this section, we present and discuss the results of our empirical specifications, which are found in Tables 2 and 3. As can be seen from Table 2, which represents our most general regression,

shocks loosening the Fed Funds Rate and Forward Guidance are significant at the 99% level after two quarters and are positively correlated with share repurchases by firms, although the effect of the Fed Fund Rate loosening are negative three quarters out at similar levels of significance but of lower magnitude. Loosening shocks to QE are negatively correlated with buybacks at the same significance level. Overall, the net effect of monetary policy loosening is positive on share repurchases. Furthermore, as predicted by the excess cash flow theory of repurchases, the growth of cash flows is positively correlated with share repurchases and significant at the 95% level. The expectation of future investment opportunities, as proxied by Tobin's Q, is negatively correlated with them, but insignificant. This result is unsurprising in the context of the theory formulated by Liang et al. (2012), as our sample is composed of firms that could reasonably be seen as further along their life-cycle than is usual.

Specifications 2 through 5 in Table 2 stand respectively for firm fixed-effects, year fixed-effects, as well as recession and no-recession fixed effects. As can be seen from the table, the results from the pooled regression are generally robust to these alternative specifications. Of particular interest is the difference between the recession and no-recession specifications, which suggest that a recession dummy is not sufficient to fully capture the effects of economic crises on repurchase activities. Notably, the impact of monetary policy loosening on firm stock repurchase behavior becomes unambiguously positive during recessions. Table 3 presents all the same regressions, but on a more robust sample restricted only to those firms for which we have repurchase data for the whole sample period. The coefficients are once again generally resilient to this alternative sample. Differences between the two sample results could possibly be explained by the fact that the restricted sample is generally older than the full one, although the authors do not verify this hypothesis.

In Tables 4 and 5, we present interactions between the monetary shock parameters and international average sales, bond ratings, and the recession dummy. The motivation behind these interactions is an attempt at shedding more light on how monetary policy affects firm behavior. More specifically, since we have found generally robust relationship between loose monetary policy and share repurchases, do firms choose to borrow in order to fund their repurchases, or do they instead use their cash reserves to fund these buybacks? As we do not possess information

about firms' intentions as to how to spend the money obtained through bond emissions, we must infer this through other means.

In Table 4, we interact the percentage of international sales with the three monetary shock parameter under the assumption that firms which have greater international sales revenues will face a tax cost when returning these earnings to the United States, and will therefore prefer to issue debt in order to fund share repurchases. We find that, except in the case of the LSAP and one period of Forward Guidance, there is no significance to this interaction. However, the percentage of international sales in the year has a significant positive main effect in the FFR and LSAP interaction specifications.

In Table 5, we interact firms' credit ratings with the three monetary shock parameters under the assumption that firms whose costs of borrowing are most driven down by monetary policy stand the most to gain from using debt to fund their repurchases. We expect this phenomenon to be stronger when interacting credit ratings with QE, as the reduction in the quantity of riskless assets resulting from FRB asset purchases would normally drive investors towards alternative lower risk assets such as high grade corporate debt, thus lowering the yield on the highest rated corporate debt. This assumption proves inconclusive, as we find that the interaction between LSAP shocks and bond ratings are weakly negative or insignificant. This is also true regarding the interaction with the Federal Funds Rate and Forward Guidance.

Conclusion

In conclusion, we find significant evidence suggesting that loose monetary policy has an effect on the growth rate of share repurchases. More specifically, that shocks to the Fed Funds Rate and to Forward Guidance are generally positively correlated with firm decisions to increase their share repurchase. The negative effects of Quantitative Easing upon buyback activities are surprising, and the authors suspect that this may be due to the manner in which QE is conducted, as its stimulative aims are similar to those of other policies. At the same time, much work remains to be done to assess the true impacts of unorthodox policies such as Quantitative Easing.

The fact that these results are magnified during recessions is of particular importance to the conduct of monetary policy, as it indicates that the central bank's attempt at encouraging firms to invest through loose policy might be weakened at the worst time by firms choosing to return cash to their shareholders instead. We do not attempt at this point to assess the net effect of this behavior on the overall effectiveness of monetary stimulus, but it is apparent from these results that a further analysis of the interplay between share repurchases and monetary policy would be fruitful.

We also find weak evidence, through the interaction of monetary policy shocks with other variables, that firms are, in fact, choosing to issue debt in order to conduct these repurchase operations, though it is not possible to estimate whether this is true directly.

After uncovering these relationships, there is one extension that could feasibly well be done, which is an assessment of the effect of monetary policy on stock market prices, as a number of approaches exist to appraise how much share repurchase activities increase asset prices. This would perhaps allow us to shed some light on the issue of asset price inflation during monetary stimulus periods.

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Table 1: Summary statistics

	Mean	Std. Dev.
Buybacks	154.4469	569.4445
Cashflows	631.4266	1291.614
Share Issuance	69.94023	663.8982
Average International Sales	27.32847	26.23161
Capital Expenditure	209.5015	503.6025
Price to Book ratio	5.569104	77.36908
Market Valuation	21017.7	39466.62

Chart 1: Monetary Policy Shocks

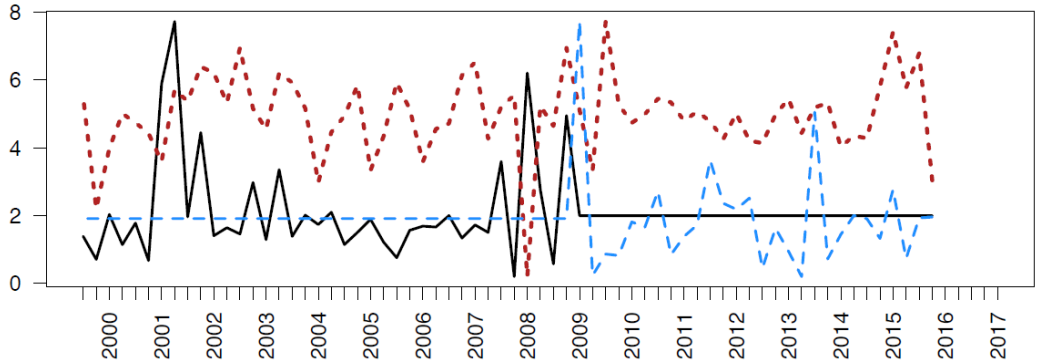

Figure1: Fed funds rate (black), forward guidance (red) and quantitative easing (blue) shocks

Chart 2: Abdymomunov GDP Growth Forecasts

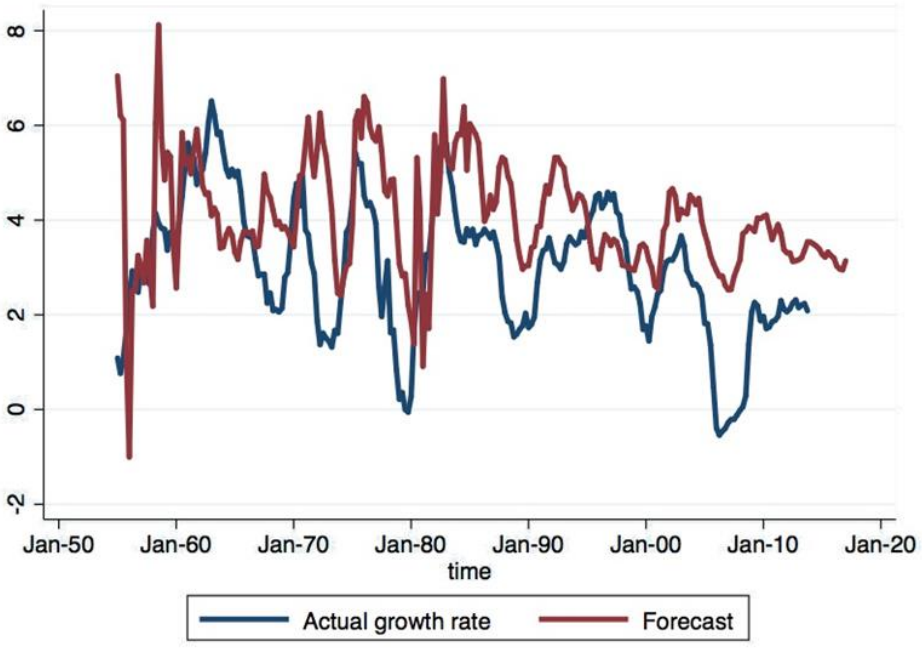

Table 2: Dependent variable: ΔBB_t

	(1) Main Regression		(2) Firm FE		(3) Year FE		(4) Recession		(5) No Recession	
FG_t	0.00122	(0.00236)	0.00127	(0.00239)	0.00287	(0.00429)	0.0142	(0.00826)	0.000136	(0.00292)
FG_{t-1}	0.00159	(0.00229)	0.00147	(0.00230)	0.00739	(0.00463)	0.00170	(0.00879)	0.00105	(0.00301)
FG_{t-2}	0.00856***	(0.00222)	0.00861***	(0.00224)	0.0111**	(0.00387)	0.0152	(0.00929)	0.00666*	(0.00274)
FG_{t-3}	0.00690**	(0.00217)	0.00698**	(0.00220)	0.00848*	(0.00375)	0.00638	(0.00671)	0.0105***	(0.00293)
FFR_t	0.00158	(0.00284)	0.00157	(0.00287)	-0.00296	(0.00472)	0.0103**	(0.00351)	-0.00348	(0.00733)
FFR_{t-1}	0.000563	(0.00241)	0.000592	(0.00243)	-0.00447	(0.00364)	0.000795	(0.00562)	-0.0254***	(0.00685)
FFR_{t-2}	0.0112***	(0.00271)	0.0112***	(0.00274)	0.00349	(0.00413)	0.0182**	(0.00598)	-0.0138*	(0.00587)
FFR_{t-3}	-0.00736**	(0.00250)	-0.00729**	(0.00253)	-0.0103***	(0.00301)	-0.0240	(0.0147)	0.00444	(0.00390)
$LSAP_t$	-0.00559	(0.00350)	-0.00539	(0.00352)	-0.00501	(0.00389)	-0.00661	(0.0106)	-0.00325	(0.00462)
$LSAP_{t-1}$	-0.0141***	(0.00369)	-0.0139***	(0.00373)	-0.0105*	(0.00467)	-0.0128	(0.00992)	-0.0282***	(0.00497)
$LSAP_{t-2}$	-0.00674*	(0.00317)	-0.00679*	(0.00320)	-0.00944	(0.00563)			-0.0141***	(0.00361)
$LSAP_{t-3}$	-0.00281	(0.00365)	-0.00268	(0.00366)	-0.00877	(0.00539)			-0.00380	(0.00374)
ΔBB_{t-1}	-0.391***	(0.0139)	-0.393***	(0.0140)	-0.392***	(0.0139)	-0.346***	(0.0328)	-0.401***	(0.0153)
ΔCF_{t-1}	0.0552*	(0.0245)	0.0550*	(0.0250)	0.0538*	(0.0244)	0.130*	(0.0572)	0.0329	(0.0268)
ΔCap_{t-1}	0.00280	(0.0165)	0.00253	(0.0165)	0.00136	(0.0165)	0.00947	(0.0400)	0.000441	(0.0180)
Q_t	-0.00000238	(0.00000572)	-0.00000393	(0.00000636)	-0.000000126	(0.00000683)	0.000154**	(0.0000553)	-0.00000907*	(0.00000421)
$FCast_t$	-0.00225	(0.00629)	-0.00177	(0.00648)	0.0485*	(0.0190)			-0.000808	(0.00720)
ΔGDP_{t-1}	0.0130*	(0.00621)	0.0135*	(0.00626)	0.0111	(0.00788)			0.0279**	(0.00853)
Recession	-0.0723***	(0.0146)	-0.0719***	(0.0147)	-0.124***	(0.0264)				
N	24455		24454		24455		4057		20398	

Newey-West standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Robust Regression, Dependent variable: ΔBB_t

	(1)		(2)		(3)		(4)		(5)	
	Main Regression		Firm FE		Year FE		Recession		No Recession	
FG_t	-0.00141	(0.00388)	-0.00140	(0.00391)	0.00639	(0.00711)	0.0258*	(0.0127)	-0.00525	(0.00487)
FG_{t-1}	0.00190	(0.00393)	0.00191	(0.00395)	0.0141	(0.00760)	0.00446	(0.0142)	-0.000617	(0.00508)
FG_{t-2}	0.0106**	(0.00367)	0.0107**	(0.00370)	0.0191**	(0.00624)	0.0198	(0.0140)	0.0112*	(0.00460)
FG_{t-3}	0.0106**	(0.00374)	0.0106**	(0.00377)	0.0183**	(0.00614)	0.00398	(0.0114)	0.0174***	(0.00516)
FFR_t	0.00276	(0.00448)	0.00270	(0.00452)	-0.00241	(0.00702)	0.0123*	(0.00576)	-0.00416	(0.0118)
FFR_{t-1}	0.00259	(0.00382)	0.00267	(0.00384)	-0.00403	(0.00546)	-0.00239	(0.00808)	-0.0278*	(0.0111)
FFR_{t-2}	0.0123**	(0.00452)	0.0124**	(0.00455)	0.000567	(0.00642)	0.0199*	(0.00970)	-0.0188*	(0.00939)
FFR_{t-3}	-0.00366	(0.00402)	-0.00357	(0.00406)	-0.00874	(0.00482)	-0.0382	(0.0218)	0.0107	(0.00616)
$LSAP_t$	-0.0121	(0.00628)	-0.0119	(0.00628)	-0.0146*	(0.00691)	-0.0212	(0.0175)	-0.0107	(0.00836)
$LSAP_{t-1}$	-0.0272***	(0.00618)	-0.0271***	(0.00618)	-0.0256**	(0.00812)	-0.0363*	(0.0147)	-0.0465***	(0.00893)
$LSAP_{t-2}$	-0.00518	(0.00561)	-0.00522	(0.00564)	-0.0225*	(0.0100)			-0.0145*	(0.00643)
$LSAP_{t-3}$	0.00130	(0.00724)	0.00132	(0.00720)	-0.0199*	(0.00936)			0.00164	(0.00728)
ΔBB_{t-1}	-0.380***	(0.0201)	-0.380***	(0.0203)	-0.382***	(0.0202)	-0.390***	(0.0457)	-0.378***	(0.0224)
ΔCF_{t-1}	0.0256	(0.0386)	0.0256	(0.0406)	0.0220	(0.0385)	0.0565	(0.0620)	0.0102	(0.0464)
ΔCap_{t-1}	0.0356	(0.0297)	0.0355	(0.0296)	0.0330	(0.0299)	0.0494	(0.0828)	0.0320	(0.0321)
Q_t	-0.0000304	(0.0000229)	-0.0000262	(0.0000250)	-0.0000264	(0.0000208)	-0.000206	(0.00124)	-0.0000399	(0.0000204)
$FCast_t$	-0.00643	(0.0103)	-0.00629	(0.0106)	0.0692*	(0.0301)			-0.00780	(0.0117)
ΔGDP_{t-1}	0.0317**	(0.00988)	0.0319**	(0.00996)	0.0357**	(0.0125)			0.0554***	(0.0135)
Recession	-0.0711**	(0.0247)	-0.0714**	(0.0249)	-0.159***	(0.0448)				
N	10163		10163		10163		1741		8422	

Newey-West standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: International Sales Interactions, Dependent variable: ΔBB_t

	(1) FG Interaction		(2) FFR Interaction		(3) LSAP Interaction	
FG_t	0.00613*	(0.00310)	0.00105	(0.00247)	0.000999	(0.00246)
FG_{t-1}	0.00313	(0.00332)	0.00143	(0.00238)	0.00145	(0.00238)
FG_{t-2}	0.00874**	(0.00315)	0.00869***	(0.00233)	0.00870***	(0.00232)
FG_{t-3}	0.00359	(0.00293)	0.00767***	(0.00226)	0.00778***	(0.00226)
FFR_t	0.000983	(0.00297)	0.00232	(0.00357)	0.000952	(0.00297)
FFR_{t-1}	0.000756	(0.00253)	0.00482	(0.00312)	0.000899	(0.00253)
FFR_{t-2}	0.0119***	(0.00287)	0.0131***	(0.00330)	0.0122***	(0.00286)
FFR_{t-3}	-0.00750**	(0.00265)	-0.00316	(0.00316)	-0.00708**	(0.00264)
$LSAP_t$	-0.00580	(0.00367)	-0.00561	(0.00367)	0.00256	(0.00432)
$LSAP_{t-1}$	-0.0145***	(0.00385)	-0.0145***	(0.00386)	-0.000151	(0.00524)
LSAP_{t-2}	-0.00710*	(0.00332)	-0.00693*	(0.00333)	-0.00539	(0.00468)
LSAP_{t-3}	-0.00260	(0.00383)	-0.00249	(0.00382)	0.00479	(0.00583)
ΔBB_{t-1}	-0.391***	(0.0142)	-0.391***	(0.0142)	-0.391***	(0.0141)
ΔCF_{t-1}	0.0502*	(0.0253)	0.0505*	(0.0253)	0.0499*	(0.0252)
ΔCap_{t-1}	0.00482	(0.0170)	0.00437	(0.0171)	0.00413	(0.0170)
Q_t	-0.00000436	(0.00000512)	-0.00000395	(0.00000544)	-0.00000346	(0.00000568)
Intl. Sales_t	0.000658	(0.000975)	0.00105**	(0.000368)	0.00218***	(0.000615)
FCast_t	-0.00332	(0.00662)	-0.00311	(0.00662)	-0.00367	(0.00662)
ΔGDP_{t-1}	0.0122	(0.00654)	0.0121	(0.00654)	0.0126	(0.00653)
Recession	-0.0732***	(0.0151)	-0.0725***	(0.0151)	-0.0739***	(0.0151)
$FG_t \times Intl.Sales_t$	-0.000176*	(0.0000802)				
$FG_{t-1} \times Intl.Sales_t$	-0.0000557	(0.0000957)				
$FG_{t-2} \times Intl.Sales_t$	-0.00000261	(0.0000824)				
$FG_{t-3} \times Intl.Sales_t$	0.000147	(0.0000793)				
$FFR_t \times Intl.Sales_t$			-0.0000613	(0.0000940)		
$FFR_{t-1} \times Intl.Sales_t$			-0.000168	(0.0000970)		
$FFR_{t-2} \times Intl.Sales_t$			-0.0000545	(0.0000886)		
$FFR_{t-3} \times Intl.Sales_t$			-0.000165	(0.0000865)		
$LSAP_t \times Intl.Sales_t$					-0.000272*	(0.000108)
$LSAP_{t-1} \times Intl.Sales_t$					-0.000471***	(0.000118)
$LSAP_{t-2} \times Intl.Sales_t$					-0.0000614	(0.000117)
$LSAP_{t-3} \times Intl.Sales_t$					-0.000239	(0.000135)
N	22773		22773		22773	

Newey-West standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Credit Rating Interactions, Dependent variable: ΔBB_t

	(1) FG Interaction		(2) FFR Interaction		(3) LSAP Interaction	
FG_t	-0.0141	(0.0139)	-0.000298	(0.00267)	-0.000231	(0.00266)
FG_{t-1}	-0.0229	(0.0144)	0.00419	(0.00259)	0.00428	(0.00259)
FG_{t-2}	-0.00366	(0.0128)	0.00832***	(0.00252)	0.00815**	(0.00253)
FG_{t-3}	0.00489	(0.0120)	0.00515*	(0.00245)	0.00517*	(0.00245)
FFR_t	0.00184	(0.00330)	-0.00459	(0.0151)	0.00181	(0.00330)
FFR_{t-1}	0.00191	(0.00282)	0.00145	(0.0134)	0.00198	(0.00282)
FFR_{t-2}	0.00996**	(0.00315)	0.0272*	(0.0132)	0.0101**	(0.00315)
FFR_{t-3}	-0.00808**	(0.00299)	-0.00397	(0.0124)	-0.00782**	(0.00299)
$LSAP_t$	-0.00465	(0.00390)	-0.00453	(0.00390)	0.00288	(0.0219)
$LSAP_{t-1}$	-0.0136**	(0.00418)	-0.0137**	(0.00418)	0.0303	(0.0207)
$LSAP_{t-2}$	-0.00458	(0.00354)	-0.00465	(0.00354)	0.00799	(0.0181)
$LSAP_{t-3}$	-0.00458	(0.00421)	-0.00460	(0.00420)	-0.0310	(0.0239)
ΔBB_{t-1}	-0.401***	(0.0159)	-0.401***	(0.0159)	-0.401***	(0.0159)
ΔCF_{t-1}	0.0509	(0.0285)	0.0502	(0.0285)	0.0509	(0.0285)
ΔCap_{t-1}	-0.0105	(0.0194)	-0.0100	(0.0195)	-0.0102	(0.0195)
Q_t	-0.00000348	(0.00000530)	-0.00000335	(0.00000525)	-0.00000260	(0.00000528)
$DebtRating_t$	-0.0177	(0.00908)	0.00169	(0.00311)	0.00430	(0.00650)
$FCast_t$	-0.00292	(0.00729)	-0.00326	(0.00729)	-0.00303	(0.00729)
ΔGDP_{t-1}	0.0128	(0.00712)	0.0130	(0.00712)	0.0131	(0.00713)
Recession	-0.0705***	(0.0164)	-0.0710***	(0.0164)	-0.0708***	(0.0165)
$FG_t \times DebtRating_t$	0.000774	(0.000798)				
$FG_{t-1} \times DebtRating_t$	0.00152	(0.000822)				
$FG_{t-2} \times DebtRating_t$	0.000661	(0.000722)				
$FG_{t-3} \times DebtRating_t$	0.0000123	(0.000680)				
$FFR_t \times DebtRating_t$			0.000346	(0.000844)		
$FFR_{t-1} \times DebtRating_t$			0.0000313	(0.000742)		
$FFR_{t-2} \times DebtRating_t$			-0.000934	(0.000737)		
$FFR_{t-3} \times DebtRating_t$			-0.000210	(0.000689)		
$LSAP_t \times DebtRating_t$					-0.000427	(0.00126)
$LSAP_{t-1} \times DebtRating_t$					-0.00248*	(0.00122)
$LSAP_{t-2} \times DebtRating_t$					-0.000711	(0.00105)
$LSAP_{t-3} \times DebtRating_t$					0.00149	(0.00142)
N	19027		19027		19027	

Newey-West standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$