Forward Guidance and Corporate Lending

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Abstract

We suggest that forward guidance, via "binding" the central bank's actions and creating associated expectations, fundamentally affects bank-lending decisions independently of other forms of monetary policy. To test this hypothesis, we build a forward guidance measure based on the language used in the Federal Open Market Committee meetings and match this measure with syndicated loans. Our results show that expansionary forward guidance decreases corporate loan spreads and that this effect is stronger for well-capitalized banks lending to riskier firms. Moreover, banks more easily initiate new lending relationships with lower spreads, and the loan syndicates are less concentrated.

JEL classification: G21; E52; E43; E58

Keywords: Forward guidance; Monetary policy transmission; Bank lending; Corporate loans; Loan spreads; Syndicate structure; Bank-firm relationships

1. Introduction

How does forward guidance affect corporate lending? The answer has important implications for the role of monetary policy on bank lending and, by extension, for real economic activity. Central banks describe forward guidance as their communication with the public about the state of the economy, the economic outlook, and the likely future course of monetary policy. Thus, forward guidance explicitly affects the future expectations of economic agents, the long-term path of interest rates, and long-term economic and financial expectations (e.g., McKay, Nakamura, and Steinsson 2016). Officially, the Board of Governors of the Federal Reserve System (Fed) acknowledges that the Federal Open Market Committee (FOMC) began using forward guidance in its post-meeting statements in the early 2000s. In the aftermath of the 2008 global financial crisis, and with consistently low policy rates, forward guidance has become an indispensable tool for central banks to fulfil the dual mandate of maximum sustainable employment and price stability.

The credit-channel literature suggests that expansionary monetary policy, exercised via low interest rates, advances banks' appetite for risk (Jiménez, Ongena, Peydró, and Saurina 2014; Delis, Hasan, and Mylonidis 2017) and generally affects credit supply (Bernanke and Blinder 1992; Kashyap and Stein 2000). With the policy rate constrained in its effective lower bound since 2008, little scope existed to change actual policy in order to affect expectations. Therefore, central banks relied on quantitative easing and forward guidance to shape expectations. Along this line, recent research has placed the spotlight on the effects of unconventional monetary policy tools. Most related to our research, Dell'Ariccia, Laeven, and Suarez (2018) suggest that asset purchases increase bank lending and reserves, a result especially pronounced for banks with weaker balance sheets.

The literature remains silent on the role of forward guidance in the credit channel of monetary policy. We hypothesize that by "binding" the central bank's future actions and

creating associated expectations, forward guidance fundamentally affects contemporary bank-lending decisions *independently* of the related effects of short rates and asset-purchase programs. To test our hypothesis, we build a monthly forward guidance measure based on the language used in the statements produced after the FOMC meetings. We distinguish the language used in these meetings toward accommodative or contractionary monetary policy and toward commitment to a particular course of action ("Odyssean" forward guidance) or to a likely monetary policy action ("Delphic" forward guidance). The distinction is important because Odyssean forward guidance significantly affects economic output, inflation, and the unemployment rate, while Delphic forward guidance has no such effects (Campbell, Fisher, Justiniano, and Melosi 2017).

We place the cost of loans (loan spreads over the LIBOR plus any fees) at the center of our analysis (see, e.g., Delis, Hasan, and Mylonidis 2017; Paligorova and Santos 2017). All else equal, the loan spread is an indicator of the loan-specific default probability (*ex ante* risk). We match the dates of forward guidance with 20,615 syndicated loans made to 3,834 US companies by 329 US banks, from May 1999 until June 2017.

Our identification strategy for a causal effect of forward guidance on the cost of loans confronts three problems. First, we disentangle the effect of forward guidance from the effects of the federal funds rate and other monetary policy innovations. To this end, we use the shadow rate (Krippner 2015), which encompasses the full stance of monetary policy especially after 2008, leaving the effect of forward guidance to be captured by our measure of explicit forward-looking language.

The other two identification problems find their solution in the use of loan-level data (Delis, Hasan, and Mylonidis 2017; Ioannidou, Ongena, and Peydró 2015; Jiménez, Ongena, Peydró, and Saurina 2014). Specifically, identifying the effect of forward guidance implies identifying changes in incentives to take *new* risk, and this new risk must emanate from the

supply (bank) side as opposed to the demand (firm) side. In these respects, syndicated loans are ideal because they allow both (i) studying the effect of forward guidance on new loans (new risk) and (ii) distinguishing between loan demand and loan supply using firm times year fixed effects and interaction terms between forward guidance and specific bank and/or firm characteristics.

Our benchmark results (without interaction terms but with firm times year fixed effects) show that expansionary forward guidance is associated with a decline in the corporate loan spreads, with this effect being highly significant in the post-2008 period over and above the effect of conventional monetary policy tools. According to our baseline specification, forward guidance yields a decline in corporate loan spreads by approximately 31 bps (or 13.3% reduction in the loan spread) for a loan with an average spread originated one month after an Odyssean forward guidance. When we consider loans originated two months after an Odyssean forward guidance (at which point the lending markets have had time to further absorb the guidance information), the effect is more pronounced, with a decline of 36.9 bps in corporate loan spreads (or 15.7% reduction in the loan spread). The reduction of interest expenses for the borrowing firm is equal to USD 9.1 million for the loan with an average size and maturity.

Notably, our results support a risk-taking channel working via forward guidance. Specifically, the models that interact forward guidance with bank capital and firm risk measures show that banks with higher capital levels offer lower spreads to riskier firms, ceteris paribus. These specifications enable us to isolate the pure supply-driven effects of forward guidance on loan spreads, suggesting that banks, especially those with higher capital ratios, take on more risk after forward guidance, as evidenced by their willingness to offer cheaper loans to riskier firms. Economically, a highly capitalized bank (75th percentile) reduces the loan spread by 19.56% (13.66%) more than a less capitalized bank (25th percentile) one month (two

months) after expansionary forward guidance, for a borrowing firm with high leverage (7th percentile in a standard leverage ratio).

These findings are robust (and conservative) to several robustness tests. Specifically, we use a quarterly measure of forward guidance; we run placebo tests for Delphic forward guidance (the results are statistically insignificant); we replace the shadow rate with the federal funds rate; we use different fixed effects and alternative control variables (e.g., credit ratings); and we distinguish between term loans and credit lines (because these loan groups have important differences).

We also consider two important extensions of our analysis. The first is on lender–borrower relationships, which can play a key role in the effect of forward guidance on loan spreads. We show that expansionary forward guidance increases the probability of establishing new lender–borrower relationships and lowers the loan spreads on such loans. Second, we examine the effect of forward guidance on the structure of loan syndicates (syndicate size and concentration). Consistent with the literature suggesting that lower informational asymmetry between syndicate participants implies less monitoring effort by lead banks and thus less concentrated syndicates (e.g., Sufi 2007), our findings show that forward guidance innovations increase the number of lenders in the syndicate and lower the share held by lead banks. The results from these analyses further imply that, by alleviating informational asymmetry concerns, forward guidance intensifies the banks' willingness both to lend and to lend at lower cost.

The rest of the paper proceeds as follows. Section 2 places our paper within the extant literature, discusses the theoretical background of our study, and formulates our testable hypotheses. Section 3 discusses the data and our empirical model, emphasizing the importance of distinguishing between Odyssean and Delphic forward guidance. Section 4 discusses our solutions to the identification problems. Section 5 presents our empirical results and discusses the implications for our hypotheses. Section 6 concludes.

2. Theoretical considerations and hypothesis development

2.1. The credit channel of monetary policy

The prevailing mechanism for the transmission of monetary policy is through the interest-rate channel. A monetary tightening, along with the combination of sticky prices and rational expectations, increases the real long-term interest rate. This, in turn, lowers investment spending and aggregate demand, yielding reduced output. In reexamining the transmission mechanism, both Bernanke and Blinder (1988) and Bernanke and Gertler (1995) suggest that the response to interest rate changes can be considerably larger than that implied by the conventional interest rate channel, and they put forth the role of the credit channel, further separated into the bank-lending channel and the balance sheet channel.

The bank-lending channel suggests that a monetary contraction reduces bank deposits, yielding a reduction in bank lending and the aggregate loan supply.[1] In turn, the balance sheet channel (Bernanke, Gertler, and Gilchrist 1999) suggests that shifts in monetary policy affect the financial position of both borrowers (e.g., firms, households, and consumers) and private agents. A contractionary monetary policy reduces borrowers' net worth, which triggers an increase in agency costs and motivates banks to reallocate the loan supply from riskier to safer borrowers.

The simultaneous low interest rates and increase of bank risk-taking on the road to the global financial crisis triggered renewed discussion on the credit channel. The key premise is that a prolonged period of low interest rates leads to excessive bank risk-taking for three reasons (Borio and Zhu 2012; Delis, Hasan, and Mylonidis 2017). First, low nominal interest rates lower the intermediation margin and induce a search for yield mechanism through the financing of riskier loans. Second, low rates lead to risk downsizing by banks through the

[1] There is voluminous empirical literature on the bank-lending channel (e.g., Kashyap and Stein 2000; Kishan and Opiela 2000 and 2012; Jayaratne and Morgan 2000; Ashcraft 2006; Jiménez, Ongena, Peydró, and Saurina 2014), showing that banks with relatively weak balance sheets reduce loan supply during monetary contractions.

higher asset and collateral values, and firms' net worth. Third, the commitment of a central bank for lower future interest rates in the case of a threatening shock reduces the probability of large downside risks, thereby encouraging banks to assume greater risk (the transparency effect). Several studies empirically show a potent risk-taking channel of monetary policy (e.g., Ioannidou, Ongena and Peydró 2015; Jiménez, Ongena, Peydró, and Saurina 2014; Dell'Ariccia, Laeven, and Suarez 2017; Delis, Hasan, and Mylonidis 2017).

The third mechanism of the risk-taking channel (working via central bank commitment) is particularly important for our work. This effect, also known as the Greenspan or Bernanke put, operates through expected lower interest rates rather than through the current low rates themselves. Theoretically, anticipated interest rate reductions tend to correspond to a higher-risk position when there is greater room for monetary expansion—that is, when current rates are relatively high (De Nicolò, Dell'Ariccia, Laeven, and Valencia 2010). When current rates are close to the zero lower bound, however, the focus turns to the effects of unconventional policy tools. In the next section, we discuss how forward guidance in particular might affect bank lending and loan pricing.

2.2. Forward guidance and the cost of corporate loans

Since the FOMC cut interest rates to the zero lower bound in December 2008, forward guidance and quantitative easing have become the key policy tools for monetary accommodation. The theoretical foundation of the effects of these tools is with macroeconomic models of forward-looking beliefs and expectations. Krugman (1999) was among the first to note that, at the zero lower bound, central banks can stimulate output by providing guidance that commits to generate inflation. In theory, such commitments affect private expectations *ex ante* (Woodford 2003; Galí 2008).

Eggertsson and Woodford (2003) show that commitment to future policy rates affects the entire path of expected future interest rates, and this dynamic in turn influences economic activity. Accordingly, Krishnamurthy and Vissing-Jorgensen (2011) find that FOMC guidance concerning asset purchase programs significantly increased asset prices. To explain these effects, Justiniano, Primiceri and Tambalotti (2011) use a macroeconomic model in which forward guidance influences both private and public expectations about the future path of the economy and alleviates uncertainty. Romer and Romer (2004) and Ellingsen and Söderström (2001) show that the use of explicit forward-guidance language facilitates changes in economic outcomes.

Central bank guidance is not always sufficiently clear and quantifiable, however, and as a result, its effects are questionable. Campbell, Evans, Fisher, and Justiniano (2012) study public statement announcements made by the FOMC. They distinguish between "Odyssean" forward guidance, which commits policymakers to specific future actions of monetary policy at a specific date (i.e., state- and time-dependent commitment), and "Delphic" forward guidance, which provides communication about future economic developments and intended monetary policy actions. Working along these lines, Carlstrom, Fuerst, and Paustian (2015) and Campbell, Fisher, Justiniano, and Melosi (2017) theoretically show that an explicit promise by the central bank to keep interest rates below the natural rate of interest for a time horizon of two years causes a significant increase in output.[2]

The relevant empirical literature is scant, whereas the effect of forward guidance on banks' loan pricing is, to the best of our knowledge, novel research. Our first hypothesis is that apart from (over and above) the direct effect of short-term rates on banks' incentives (i.e., apart

[2] Other studies are more sceptical about the potency of these effects. McKay, Nakamura, and Steinsson (2016) question the magnitude of the effects of forward guidance on the real economy in the long-term. Hagedorn, Luo, Manovskii, and Mitman (2019) focus on the power of forward guidance in a liquidity trap and suggest that its effects are negligible. Angeletos and Lian (2018) provide an explanation on the so-called "forward guidance puzzle" by relaxing the assumption that agents have common understanding on the central bank's policy announcement. Their findings suggest that the effectiveness of forward guidance is time- and agent-dependent.

from the usual effect of the interest rate channel), the central bank communication policies affect the cost of loans. Transparency, commitment, and guidance about the future monetary policy path, as well as the specific time-dependent binding actions communicated by the FOMC, reduce informational asymmetries between the central bank and lenders. The same effects prevail for the private decision makers' uncertainty about future economic and financial outcomes. This implies that anticipated interest rates induce forward-looking expectations about banks' funding costs, so that future corporate loan spreads are also better anticipated.

In theory, we should then observe that expansionary forward guidance lowers the cost of loans. Two notable issues lie behind this prediction. First, any empirical findings should be first and foremost about Odyssean forward guidance, which provides the most explicit path for future monetary policy. The effect of Delphic forward guidance does not lower the relevant informational asymmetries and should have a much lesser effect (if any) on the cost of bank loans. Second, our prediction is the opposite of the risk-taking channel's prediction, which suggests that in light of low interest rates, banks will charge higher loan spreads on average because they will expand lending to more-risky borrowers. The effect of forward guidance mitigates informational asymmetries via increased transparency and commitment. Thus, expansionary forward guidance should reduce the cost of loans despite the opposite effect of short-term interest rates. For obvious reasons, this dynamic should be especially true for the cost of credit for existing (as opposed to new) borrowers.

To this end, we formulate our first hypothesis as follows:

H1: Expansionary Odyssean forward guidance lowers the cost of loans.

Very similar to the mechanisms of the bank-lending channel, forward guidance should have heterogeneous effects across banks with different balance sheet characteristics. A key

bank characteristic in recent literature about the bank-lending channel is bank capitalization (Jiménez, Ongena, Peydró, and Saurina 2014; Delis, Hasan, and Mylonidis 2017). The theoretical reason behind the role of bank capitalization is that it represents a measure of the bank's ability to expand credit in conjunction with any agency conflict that besets banks' own borrowing from their financiers (Holmstrom and Tirole 1997; Freixas and Rochet 2008; Jiménez, Ongena, Peydró, and Saurina 2014).

Better-capitalized banks are better able to pass changes in forward-looking expectations along to lending rates. Specifically, in light of expansionary forward guidance and the associated developments highlighted under *H1*, the availability of bank capital implies lower loan spreads to existing borrowers or attractive rates for new borrowers. Moreover, in a period of low interest rates (as is the case when central banks use forward guidance), bank asset valuation increases, thereby increasing the availability of bank capital (Dell'Ariccia, Laeven and Marquez 2014). We expect that banks with already high levels of capital will benefit the most from such valuation effects, thereby allowing them to offer their borrowers the most attractive loan spreads.

Given the potentially important role of bank capitalization in the relation between forward guidance and loan cost, we formulate our second hypothesis as follows:

H2: The negative effect of Odyssean forward guidance on the cost of loans will be more potent for loans originated by highly capitalized banks.

Regardless of its financial condition, every bank aims to lend to borrowers that maximize the bank's returns. Especially in the corporate loan market, the pool generally includes a mix of relatively low-risk borrowers and relatively high-risk borrowers. For a fixed level of bank capital, we expect that expansionary forward guidance will boost the mechanisms

underlying the risk-taking channel in the form of lending to riskier borrowers. The two key firm characteristics indicating firms' health are the ratio of risk-adjusted returns (*Z*-score) and leverage. When expansionary forward guidance occurs, better-capitalized banks will probably be the ones expanding lending (via the associated mechanisms highlighted in our second hypothesis). If a risk-taking channel is at work, banks (especially the better-capitalized ones) should decrease the cost of loans more for risky and leveraged firms.

To be clear about our premise here, consider an example of the same bank lending to the same firm twice within one year. The first loan originates during the period before expansionary forward guidance, and the second originates after expansionary forward guidance. The better-capitalized banks are more likely than less-capitalized banks to offer loans at lower rates but also to further decrease those rates for relatively risky firms. Thus, the lending-rate reduction would be more potent for risky firms compared with less risky ones (those that already have access to relatively low rates).

Accordingly, we formulate our third testable hypothesis as follows:

H3: The negative effect of Odyssean forward guidance on the cost of loans will be more potent for loans originated by highly capitalized banks and to relatively riskier borrowers.

3. Data and variables

Table 1 summarizes all the variable definitions and the data sources. Our variables include measures of forward guidance, bank and firm characteristics, loan characteristics, and macroeconomic characteristics.

(Please insert Table 1 about here)

3.1. Forward guidance

We measure forward guidance from the forward-looking language used in statements released by the FOMC after every meeting. Approximately eight regular FOMC meetings take place each year, but not every post-meeting statement contains a clear guidance message to the public. For example, the phrase "policy accommodation can be removed at a pace that is likely to be measured," which appeared in several 2004 statements, provides no specific guidance about the Fed's forward-looking policy intentions.

Since the 2008 global financial crisis, however, the FOMC began providing explicit forward guidance within its statements in order to improve macroeconomic outcomes by affecting agents' expectations. Campbell, Evans, Fisher, and Justiniano (2012) distinguish between two types of forward guidance: Odyssean forward guidance, in which policymakers publicly commit to a particular course of action; and Delphic forward guidance, which broadly discusses macroeconomic conditions and likely monetary policy actions without binding the central bank to future courses of action. The authors find that the use of Odyssean forward guidance effectively stimulates the economy. For this reason, our empirical analysis mainly considers Odyssean forward guidance from October 2008 onward, which corresponds to the first post-FOMC meeting statement with an accommodating forward guidance since 2004. We use Delphic guidance as placebo tests, under the premise that their effect must be considerably weaker.

The policy stance and the communicative language used in the statements can remain unchanged across several meetings if the committee so desires. Therefore, we consider only new guidance issued to the public, wherein the forward-looking language changed significantly from the previous statement. We construct forward guidance indicator variables corresponding to the month when the relevant statement is publicly released. In constructing the variables, we

also note the direction of forward guidance, because an accommodative monetary policy and a tightening monetary policy are expected to affect bank lending differently.

More precisely, for a given loan origination month t, we define the following:

$$Forward\ guidance\ (t-n) =$$

$$\begin{cases} 1, & \text{if the most recent expansionary guidance is provided } n \text{ month(s) ago} \\ -1, & \text{if the most recent contractionary guidance is provided } n \text{ month(s) ago,} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

where $n = 1, 2, 3$. The three forward guidance variables described in Eq. (1) measure whether the FOMC forward guidance was in play one, two, or three months before the loan origination date. As an alternative measure, we consider a quarterly forward guidance variable, which takes the value 1 if expansionary guidance was issued in the previous quarter, –1 for contractionary guidance, and 0 otherwise.

This procedure yields 19 changes in Odyssean forward guidance since the global financial crisis, similar to the ones considered in the literature (Rudebusch and Williams 2008; Campbell, Evans, Fisher, and Justiniano 2012; Swanson 2016; and others). Appendix Table A1 lists the dates of Odyssean forward guidance and the relevant key forward-looking phrases within the statements. Our sample begins in May 1999, when the FOMC began disclosing information about the future stance of monetary policy in its post-meeting statements.

3.2. Loan-level variables

We match the FOMC statement dates with syndicated loan data, obtained from Thomson Reuters LPC's DealScan. An important feature of this data is that it records *new* loans, along with their origination date, the spread over LIBOR, loan maturity, status of seniority, and identities of lenders and borrowers. We exclude loans obtained by financial companies (SIC codes 6000–6999) and loans without pricing or maturity information. We match borrowers

with their financial information using the Chava and Roberts (2008) DealScan–Compustat link table. Next, we manually match the lead arrangers' names and cities with call reports (for standalone commercial banks) or with FR Y-9C reports (for bank holding companies). This matching procedure allows us to obtain the lender's financial statements at the time of loan origination. Our full sample consists of 20,615 syndicated loans to 3,834 US firms from 329 US banks initiated from May 1999 to June 2017.

Among the loan-level variables, our key outcome variable is the all-in spread drawn (AISD), which reflects the total (including fees and interest) annual spread paid over LIBOR for each dollar drawn down from the loan. The literature uses this variable to identify the risk-taking channel using syndicated loans (Delis, Hasan, and Mylonidis 2017; Paligorova and Santos 2017). *Ceteris paribus*, a higher loan spread is an *ex ante* indicator of higher bank risk-taking because it reflects a riskier borrower (demand-side risk) or a riskier stance by bank management (supply-side risk).

We consider a large set of loan-level control variables, including loan amount (in USD million), loan maturity (in years), type of loan (term loan or credit line), loan purpose (corporate purpose, debt repayment, or working capital), loan category (secured or unsecured), use of dividend restrictions, and the number of lenders in the syndicate. These variables capture a rich set of information on the banks' syndication process and control for loan-level heterogeneity.

3.3. Bank, firm, and macroeconomic characteristics

Concerning bank-level variables (quarterly data), and following our theoretical considerations, we first use the capital ratio (*Capital*) as our key identifier of banks' willingness to give out new loans following forward guidance innovations. Moreover, we use the log of total assets, a liquidity ratio, the bank's return on assets (ROA), and the bank's quarterly net loan charge-offs to proxy for additional elements of bank health. At the firm level, and following out theoretical

discussion, our key proxies for firm risk are the book leverage and Altman's *Z*-score. The firm and bank variables are quarterly and enter our empirical model lagged once before a loan origination.

We aim to identify the effect of forward guidance over and above the general monetary conditions, and thus we control for the quarterly shadow rate (Krippner 2015). This measure captures the effect of both the federal funds rate and (importantly) the effect of quantitative easing after the financial crisis, when interest rates were constrained at the zero lower bound. We also control for within-year changes in the macroeconomic environment using the quarterly GDP growth rate and the CBOE Volatility Index (VIX).

3.4. Summary statistics

Table 2 reports summary statistics for the variables used in our analysis, distinguishing between the pre-crisis period (May 1999 to September 2008) and the crisis and post-crisis period (October 2008 to June 2017). Our sample includes 13,122 syndicated loans in the pre-crisis period and 7,493 loans in the crisis and post-crisis period. In Appendix Table A2, we report summary statistics for the full sample period.

The average AISD in the pre-crisis period is 181 bps, rising to 235 bps from October 2008 onward. We observe equivalent increases for loan amount and maturity. Notably, the proportion of loans offered for corporate purposes more than doubles (from 32% to 67%) after October 2008, whereas the other loan-purpose groups shrink during the same period. This trend explains the increase in credit lines vis-à-vis term loans. In terms of the syndicate composition, we observe a slight increase in the average number of lenders.

The relevant figures for bank and firm characteristics follow our theoretical priors and empirical literature. We observe increases in the average bank capital and liquidity ratios, whereas ROA drops from 0.7% to 0.4%. In addition, the average quarterly net loan charge-offs

increase from 0.1% to 0.2%. The average borrower's debt composition increases; however, the average *Z*-score slightly improves.

(Please insert Table 2 about here)

4. Identification method

For identification purposes, we conduct our analysis at the lead bank-loan facility level[3] and estimate the following model:

$$logAISD_{l,f,b,t} = a_{f,y} + \delta_n Forward\ guidance\ (t-n) + \alpha Shadow\ rate_{t-1} + \boldsymbol{\beta}'\boldsymbol{X_{l,t}} + \boldsymbol{\gamma}'\boldsymbol{Y_{b,t-1}} + \boldsymbol{\phi}'\boldsymbol{Z_{f,t-1}} + \boldsymbol{\chi}'\boldsymbol{E_{t-1}} + \varepsilon_{l,f,b,t}\ . \quad (2)$$

The dependent variable, $logAISD_{l,f,b,t}$, is the natural log of the AISD of a syndicated loan (l) to firm (f) from bank (b) at time (t). *Forward guidance* is the indicator variable capturing Odyssean forward guidance issued one, two, or three months before the loan origination date, as defined in Eq. (1). In addition, $\boldsymbol{X_l}$, $\boldsymbol{Y_b}$, $\boldsymbol{Z_f}$, and $\boldsymbol{E}$ are vectors representing the loan, bank, firm, and macroeconomic control variables, respectively. Our coefficient of interest is δ_n, which is expected to capture the negative effect of expansionary forward guidance on the loan spread (based on *H1*).

Our identification strategy confronts three interrelated identification problems (Ioannidou, Ongena, and Peydró 2014; Delis, Hasan, and Mylonidis 2017). The first is the fact that any monetary policy innovation must affect new risk. Using syndicated loan data and the

[3] This means that we have observations for each lead bank in our sample. Thus, we can have repeated observations for the same loan facility if that loan facility originates by more than one lead bank. This practice substantially improves our identification approach resulting from the use of firm × year fixed effects, as thoroughly discussed later. Moreover, the unit of our analysis is the loan facility, not the loan package. The loan facility refers to each individual portion of a deal (the package), with one package usually comprising multiple loan facilities. Loan facilities may have different starting dates, spreads, maturity, amount, and loan types. Hence, multiple loan facilities, even when in the same loan deal, are not fully dependent observations— simply adding facilities and ignoring their differences, for example, may introduce a bias in the estimates. The firm may use different loan facilities of the same package within a year, which introduces the heterogeneity allowing the use of firm × year fixed effects.

respective new loan facilities originated in the three months after forward guidance innovations provides the key to solving this problem.

Second, we must effectively control for types of monetary policy other than forward guidance. Using the shadow rate symmetrically with *Forward guidance*, as shown in Eq. (2), essentially achieves this goal. In other words, we extract the effect of forward guidance from the total effect of monetary policy as captured by the shadow rate.

Third, any model of the risk-taking channel aims to identify shifts in loan supply from shifts in loan demand. To this end, and in line with our testable hypotheses, we use a mix of fixed effects and interaction terms with bank and firm characteristics (Delis, Hasan, and Mylonidis 2017; Paligorova and Santos 2017). Thus, we consider a highly saturated model with triple interactions of *Forward guidance* with bank capitalization and firm risk, along with suppressing the effect from demand side using firm × year fixed effects.

The firm × year fixed effects are very important because they control for time- (year-) variant demand (firm) characteristics. Including these fixed effects comes at the expense of limiting our inferences from changes in loan spreads for firms obtaining at least two loans within the same year: Obviously, the number of these loan facilities is relatively small compared with our full sample. The structure of syndicated loans, however—with many lead banks that naturally have different characteristics—eases concerns about limiting our sample. To this end, the triple interaction term with *Capital* serves to improve the information extracted from the model. The reasons are that (i) banks provide many syndicated loans in the same year, (ii) *Capital* is observed at a quarterly level, and (iii) *Capital* is different across observations even for the same loan facility if many lead banks provide the loan.

Formally, we estimate the following model:

$$logAISD_{l,f,b,t} = a_{f,y} + \delta_n Forward\ guidance\ (t-n)\ + \lambda_{1n} Forward\ guidance\ (t-n) Capital_{b,t-1} +$$
$$\lambda_{2n} Forward\ guidance\ (t-n) R_{f,t-1} + \lambda_{3n} Forward\ guidance\ (t-n) Capital_{b,t-1} R_{f,t-1} +$$

$$\alpha Shadow\ rate_{t-1} + \theta_1 Shadow\ rate_{t-1} Capital_{b,t-1} + \theta_2 Shadow\ rate_{t-1} R_{f,t-1} +$$
$$\theta_3 Shadow\ rate_{t-1} CapitalR_{f,t-1} + \theta_4 Capital_{b,t-1} R_{f,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{l,t}} + \boldsymbol{\gamma}' \boldsymbol{Y_{b,t-1}} + \boldsymbol{\phi}' \boldsymbol{Z_{f,t-1}} +$$
$$\boldsymbol{\chi}' \boldsymbol{E_{t-1}} + \varepsilon_{l,f,b,t}, \quad (3)$$

where *Capital* is the capital ratio of bank (b) and R_f is the firm risk measure (*Book leverage* or *Z-score*). The focus of the analysis concerns the interaction terms. In line with *H2*, a negative and statistically significant λ_{1n} implies that the negative effect of expansionary forward guidance is more pronounced for highly capitalized banks. In line with *H3*, a positive λ_{3n} indicates that the negative effect of expansionary forward guidance will be less pronounced for highly capitalized banks that lend to riskier borrowers. We symmetrically control for the effect of conventional monetary policy by including the interactions of shadow rate with the bank capital ratio and firm risk measures.

Eq. (3) represents a model that tests our three hypotheses while effectively mitigating the three identification problems. First, it identifies the pricing of *new* loans in the three months following forward-guidance innovations. Second, the model disentangles the effect of the general monetary environment from the effect of forward guidance. Third, the model saturates shifts in loan supply from shifts in loan demand via the fielding of firm × year fixed effects and the double and triple interaction terms (directly following the paradigm of, e.g., Kashyap and Stein 2000; Jiménez, Ongena, Peydro, and Saurina, 2014; Ioannidou, Ongena, and Peydro, 2015; and many others henceforth).

5. Empirical results

5.1. Results from the model without interaction terms

Table 3 reports the results from the estimation of Eq. (2), which serves as a benchmark to show the overall effects of the monetary environment on loan spreads. Columns 1 to 4 report the

results for the Odyssean forward guidance. The results show that loan spreads decrease subsequent to expansionary forward guidance of an Odyssean nature. The effect is highest on loans originating two months after the forward guidance is issued.[4] This result is expected because the syndication process (book-running stage) usually takes several weeks to complete.

We calculate the economic effect of forward guidance on loan spreads using the estimation results in column 4 and report them in the lower part of Table 3. Odyssean forward guidance issued one month ago decreases the spread of a new syndicated loan by 31.26 bps or 13.3% compared with the loan with an average spread (that equals 235 bps). The effect hits the peak after two months with an equivalent 15.7% reduction in loan spread, corresponding to 36.90 bps. The corresponding reduction of interest expenses of a loan with average size and maturity issued one month after Odyssean guidance is USD7.7 million (= USD 615 million × 31.26 bps × 4 years).

Columns 5 to 8 report the results for Delphic forward guidance. This exercise serves as a placebo test, given that Delphic forward guidance does not reflect explicit commitment. Further, this test substantially reduces the possibility that unobserved factors associated with FOMC meetings affect the syndicated loan market. Further, in columns 9–12, we examine the effect of forward guidance before the financial crisis. Because Odyssean guidance emerged after the financial crisis and as the policy rates touched the zero lower bound, we also expect the effect of forward guidance to be negligible prior to the crisis. Indeed, the coefficients on forward guidance are never significant in these falsification tests.

(Please insert Table 3 about here)

Figure 1 provides a graphical representation of how forward guidance affects loan spreads across different sample periods. Similar to Welch and Goyal (2007), we undertake the

[4] Forward guidance issued more than three months before loan originations is found to be insignificant in the empirical tests.

following procedure. We estimate three regression models—benchmark model, shadow rate model, and forward guidance model—using a three-year monthly moving estimation window, and record their root-mean-square errors (RMSEs). The benchmark model regresses loan spreads on the loan, bank, firm, and macroeconomic control variables. The shadow rate model includes the shadow rate as an additional independent variable to the benchmark model. The forward guidance model includes both the shadow rate and the forward guidance variables to the benchmark model, as in Eq. (2). Next, the performance of the shadow rate model is calculated as the cumulative RMSE of the benchmark model minus the cumulative RMSE of the shadow rate model. Analogously, we calculate the performance of the forward guidance model over and above the benchmark model. Finally, we plot line graphs of the performance of both the shadow rate model and the forward guidance model over time.

This graph is informative because when the line shows an upward movement, the benchmark model is weaker than the preferred model (i.e., the shadow rate model or the forward guidance model). Similarly, when the line shows a downward movement, the benchmark model performs better than the preferred model. Because the difference in cumulative errors is plotted over time in the line graph, we can gauge the performance of a preferred model for any given sample period. That is, if any two given points on the graph form an upward curve, the preferred model contributes explanatory power to the loan spread during the period between those two points.

In Figure 1, the dashed (dotted) line is the cumulative RMSE of the benchmark model minus the cumulative RMSE of the forward guidance model (shadow rate model). The gap between the two lines represent the extra explanatory power that forward guidance adds to the model over and above the shadow rate. In the beginning of the sample period, the two models both outperform the benchmark model but are quite close to each other. The gap widens around the third quarter of 2008. This widening coincides with the FOMC's statement with forward

guidance issued on October 8, 2008, which was the first accommodating Odyssean forward guidance since May 4, 2004 in our sample. Since 2008, the forward guidance model has provided significant explanatory power over and above the shadow rate model.

(Please insert Figure 1 about here)

Overall, consistent with *H1*, we find that forward guidance significantly affects corporate loan spreads since the beginning of the financial crisis.

5.2. Results from the model with interaction terms

In Table 4, we report the results from the estimation of Eq. (3), which allows testing *H2* and *H3*. Moreover, as highlighted in Section 4, this model significantly improves the empirical identification of the supply-side effects of forward guidance, by increasing the informational content of our data using interaction terms in conjunction with the firm × year fixed effects. Given the results from Eq. (2), we focus on the crisis and post-crisis period because this is where we identify significant effects of Odyssean forward guidance.

Two important findings emerge from the results in Table 4. First, the negative effect of forward guidance at $t-1$ and $t-2$ seems to be more potent for the well-capitalized banks. In Appendix Table B1, we show that this remains the case when we do not include the triple interaction terms within the specification. Based on the estimation in column 4 in Table B1, the additional percentage reduction on loan spreads offered by highly capitalized banks (75th percentile) compared with less capitalized banks (25th percentile) is 8.60%, after expansionary forward guidance was issued two months before. Thus, consistent with *H2*, the results show that the negative effect of forward guidance on loan spread intensifies for loans by highly capitalized banks. Moreover, this finding is consistent with the negative effect of forward guidance being supply-driven.

Second, consistent with *H3*, the negative coefficient on the triple interactions at $t - 1$ and $t - 2$ show that the negative effect of Odyssean forward guidance on the cost of loans is more potent for loans originated by highly capitalized banks and to relatively riskier borrowers. The results are fairly similar irrespective of whether we add the forward guidance terms separately for the three periods $t - 1$ to $t - 3$ (results in columns 1 to 3) or whether we add all terms in one specification (results in column 4); the significant terms are always those including the first two lags. Further, our results are similar irrespective of the variable used to proxy firm risk. In the first four columns, we use *Book leverage* (higher values reflect higher firm risk, and hence the coefficient on the triple term is negative), and in the last four columns, we use *Z-score* (higher values reflect lower firm risk, and hence the coefficient on the triple term is positive).

This is the key finding of our paper, suggesting that banks—especially those with higher capital ratios—take on more risk after forward guidance, as evidenced by their willingness to offer cheaper loans to riskier firms. To provide inferences on the economic magnitude of the risk-taking effects for highly capitalized banks, we report in the lower part of Table 4 the marginal effects of the difference-in-difference—the additional percentage reduction on loan spreads offered to riskier firms (25th percentile) compared with safer firms (75th percentile) by highly capitalized banks (75th percentile), over and above the reduction offered by less capitalized banks (25th percentile). Based on model specification (4) with book leverage, a highly capitalized bank reduces the loan spread by 19.56% (13.66%) more than a less capitalized bank one month (two months) after expansionary forward guidance, for a borrowing firm with a weaker capital structure. Similarly, based on model specification (8) with *Z*-score, the loan spread difference offered by highly versus less capitalized banks for riskier borrowers are 12.48% (6.38%) lower than for safer borrowers, after expansionary forward guidance one month (two months) before. The risk-taking effect is strongest in the

month after forward guidance, declines two months after the forward guidance, and is insignificant in the third month.

Note that the shadow rate and its interaction terms are also statistically significant. This result is as expected, because the shadow rate reflects the general monetary policy stance and represents the effects of quantitative easing after the financial crisis. Nonetheless, and quite importantly, the effects of forward guidance prevail over and above the effects from the shadow rates.

(Please insert Table 4 about here)

5.3. Additional sensitivity tests

We conduct a series of additional sensitivity tests. First, we examine whether our findings continue to hold when we use a quarterly measure of forward guidance, which records whether Odyssean guidance was in play in the previous quarter (as defined in Section 3.1.1.). This analysis provides an aggregate reflection on the effects of forward guidance compared to the monthly measures used so far. We repeat the estimation of Eqs. (2) and (3) and find that forward guidance issued in the previous quarter reduces loan spreads by 11% (column 1 of Table 5). Further, irrespective of the measure used to proxy firm risk, the triple interactions are statistically significant, consistent with the results in Table 4.

Second, we consider the effective federal funds rate, instead of the shadow rate, in the estimation of Eqs. (2) and (3). The effective federal funds rate is the most straightforward monetary policy tool used in previous research, but it disregards the novel monetary policy tools implemented in the crisis and post-crisis periods. Table 6 replicates the results of Table 3, and Table 7 replicates those of Table 4, using the federal funds rate. We note that the estimated effects of forward guidance are consistent with our baseline inferences.

(Please insert Tables 5, 6, and 7 about here)

Next, we split our sample into term loans and credit lines. These groups constitute the vast majority of originations (about 95%) but have some important differences. Although term loans provide new borrowers with one-time financing, credit lines allow new borrowers to revolve their debt. Notably, several term loans appeal to institutional investors (non-bank lenders) rather than banks. These loans typically include weak covenants, longer maturities, and low amortization, which would have high capital requirements if banks were to hold them. Given that banks tend not to hold such loans, we expect that our effects are stronger for credit lines. The results reported in Appendix Table B1 show that forward guidance significantly decreases the spreads for both term loans and credit lines, and this is the reason we keep both groups in our baseline specifications. In line with our expectations, however, the economic effect is stronger for credit lines.

Importantly, our results are robust to the inclusion of additional fixed effects. Specifically, in alternative specifications, we include bank and firm fixed effects, bank × year fixed effects, and bank × firm fixed effects. These fixed effects further saturate our model from the time-invariant bank and firm characteristics, time-varying bank characteristics, and bank–firm pair characteristics, respectively. The results in Appendix Tables B3 to B8 replicate those of Tables 3 to 7, and show that all our main results remain essentially unchanged.

Finally, to ease any concerns that our baseline results are affected by other macroeconomic factors such as credit risk and bond market conditions, in Tables B9 and B10 we additionally control for credit spread (Moody's AAA–ABB corporate bond spread) and the three-month T-bill rate. The results are again robust to the inclusion of these additional variables.

5.4. Forward guidance and borrower-lender relationships

An important element in banks' loan pricing decisions is their relationship with the borrowers. Because of the related informational asymmetries, establishing new borrower relationships is riskier than providing loans to borrowers with already well-established credit relationships. The reduction in macroeconomic uncertainty following forward guidance implies that lenders might be willing to take more risk by providing loans to new borrowers. We trace the history of each borrower–lender relationship and define new borrowers as firms that have not borrowed a syndicated loan from a specific lead bank in the recent past. We consider three scenarios in which borrower relationships did not exist in the previous three, five, or eight years.

We first examine the effect of forward guidance on the establishment of a new lending relationship. Table 8 reports probit estimates for the outcome variable, which takes the value 1 if the loan involves a new borrower and 0 otherwise. In the first three columns, we use the full sample, and subsequently we differentiate between term loans and credit lines. Evidently, the results come from credit lines, and we find no effect of forward guidance on the probability of issuing term loans to new borrowers. More specifically, we find that the probability of establishing new credit lines significantly increases two months after expansionary forward guidance. This result implies that establishing new relationships for credit lines takes more time compared with equivalent effects for existing borrower–lender relationships. Further, there is virtually no effect of forward guidance for term loans, which mostly involve institutional investors.

Next, we examine whether banks provide cheaper credit to new borrowers following forward guidance innovations. Table 9 analyzes the spreads that banks charge for new term loans and credit lines issued to new borrowers (as compared with the respective effects for existing borrowers). The results show that, although new borrowers receive higher spreads (as expected and reflected on the main term of *New borrower*), the negative effect of forward

guidance on loan spreads is more potent for new borrowers. For term loans, the effect is significant two months after forward guidance, and for credit lines, the forward guidance effect kicks in after three months. Consistent with our expectations, the results are economically more significant for credit lines. Overall, we find evidence of banks engaging in new risks in the presence of forward guidance, by initiating new borrower–lender relationships and offering lower spreads to new borrowers.

(Please insert Tables 8 and 9 about here)

5.5. Forward guidance and the structure of syndicated loans

By reducing informational asymmetries on the stance of monetary policy and related firm financing costs, forward guidance also reduces the frequency of lenders' information acquisition and can thus reflect differences in loan syndicate structure. Sufi (2007) and others thereafter note that in light of lower informational asymmetry problems, the lead arrangers keep smaller loan shares and form less concentrated loan syndicates, given that less monitoring effort is required to provide the right incentives to participant investors. We thus expect these effects to prevail following expansionary forward guidance.

We measure syndicate structure using the share held by the leader arrangers, the Herfindahl–Hirschman index (HHI) based on the shares of all lenders, and the number of participants. We also consider the borrowing firms' reputation through repeated borrowing in the syndicated loan market. To this end, we use the number of a firm's previous loan deals in the syndicated loan market.

We conduct these empirical tests at the loan-package level (as opposed to the loan-facility level) because the loan structure does not change within a loan package. Table 10 reports the results. Consistent with our expectations, we find that forward guidance reduces the share held by lead arrangers and the syndicate's HHI, and it increases the number of new

participants. The positive sign of the interaction term with borrower reputation in column (1) shows that lead arrangers take a smaller stake in a deal with a less reputable borrower after forward guidance. Similarly, in column (2), the positive interaction term with borrower's reputation indicates that a deal is less concentrated for a less reputable borrower after forward guidance. We conclude that in addition to affecting loan spreads, expansionary forward guidance eases the lead banks' monitoring efforts and allows larger loan syndicates.

(Please insert Table 10 about here)

6. Conclusions

Following the Great Recession and the monetary policy rates hitting the zero lower bound, unconventional tools have taken up a key role for both policymakers and researchers. Forward guidance, in particular, affects the real economy by creating expectations about the future course of monetary policy. In this study, we consider for the first time the effects of forward guidance on bank lending, using data from the syndicated loan market.

Our analysis features three novel findings. First, Odyssean forward guidance decreases the loan spreads on newly issued syndicated loans in the next three months. The effect is economically significant in the first two months after a forward guidance innovation, peaking with a 15.7% reduction in loan spreads. This effect corresponds to a 36.90-bp reduction in spreads or a USD 7.7 million reduction in the cost of a loan with mean size and maturity.

Second, the effect of forward guidance on loan spreads is more potent for highly capitalized banks, especially when those highly capitalized banks lend to firms with weaker capital structure or higher default probability. For example, a highly capitalized bank reduces the loan spread by an average 17% more than a less capitalized bank for a borrowing firm with a weak capital structure in the one to two months after expansionary forward guidance.

Third, expansionary forward guidance allows a higher probability of establishing new bank–firm relationships, lowers the spreads of such loans, and reduces syndicate concentration (more banks enter the syndicate and the lead bank holds a lower loan share). These effects are consistent with the lower informational asymmetries regarding the stance of monetary policy in particular and the monetary environment in general, as well as with the associated lower monitoring effort that banks need to exert.

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Figure 1. Explanatory power of forward guidance and shadow rate over time

This figure plots the performance of shadow rate over time (dotted line), which is calculated as the cumulative RMSE of the benchmark model minus the cumulative RMSE of the shadow rate model. Analogously, the performance of forward guidance over time (dashed line) is calculated as the cumulative RMSE of the benchmark model minus the cumulative RMSE of the forward guidance model. For the construction of the graphs, three regression models are estimated – benchmark model, shadow rate model and forward guidance model – using a 3-year monthly moving estimation window, and their respective RMSEs are recorded. The benchmark model regresses loan spreads on the loan, bank, firm, and economy-level control variables. The shadow rate model includes the shadow rate as an additional independent variable to the benchmark model, while the forward guidance model includes both the shadow rate and the forward guidance variables to the benchmark model. The definitions for all the variables used in the regressions are provided in Table 1.

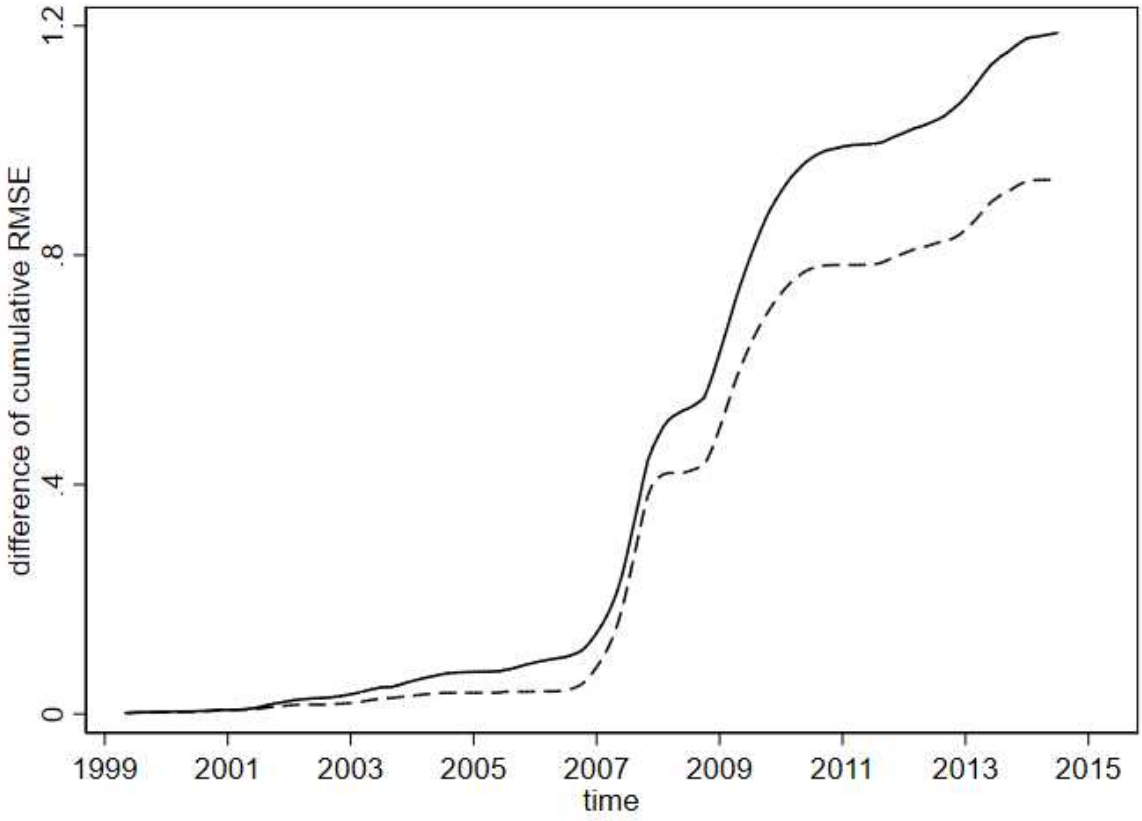

Table 1. Variable definitions and sources

Variable	Definition	Source
Forward-guidance variables		
Forward guidance (t – 1), Forward guidance (t – 2), Forward guidance (t – 3)	Three indicator variables measuring whether forward guidance is in play one month, two months, and three months, prior to the loan origination date (see section 3.2 for variables' construction details)	FOMC
Quarterly forward guidance	Indicator variable takes the value 1 if there is expansionary forward guidance in the previous quarter, –1 for contractionary guidance, and 0 otherwise	FOMC
Loan-level variables		
Loan spread	Log of all-in-spread-drawn above LIBOR (in basis points) at origination	DealScan
Loan amount	Log of loan amount (in million US dollars)	DealScan
Maturity	Maturity of the loan (in years)	DealScan
Credit line	Indicator variable equal to 1 if a loan is a credit line, and 0 otherwise	DealScan
Term loan	Indicator variable equal to 1 if a loan is a term loan, and 0 otherwise	DealScan
Corporate purpose	Indicator variable equal to 1 if a loan is used for a corporate purpose, and 0 otherwise	DealScan
Working capital	Indicator variable equal to 1 if the loan is used for working capital, and 0 otherwise	DealScan
Debt repayment	Indicator variable equal to 1 if the loan is for repayment of previous debt, and 0 otherwise	DealScan
Secured	Indicator variable equal to 2 if the loan is secured, 1 if unsecured, and 0 if the information is missing	DealScan
Dividend restriction	Indicator variable equal to 2 if a loan has to meet a dividend restriction, 1 if no such restrictions are present, and 0 if the information is missing	DealScan
Lender number	Log of the number of lenders in the syndicate	DealScan
Firm-level variables		
Book leverage	The ratio of common equity over total assets, and multiplied by -1 for ease of interpretation (higher values for the ratio indicate higher book leverage)	Compustat
Z-score	Altman's (1968) *Z*-score = (1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales)/total assets	Compustat
Bank-level variables		
Total asset (log)	Bank total assets (RCFD2170 and BHCK2170)	Call reports and Y-9C reports
Capital ratio	The ratio of bank equity over total assets (RCFD3210 and BHCK3210)	Call reports and Y-9C reports
Liquidity	The ratio of banks' cash and treasuries over total assets (RFCD0010 and RFCD0400, BHCP6775 and BHCK1287)	Call reports and Y-9C reports
ROA	The ratio of banks' net income before taxes over total assets (RIAD4340 and BHCK4340)	Call reports and Y-9C reports
Charge-off	The ratio of bank quarterly net charge-offs over total assets (RIAD4635 and BHCK2432)	Call reports and Y-9C reports
Economy-level variables		
GDP growth	quarterly GDP growth rate	FRED
VIX	quarterly averaged VIX close	CBOE
Shadow rate	quarterly average shadow rate	Leo Krippner's website

Table 2. Summary statistics

This table reports the summary statistics of all variables used in the empirical analysis. The pre–financial crisis sample period stems from May 1999 to September 2008, and the sample period following the pre-financial crisis is from October 2008 to June 2017. The definitions for all the variables are provided in Table 1.

	Pre-financial crisis sample period					Sample period following the pre-financial crisis				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Loan-level variables										
Loan spread	13,122	4.890	0.864	0.405	7.313	7,493	5.331	0.508	2.708	7.111
Loan amount	13,122	4.818	1.721	-6.639	10.309	7,493	5.602	1.380	-2.303	10.800
Maturity	13,122	3.580	1.962	0.005	20	7,493	4.482	1.459	0.083	16
Credit line	13,122	0.563	0.496	0	1	7,493	0.621	0.485	0	1
Term loan	13,122	0.246	0.431	0	1	7,493	0.330	0.470	0	1
Corporate purpose	13,122	0.320	0.467	0	1	7,493	0.671	0.470	0	1
Working capital	13,122	0.231	0.422	0	1	7,493	0.105	0.306	0	1
Debt repayment	13,122	0.115	0.319	0	1	7,493	0.030	0.170	0	1
Secured	13,122	1.246	0.856	0	2	7,493	1.249	0.859	0	2
Dividend restrictions	13,122	1.248	0.901	0	2	7,493	0.891	0.884	0	2
Number of lenders	13,122	1.677	1.041	0	5.088	7,493	1.888	0.827	0	4.248
Firm-level variables										
Book leverage	13,122	-0.409	0.198	0.000	-1.000	7,493	-0.389	0.194	0.000	-0.960
Z-score	13,122	0.629	0.823	-3.131	2.326	7,493	0.653	0.730	-3.131	2.441
Bank-level variables										
Total asset	13,122	19.808	1.330	9.501	21.279	7,493	20.884	1.225	10.555	21.586
Capital ratio	13,122	0.079	0.015	0.056	0.149	7,493	0.102	0.018	0.056	0.149
ROA	13,122	0.007	0.004	-0.012	0.048	7,493	0.004	0.004	-0.039	0.031
Liquidity	13,122	0.047	0.026	0	0.212	7,493	0.062	0.048	0	0.474
Charge-off	13,122	0.002	0.002	0	0.016	7,493	0.002	0.003	0	0.028
Economy-level variables										
GDP growth	38	1.205	0.593	0.207	2.448	35	0.766	0.750	1.858	1.888
VIX	38	20.317	6.154	11.035	35.068	35	20.675	9.620	11.692	58.596
Shadow rate	38	3.261	1.947	0.402	6.224	35	-1.677	1.905	-5.301	1.725

Table 3. Response of loan spreads to forward guidance: Baseline specifications

This table reports the regression results of Eq. (2), where the dependent variable is the log of loan spread. Forward guidance indicator variables capture forward guidance issued one, two, or three months before the loan origination date. Using the sample period following the pre-financial crisis (October 2008 to June 2017), columns (1) – (4) report results for Odyssean forward guidance and columns (5) – (8) report placebo test results for Delphic forward guidance. Columns (9) – (12) report placebo test results for forward guidance issued during the pre-financial crisis sample period (May 1999 to September 2008). Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Odyssean forward guidance				Placebo: Delphic forward guidance				Placebo: Forward guidance before financial crisis			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.089***			-0.133***	-0.021			-0.022	0.027			0.030
	(-3.16)			(-4.13)	(-0.93)			(-0.92)	(0.86)			(0.97)
Forward guidance (t-2)		-0.114***		-0.157***		-0.008		-0.012		0.023		0.027
		(-4.13)		(-5.06)		(-0.29)		(-0.39)		(0.64)		(0.76)
Forward guidance (t-3)			-0.111***	-0.150***			-0.012	-0.018			0.013	0.018
			(-3.44)	(-4.43)			(-0.21)	(-0.31)			(0.43)	(0.59)
Shadow rate	0.001	-0.001	-0.001	-0.010	0.002	0.002	0.002	0.002	-0.016*	-0.016*	-0.016*	-0.015
	(0.03)	(-0.08)	(-0.08)	(-0.66)	(0.10)	(0.14)	(0.14)	(0.12)	(-1.78)	(-1.70)	(-1.77)	(-1.63)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of observations	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493	13,122	13,122	13,122	13,122

Economic impact of forward guidance on loans with mean spreads (in basis points)

	Forward guidance (t-1)	Forwards guidance (t-2)	Forward guidance (t-3)
Odyssean forward guidance (estimated from Column (4))	31.26	36.90	35.25

Table 4. Response of loan spreads to forward guidance: Triple interactions

This table reports the regression results of Eq. (3), with the triple interaction of forward guidance, bank capital ratio and firm risk measures (denoted R). The dependent variable is the log of loan spread. The firm risk measure is book leverage in columns (1) – (4) and *Z*-score in columns (5) – (8). Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	R = Book leverage				R = *Z*-score			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forward guidance (t-1)*Capital ratio	-11.450**			-11.920**	-5.977**			-6.132**
	(-2.19)			(-2.24)	(-2.12)			(-2.04)
Forward guidance (t-2)*Capital ratio		-8.571***		-9.525***		-4.402**		-4.822**
		(-3.16)		(-3.10)		(-2.35)		(-2.19)
Forward guidance (t-3)*Capital ratio			0.928	-1.304			2.251	0.999
			(0.20)	(-0.26)			(0.99)	(0.41)
Forward guidance (t-1)*R*Capital ratio	-25.86**			-27.250**	5.457**			5.594***
	(2.41)			(2.56)	(2.57)			(2.61)
Forward guidance (t-2)*R*Capital ratio		-15.910**		-19.010**		2.322		2.861*
		(2.32)		(2.58)		(1.48)		(1.70)
Forward guidance (t-3)*R*Capital ratio			-1.841	-6.661			-2.463	-1.436
			(0.20)	(0.67)			(-1.25)	(-0.72)
Shadow rate	-0.644***	-0.628***	-0.678***	-0.607***	-0.339***	-0.323***	-0.345***	-0.334***
	(-6.63)	(-6.30)	(-6.65)	(-6.40)	(-4.77)	(-4.59)	(-4.75)	(-5.09)
Shadow rate*Capital ratio	6.135***	5.966***	6.396***	5.696***	3.241***	3.075***	3.267***	3.115***
	(6.63)	(6.36)	(6.63)	(6.39)	(4.71)	(4.49)	(4.60)	(4.91)
Shadow rate*R*capital ratio	13.320***	12.920***	13.70***	12.130***	-2.685***	-2.499***	-2.612***	-2.558***
	(-6.60)	(-6.12)	(-6.42)	(-6.09)	(-6.81)	(-6.42)	(-6.41)	(-6.89)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y

Number of observations	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493

How much additional reduction in spreads do riskier firms (25 percentile) as compared to safer firms (75 percentile) receive from highly capitalized banks (75 percentile), over and above those offered from less capitalized banks? (marginal effects of the difference-in-difference)

	Forward guidance (t-1)	Forward guidance (t-2)	Forward guidance (t-3)
Model (4)	19.56%	13.66%	Insignificant
Model (8)	12.48%	6.38%	Insignificant

Table 5. Sensitivity analysis: Response of loan spreads to forward guidance (using quarterly forward guidance)

This table reports the regression results using the quarterly forward guidance variable, which takes the value 1 if there is expansionary Odyssean guidance in the previous quarter, -1 for a contractionary guidance, and 0 otherwise. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

		R=Book leverage	R=*Z*-score
	(1)	(2)	(3)
Quarterly forward guidance (t-1)	-0.109***	0.721*	0.265
	(-3.81)	(1.94)	(1.13)
Shadow rate	-0.00783	-0.614***	-0.332***
	(-0.53)	(-6.70)	(-4.91)
Forward guidance (t-1)*Capital ratio		-8.053**	-3.524
		(-2.37)	(-1.64)
Forward guidance (t-1)*R*Capital ratio		-19.79***	2.907**
		(2.74)	(2.09)
Shadow rate*Capital ratio		5.808***	3.120***
		(6.62)	(4.71)
Shadow rate*R*capital ratio		12.20***	-2.470***
		(-6.21)	(-6.60)
Loan-level variables	Y	Y	Y
Firm-level variables	Y	Y	Y
Bank-level variables	Y	Y	Y
Economy-level variables	Y	Y	Y
Firm × year fixed effects	Y	Y	Y
Number of Observations	7,493	7,493	7,493

Table 6. Sensitivity analysis: Response of loan spreads to forward guidance (using the federal funds rate)

This table reports the regression results for the baseline specifications using the federal funds rate as an alternative proxy for the conventional monetary policy stance. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Forward guidance (t-1)	-0.092***			-0.132***
	(-3.14)			(-4.00)
Forward guidance (t-2)		-0.112***		-0.150***
		(-4.05)		(-4.89)
Forward guidance (t-3)			-0.110***	-0.143***
			(-3.42)	(-4.33)
Federal funds rate	0.159**	0.143*	0.150*	0.154*
	(2.07)	(1.83)	(1.90)	(1.91)
Loan-level variables	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y
Firm × year fixed effects	Y	Y	Y	Y
Number of Observations	7,493	7,493	7,493	7,493

Table 7. Sensitivity analysis:
Response of loan spreads to forward guidance: Triple interactions (using the federal funds rate)

This table reports the regression results of Eq. (3), with the triple interaction of forward guidance, bank capital ratio and firm risk measures (denoted R) and using the federal funds rate as an alternative proxy for the conventional monetary policy stance. The dependent variable is the log of loan spread. The firm risk measure is book leverage in columns (1) – (4) and *Z*-score in columns (5) – (8). Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	R=Book leverage				R=*Z*-score			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forward guidance (t-1)*Capital ratio	-12.400***			-14.060***	-4.335*			-5.299*
	(-2.81)			(-3.08)	(-1.75)			(-1.96)
Forward guidance (t-2)*Capital ratio		-17.180***		-18.520***		-6.412**		-7.299**
		(-5.70)		(-5.53)		(-2.43)		(-2.57)
Forward guidance (t-3)*Capital ratio			-8.049	-10.000*			-1.620	-2.938
			(-1.56)	(-1.76)			(-0.74)	(-1.24)
Forward guidance (t-1)*R*Capital ratio	-26.660***			-30.190***	3.215*			3.783*
	(3.25)			(3.64)	(1.75)			(1.90)
Forward guidance (t-2)*R*Capital ratio		-34.450***		-37.620***		2.859		3.502
		(5.07)		(5.12)		(1.11)		(1.32)
Forward guidance (t-3)*R*Capital ratio			-21.000**	-24.570**			0.775	1.547
			(2.12)	(2.21)			(0.43)	(0.81)
Federal funds rate	2.859**	2.977***	3.128***	2.792**	1.475*	1.463*	1.596*	1.455*
	(2.50)	(2.62)	(2.64)	(2.58)	(1.87)	(1.87)	(1.96)	(1.91)
Federal funds rate*Capital ratio	-28.340**	-29.260**	-31.030**	-27.750**	-14.940*	-14.840*	-16.300*	-14.730*
	(-2.18)	(-2.26)	(-2.30)	(-2.24)	(-1.71)	(-1.70)	(-1.80)	(-1.73)
Federal funds rate*R*capital ratio	-48.530**	-51.700**	-54.070**	-47.690**	7.489	7.519	8.185	7.177
	(2.20)	(2.33)	(2.35)	(2.26)	(1.34)	(1.37)	(1.44)	(1.34)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	bank-year	bank-year	bank-year	bank-year	bank-year	bank-year	bank-year	bank-year

Table 8. New borrower-lender relationships

This table reports the Probit regression results for the dependent variable capturing whether or not the bank enters into a new borrower-lender relationship. The dependent variables take the value of 1 if the borrowing firm has not borrowed a syndicated loan from the bank in the previous 3, 5, or 8 years. The results for the new of issuance term loans and credit lines are separately reported. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively .

	All loans			Term loans			Credit lines		
	3 years	5 years	8 years	3 years	5 years	8 years	3 years	5 years	8 years
Forward guidance (t-1)	-0.123***	-0.086*	-0.047	-0.003	0.122	0.062	-0.238***	-0.169***	-0.136**
	(-2.76)	(-1.87)	(-1.07)	(-0.04)	(1.55)	(0.79)	(-4.15)	(-3.01)	(-2.42)
Forward guidance (t-2)	0.029	0.008	0.127***	0.035	0.111	0.098	0.021	0.121**	0.144**
	(0.64)	(0.16)	(2.89)	(0.46)	(1.49)	(1.32)	(0.34)	(2.09)	(2.50)
Forward guidance (t-3)	-0.036	0.018	-0.066	-0.015	-0.015	-0.070	-0.009	0.020	-0.041
	(-0.71)	(0.35)	(-1.31)	(-0.18)	(-0.17)	(-0.81)	(-0.14)	(0.32)	(-0.64)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,493	7,493	7,493	2,469	2,469	2,469	4,654	4,654	4,654

Table 9. New borrower-lender relationships and loan spreads

This table reports the loan-level regression estimates, where the dependent variable is the log of loan spread. The New borrower dummy equals 1 if the borrowing firm has not borrowed a syndicated loan from the bank in the previous 3, 5, or 8 years. The results for the new of issuance term loans and credit lines are separately reported. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Results for term loans												
	3 years				5 years				8 years			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.039			-0.0530	-0.061*			-0.077**	-0.050			-0.064*
	(-1.18)			(-1.40)	(-1.90)			(-2.10)	(-1.61)			(-1.84)
Forward guidance (t-2)		0.013		-0.008		0.013		-0.012		0.018		-0.006
		(0.52)		(-0.30)		(0.53)		(-0.39)		(0.72)		(-0.20)
Forward guidance (t-3)			-0.060*	-0.073**			-0.072	-0.088*			-0.074*	-0.088*
			(-1.72)	(-2.00)			(-1.53)	(-1.77)			(-1.69)	(-1.91)
New borrower	0.017	0.031*	0.021	0.030	0.005	0.025	0.012	0.016	0.019	0.038**	0.0232	0.031
	(0.81)	(1.67)	(1.11)	(1.10)	(0.27)	(1.40)	(0.69)	(0.65)	(0.98)	(2.22)	(1.33)	(1.34)
Forward guidance (t-1)*New borrower	0.020			0.010	0.057			0.048	0.040			0.029
	(0.44)			(0.20)	(1.28)			(1.01)	(0.92)			(0.63)
Forward guidance (t-2)*New borrower		-0.070**		-0.069*		-0.078**		-0.071**		-0.088***		-0.083**
		(-2.29)		(-1.97)		(-2.49)		(-2.01)		(-2.84)		(-2.40)
Forward guidance (t-3)*New borrower			-0.023	-0.023			-0.005	-0.003			-0.001	-0.001
			(-0.42)	(-0.39)			(-0.09)	(-0.04)			(-0.01)	(-0.01)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of Observations	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469

Results for credit lines

	3 years				5 years				8 years			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.078**			-0.088**	-0.081**			-0.096***	-0.074**			-0.090***
	(-2.01)			(-2.27)	(-2.50)			(-2.82)	(-2.35)			(-2.69)
Forward guidance (t-2)		0.000		-0.026		-0.009		-0.039		-0.014		-0.043
		(0.02)		(-0.88)		(-0.32)		(-1.25)		(-0.51)		(-1.43)
Forward guidance (t-3)			-0.002	-0.025			-0.031	-0.054			-0.034	-0.057*
			(-0.07)	(-0.75)			(-0.98)	(-1.63)			(-1.24)	(-1.89)
New borrower	0.001	0.011	0.013	0.015	0.022	0.032*	0.0315**	0.030*	0.028*	0.036**	0.035**	0.035**
	(0.06)	(0.54)	(0.72)	(0.80)	(1.31)	(1.77)	(2.02)	(1.91)	(1.74)	(2.03)	(2.36)	(2.23)
Forward guidance (t-1)*New borrower	0.007			-0.007	0.018			0.010	0.005			-0.002
	(0.16)			(-0.17)	(0.42)			(0.23)	(0.11)			(-0.05)
Forward guidance (t-2)*New borrower		-0.052		-0.056*		-0.043		-0.042		-0.036		-0.035
		(-1.58)		(-1.80)		(-1.14)		(-1.12)		(-0.93)		(-0.91)
Forward guidance (t-3)*New borrower			-0.107***	-0.104***			-0.075**	-0.072**			-0.075**	-0.072**
			(-3.06)	(-3.12)			(-2.24)	(-2.20)			(-2.57)	(-2.54)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of Observations	4,654	4,654	4,654	4,654	4,654	4,654	4,654	4,654	4,654	4,654	4,654	4,654

Table 10. Syndicate structure and borrowing firm reputation

This table reports the regression results relating to the syndicate structure. The dependent variables are the number of new participant lenders, the share held by lead arrangers and a Herfindahl index (HHI) based on the shares held by all lenders. The firm controls include firm sales, an indicator variable equals to 1 if the firm is private and borrower reputation variable (measured as ln(1+previous loans by firm)). Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Share held by lead	HHI	Number of new participants
Forward guidance (t-1)	-0.055*	-682.9**	0.365
	(-1.73)	(-2.02)	(0.99)
Forward guidance (t-2)	0.044	511.7	0.685*
	(0.94)	(0.98)	(1.82)
Forward guidance (t-3)	-0.033	-326.9	0.140
	(-0.91)	(-0.81)	(0.34)
Forward guidance (t-1)*Borrower reputation	0.024*	306.2**	-0.157
	(1.78)	(2.10)	(-0.91)
Forward guidance (t-2)*Borrower reputation	-0.015	-154.0	-0.381**
	(-0.75)	(-0.72)	(-2.23)
Forward guidance (t-3)*Borrower reputation	0.014	133.4	0.071
	(0.88)	(0.77)	(0.37)
Shadow rate	0.002	50.62	-0.016
	(0.34)	(0.65)	(-0.19)
Loan controls	Y	Y	Y
Firm Controls	Y	Y	Y
Economy controls	Y	Y	Y
Industry fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Observations	2048	1879	6667

Appendix with Supplementary Materials

Forward Guidance and Corporate Lending

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This document presents tables of results from additional tests that serve as robustness checks and supplement the main tables in the paper. The following tables are presented:

A. List of Odyssean forward guidance statements, summary statistics

Table A1 lists the dates of Odyssean guidance statements used in the construction of the forward guidance measures, with relevant key phrases within the statements with the forward-looking (contractionary or expansionary) language.

Table A2 reports the summary statistics of the loan-, firm-, bank-, and economy-level control variables for the whole sample period, May 1999 to June 2017.

B. Additional Sensitivity Tests

Part B of the Appendix presents additional sensitivity tests that supplement the main tables in the paper and confirm the robustness of the results.

1. Response of loan spreads to forward guidance: results for term loans and credit lines

   We test the baseline specification (estimation of Eq. (2)) for the two dominant types of syndicated loans, namely, term loans and credit lines. We find that forward guidance significantly reduces the spreads for both types of loans, with the economic magnitudes associated with credit lines being slightly stronger.

2. Response of loan spreads to forward guidance: role of bank capitalization

   We examine the role of bank capitalization in the relationship between cost of loans and forward guidance. Specifically, Table B1 estimates regression models with double interaction terms between forward guidance measures and bank capital ratio. The table also reports the economic magnitude of the effects – the additional percentage reduction on loan spreads offered by highly capitalized bank (75 percentile) as compared to less capitalized bank (25 percentile), after expansionary forward guidance.

3. Tests with different fixed effects and sample periods

Tables B3, B4, and B5 estimate the regression models in Table 3 in the paper with bank fixed effects, firm fixed effects, bank × year fixed effects and bank × firm fixed effects, in order to test for the sensitivity of the findings. Table B3 presents the baseline regression results using Odyssean forward guidance, Table B4 presents the placebo test results for the effect of Delphic forward guidance on loan spreads, and Table B5 reports the placebo test for the pre-crisis period. In all the sensitivity tests considered, we observe that the findings reported in the paper continue to hold.

4. Testing with different fixed effects and using the effective federal funds rate (instead of the shadow rate) as an alternative proxy of the monetary policy rate

Tables B6 to B8 replicates the results of Table 3 in the paper by including the effective federal funds rate and using different fixed effects specifications. Notably, all the results confirm the findings reported in the paper.

5. Additional economy-level control variables

To ease any concerns that the results may be influenced by other macroeconomic factors such as credit risk and bond market conditions, in Tables B9 and B10 we replicate the main results in the paper, by additionally controlling for credit spread (Moody's AAA-ABB corporate bond spread) and the 3-month T-Bill rate. The results remain robust to the inclusion of these additional variables.

Table A1. Forward guidance statements with the forward-looking language

This table lists the dates of Odyssean guidance statements and the relevant key phrases within the statements with the forward-looking (contractionary or expansionary) language.

Date	Forward-looking language	Type
18/05/1999	…the Committee was concerned about the potential for a buildup of inflationary imbalances that could undermine the favorable performance of the economy and therefore adopted a directive that is tilted toward the possibility of a firming in the stance of monetary policy.	contractionary
05/10/1999	…the Committee adopted a directive that was biased toward a possible firming of policy going forward.	contractionary
02/02/2000	…the Committee believes the risks are weighted mainly toward conditions that may generate heightened inflation pressures in the foreseeable future.	contractionary
19/12/2000	…the Committee consequently believes the risks are weighted mainly toward conditions that may generate economic weakness in the foresee-able future.	expansionary
13/08/2002	…the Committee believes that, for the foreseeable future…the risks are weighted mainly toward conditions that may generate economic weakness.	expansionary
12/08/2003	…the Committee believes that policy accommodation can be maintained for a considerable period.	expansionary
28/01/2004	With inflation quite low and resource use slack, the Committee believes that it can be patient in removing its policy accommodation.	expansionary
04/05/2004	…the Committee believes that policy accommodation can be removed at a pace that is likely to be measured.	contractionary
13/12/2005	The Committee judges that some further policy firming is likely to be needed to keep the risks to the attainment of both sustainable economic growth and price stability roughly in balance.	contractionary
29/06/2006	…the Committee judges that some inflation risks remain.	contractionary
25/06/2008	Although downside risks to growth remain, they appear to have diminished somewhat, and the upside risks to inflation and inflation expectations have increased.	contractionary
08/10/2008	The recent intensification of the financial crisis has augmented the downside risks to growth and thus has diminished further the upside risks to price stability. Some easing of global monetary conditions is therefore warranted.	expansionary
16/12/2008	The Federal Open Market Committee decided today to establish a target range for the federal funds rate of 0 to 1/4 percent. ...The Federal Reserve will employ all available tools to promote the resumption of sustainable economic growth and to preserve price stability. In particular, the Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.	expansionary
18/03/2009	…economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period. To provide greater support to mortgage lending and housing markets, the Committee decided today to increase the size of the Federal Reserve's balance sheet further by purchasing up to an additional $750 billion of agency mortgage-backed securities, bringing its total purchases of these securities to up to $1.25 trillion this year, and to increase its purchases of agency debt this year by up to $100 billion to a total of up to $200 billion. Moreover, to help improve conditions in private credit markets, the Committee decided to purchase up to $300 billion of longer-term Treasury securities over the next six months. The Federal Reserve has launched the Term Asset-Backed Securities Loan Facility to facilitate the extension of credit to households and small businesses and anticipates that the range of eligible collateral for this facility is likely to be expanded to include other financial assets	expansionary
12/08/2009	To promote a smooth transition in markets as these purchases of Treasury securities are completed, the Committee has decided to gradually slow the pace of these transactions and anticipates that the full amount will be purchased by the end of October.	contractionary
16/12/2009	In light of ongoing improvements in the functioning of financial markets, the Committee and the Board of Governors anticipate that most of the Federal Reserve's special liquidity facilities will expire on February 1, 2010, consistent with the Federal Reserve's announcement of June 25, 2009. These facilities include the Asset-Backed Commercial	contractionary

	Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, the Primary Dealer Credit Facility, and the Term Securities Lending Facility. The Federal Reserve will also be working with its central bank counterparties to close its temporary liquidity swap arrangements by February 1. The Federal Reserve expects that amounts provided under the Term Auction Facility will continue to be scaled back in early 2010. The anticipated expiration dates for the Term Asset-Backed Securities Loan Facility remain set at June 30, 2010, for loans backed by new-issue commercial mortgage-backed securities and March 31, 2010, for loans backed by all other types of collateral.	
03/11/2010	Although the Committee anticipates a gradual return to higher levels of resource utilization in a context of price stability, progress toward its objectives has been disappointingly slow. To promote a stronger pace of economic recovery and to help ensure that inflation, over time, is at levels consistent with its mandate, the Committee decided today to expand its holdings of securities. The Committee will maintain its existing policy of reinvesting principal payments from its securities holdings. In addition, the Committee intends to purchase a further $600 billion of longer-term Treasury securities by the end of the second quarter of 2011, a pace of about $75 billion per month. The Committee will regularly review the pace of its securities purchases and the overall size of the asset-purchase program in light of incoming information and will adjust the program as needed to best foster maximum employment and price stability.	expansionary
09/08/2011	The Committee currently anticipates that economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013.	expansionary
21/09/2011	To support a stronger economic recovery and to help ensure that inflation, over time, is at levels consistent with the dual mandate, the Committee decided today to extend the average maturity of its holdings of securities. The Committee intends to purchase, by the end of June 2012, $400 billion of Treasury securities with remaining maturities of 6 years to 30 years and to sell an equal amount of Treasury securities with remaining maturities of 3 years or less...To help support conditions in mortgage markets, the Committee will now reinvest principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities. In addition, the Committee will maintain its existing policy of rolling over maturing Treasury securities at auction.	expansionary
25/01/2012	the Committee decided today to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through late 2014.	expansionary
13/09/2012	The Committee is concerned that, without further policy accommodation, economic growth might not be strong enough to generate sustained improvement in labor market conditions...the Committee agreed today to increase policy accommodation by purchasing additional agency mortgage-backed securities at a pace of $40 billion per month...If the outlook for the labor market does not improve substantially, the Committee will continue its purchases of agency mortgage-backed securities, undertake additional asset purchases, and employ its other policy tools as appropriate until such improvement is achieved in a context of price stability...In particular, the Committee also decided today to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that exceptionally low levels for the federal funds rate are likely to be warranted at least through mid-2015.	expansionary
12/12/2012	The Committee also will purchase longer-term Treasury securities after its program to extend the average maturity of its holdings of Treasury securities is completed at the end of the year, initially at a pace of $45 billion per month...the Committee decided to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored	expansionary
18/12/2013	In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions, the Committee decided to modestly reduce the pace of its asset purchases. Beginning in January, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $35 billion per month rather than $40 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $40 billion per month rather than $45 billion per month...The Committee now anticipates, based on its assessment of these factors, that it likely will be appropriate to maintain the current target range for the federal funds rate well past the time that the unemployment rate declines	expansionary

	below 6-1/2 percent, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal.	
19/03/2014	the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in April, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $25 billion per month rather than $30 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $30 billion per month rather than $35 billion per month...The Committee continues to anticipate, based on its assessment of these factors, that it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the asset purchase program ends, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal, and provided that longer-term inflation expectations remain well anchored...When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent. The Committee currently anticipates that, even after employment and inflation are near mandate-consistent levels, economic conditions may, for some time, warrant keeping the target federal funds rate below levels the Committee views as normal in the longer run. With the unemployment rate nearing 6-1/2 percent, the Committee has updated its forward guidance	expansionary
17/12/2014	Based on its current assessment, the Committee judges that it can be patient in beginning to normalize the stance of monetary policy.	expansionary
18/03/2015	. Consistent with its previous statement, the Committee judges that an increase in the target range for the federal funds rate remains unlikely at the April FOMC meeting.	expansionary
16/12/2015	The Committee judges that there has been considerable improvement in labor market conditions this year, and it is reasonably confident that inflation will rise, over the medium term, to its 2 percent objective. Given the economic outlook, and recognizing the time it takes for policy actions to affect future economic outcomes, the Committee decided to raise the target range for the federal funds rate to 1/4 to 1/2 percent. The stance of monetary policy remains accommodative after this increase, thereby supporting further improvement in labor market conditions and a return to 2 percent inflation...The Committee expects that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run...The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction, and it anticipates doing so until normalization of the level of the federal funds rate is well under way.	expansionary
21/09/2016	Against this backdrop, the Committee decided to maintain the target range for the federal funds rate at 1/4 to 1/2 percent. The Committee judges that the case for an increase in the federal funds rate has strengthened but decided, for the time being, to wait for further evidence of continued progress toward its objectives. The stance of monetary policy remains accommodative, thereby supporting further improvement in labor market conditions and a return to 2 percent inflation.	expansionary
14/12/2016	In view of realized and expected labor market conditions and inflation, the Committee decided to raise the target range for the federal funds rate to 1/2 to 3/4 percent. The stance of monetary policy remains accommodative, thereby supporting some further strengthening in labor market conditions and a return to 2 percent inflation	expansionary
15/03/2017	In view of realized and expected labor market conditions and inflation, the Committee decided to raise the target range for the federal funds rate to 3/4 to 1 percent. The stance of monetary policy remains accommodative, thereby supporting some further strengthening in labor market conditions and a sustained return to 2 percent inflation	expansionary

Table A2. Summary statistics

This table reports the summary statistics of all variables for the whole sample period, May 1999 to June 2017. The definitions for all the variables are provided in Table 1.

Variable	Obs	Mean	Std. Dev.	Min	Max
Loan-level variables					
Loan spread	20,615	5.050	0.783	0.405	7.313
Loan amount	20,615	5.103	1.649	-6.639	10.800
Maturity	20,615	3.908	1.847	0.005	20
Credit line	20,615	0.584	0.493	0	1
Term loan	20,615	0.276	0.447	0	1
Corporate purpose	20,615	0.448	0.497	0	1
Working capital	20,615	0.185	0.389	0	1
Debt repayment	20,615	0.084	0.277	0	1
Secured	20,615	1.247	0.857	0	2
Dividend restrictions	20,615	1.118	0.911	0	2
Number of lenders	20,615	1.754	0.974	0	5.088
Firm-level variables					
Book Leverage	20,615	-0.402	0.196	0.000	-1.000
Z-score	20,615	0.638	0.791	-3.131	2.441
Bank-level variables					
Total asset	20,615	20.199	1.392	9.501	21.586
Capital ratio	20,615	0.087	0.019	0.056	0.149
ROA	20,615	0.006	0.004	-0.039	0.048
Liquidity	20,615	0.052	0.036	0	0.474
Charge-off	20,615	0.002	0.002	0	0.028
Economy-level variables					
GDP growth	73	0.994	0.703	1.858	2.448
VIX	73	20.489	7.950	11.035	58.596
Shadow rate	73	0.893	3.136	-5.301	6.224

Table B1. Response of loan spreads to forward guidance: Double interactions

This table reports the regression results with the double interaction of forward guidance and bank capital ratio. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)
Forward guidance (t-1)*Capital ratio	-2.519			-2.522
	(-1.13)			(-1.00)
Forward guidance (t-2)*Capital ratio		-3.247**		-3.276*
		(-2.19)		(-1.84)
Forward guidance (t-3)*Capital ratio			1.276	0.572
			(0.59)	(0.26)
Shadow rate	-0.195***	-0.188***	-0.204***	-0.201***
	(-2.83)	(-2.76)	(-2.94)	(-3.16)
Shadow rate*Capital ratio	1.909***	1.825***	1.966***	1.875***
	(2.83)	(2.75)	(2.88)	(3.00)
Loan-level variables	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y
Firm-year FE	Y	Y	Y	Y
Number of observations	7,493	7,493	7,493	7,493
How much additional percentage reduction on loan spreads is offered by highly capitalized bank (75 percentile) as compared to less capitalized bank (25 percentile), after expansionary forward guidance?				
Forward guidance (t-2) in Model (4)	8.60%			

Table B2. Response of loan spreads to forward guidance: results for term loans and credit lines

This table reports the baseline regression results of Eq. (2) for loan spreads associated to the two main types of syndicated loans, namely, term loans and credit lines. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	Term loans	Credit lines
Forward guidance (t-1)	-0.048*	-0.094***
	(-1.87)	(-3.47)
Forward guidance (t-2)	-0.050*	-0.063**
	(-1.88)	(-2.44)
Forward guidance (t-3)	-0.090***	-0.095***
	(-2.77)	(-3.42)
Shadow rate	0.012	0.020**
	(1.42)	(2.43)
Loan-level variables	Y	Y
Firm-level variables	Y	Y
Bank-level variables	Y	Y
Economy-level variables	Y	Y
Firm × year fixed effects	Y	Y
Number of observations	2,469	4,654

Table B3. Response of loan spreads to Odyssean forward guidance

This table reports the regression results of Eq. (2), where the dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Columns (1) – (4) use bank fixed effects and firm fixed effects, columns (5) – (8) use bank × year fixed effects, and column (9) - (12) use bank× firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.050**			-0.071***	-0.063**			-0.098***	-0.062**			-0.084***
	(-2.12)			(-2.89)	(-2.40)			(-3.11)	(-2.43)			(-2.96)
Forward guidance (t-2)		-0.053***		-0.076***		-0.072***		-0.107***		-0.041*		-0.069***
		(-3.01)		(-3.90)		(-2.66)		(-3.37)		(-1.92)		(-2.82)
Forward guidance (t-3)			-0.087***	-0.103***			-0.103***	-0.132***			-0.100***	-0.118***
			(-4.29)	(-4.98)			(-3.02)	(-3.59)			(-3.96)	(-4.55)
Shadow rate	0.015***	0.013***	0.013***	0.010***	0.000	-0.001	-0.002	-0.009	0.020***	0.019***	0.018***	0.015***
	(3.22)	(2.99)	(2.90)	(2.65)	(0.01)	(-0.05)	(-0.10)	(-0.45)	(3.27)	(3.19)	(3.03)	(2.92)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y								
Firm fixed effects	Y	Y	Y	Y								
Bank × year fixed effects					Y	Y	Y	Y				
Bank × firm fixed effects									Y	Y	Y	Y

Economic impact of forward guidance on loans with mean spreads (in basis points)

	Forward guidance (t-1)	Forwards guidance (t-2)	Forward guidance (t-3)
Model (4)	16.69	17.86	24.21
Model (8)	23.03	25.15	31.02
Model (12)	19.74	16.21	27.73

Table B4. Placebo test: Response of loan spreads to Delphic forward guidance

This table reports the regression results of Eq. (2), where the dependent variable is the log of loan spread. Forward guidance indicator variables capture Delphic forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Columns (1) – (4) use bank fixed effects and firm fixed effects, columns (5) – (8) use bank × year fixed effects and columns (9) – (12) use bank × firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.013			-0.013	-0.018			-0.019	-0.023			-0.024
	(-1.26)			(-1.28)	(-0.76)			(-0.72)	(-1.13)			(-1.13)
Forward guidance (t-2)		-0.005		-0.005		0.000		-0.003		-0.013		-0.015
		(-0.35)		(-0.39)		(0.01)		(-0.10)		(-0.48)		(-0.53)
Forward guidance (t-3)			-0.027	-0.030			-0.010	-0.015			-0.048	-0.052
			(-0.52)	(-0.56)			(-0.23)	(-0.33)			(-0.79)	(-0.84)
Shadow rate	0.015***	0.015***	0.015***	0.015***	0.001	0.001	0.002	0.001	0.004	0.005	0.005	0.004
	(3.09)	(3.13)	(3.04)	(3.00)	(0.06)	(0.08)	(0.08)	(0.07)	(0.33)	(0.40)	(0.44)	(0.38)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y								
Firm fixed effects	Y	Y	Y	Y								
Bank × year fixed effects					Y	Y	Y	Y				
Bank × firm fixed effects									Y	Y	Y	Y

Table B5. Response of loan spreads to forward guidance during the pre-financial crisis sample period

This table reports the regression results of Eq. (2), where the dependent variable is the log of loan spread. Forward guidance indicator variables capture all forward guidance issued one, two, or three months before the loan origination date. The sample period is from May 1999 to September 2008. Columns (1) – (4) use bank fixed effects, columns (5) – (8) use bank × year fixed effects and columns (9) – (12) use bank × firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	0.025			0.027	0.016			0.018	0.024			0.025
	(1.38)			(1.44)	(0.49)			(0.57)	(0.83)			(0.87)
Forward guidance (t-2)		0.021		0.024		0.023		0.025		0.0146		0.0162
		(1.00)		(1.12)		(0.63)		(0.67)		(0.43)		(0.48)
Forward guidance (t-3)			0.013	0.015			0.000	0.004			-0.002	0.000
			(0.70)	(0.83)			(-0.01)	(0.12)			(-0.08)	(0.01)
Shadow rate	-0.052***	-0.052***	-0.052***	-0.051***	-0.001	-0.001	-0.001	-0.001	-0.019**	-0.019**	-0.020**	-0.019**
	(-12.66)	(-11.61)	(-12.71)	(-11.63)	(-0.12)	(-0.07)	(-0.12)	(-0.06)	(-2.45)	(-2.34)	(-2.48)	(-2.27)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y				
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y				
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y				
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y				
Bank fixed effects	Y	Y	Y	Y								
Firm fixed effects	Y	Y	Y	Y								
Bank × year fixed effects					Y	Y	Y	Y				
Bank × firm fixed effects									Y	Y	Y	Y

Table B6. Response of loan spreads to Odyssean forward guidance, controlling for federal funds rate

This table reports the regression results for the baseline specifications using the federal funds rate as an alternative proxy for the conventional monetary policy stance. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Columns (1) – (4) use bank fixed effects, columns (5) – (8) use bank × year fixed effects and columns (9) – (12) use bank × firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.049**			-0.072***	-0.068**			-0.098***	-0.092***			-0.126***
	(-2.09)			(-2.89)	(-2.45)			(-3.06)	(-3.49)			(-4.38)
Forward guidance (t-2)		-0.062***		-0.084***		-0.068**		-0.0997***		-0.107***		-0.139***
		(-3.34)		(-4.13)		(-2.48)		(-3.15)		(-4.41)		(-5.39)
Forward guidance (t-3)			-0.097***	-0.111***			-0.101***	-0.125***			-0.118***	-0.144***
			(-4.95)	(-5.58)			(-3.22)	(-3.80)			(-3.99)	(-4.96)
Federal funds rate	-0.065**	-0.069**	-0.071***	-0.058**	0.256***	0.244***	0.248***	0.249***	0.109*	0.090	0.093	0.105
	(-2.26)	(-2.51)	(-2.62)	(-2.12)	(2.98)	(2.90)	(2.89)	(2.88)	(1.72)	(1.42)	(1.44)	(1.56)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y								
Firm fixed effects	Y	Y	Y	Y								
Bank × year fixed effects					Y	Y	Y	Y				
Bank × firm fixed effects									Y	Y	Y	Y

Table B7. Response of loan spreads to Delphic forward guidance, controlling for federal funds rate

This table reports the regression results for the baseline specifications using the federal funds rate as an alternative proxy for the conventional monetary policy stance. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Delphic forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Columns (1) – (4) use bank fixed effects and firm fixed effects, columns (5) – (8) use firm × year fixed effects, columns (9) – (12) use bank × year fixed effects and columns (13) – (16) use bank × firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forward guidance (t-1)	-0.018*			-0.019*	-0.021			-0.023
	(-1.73)			(-1.70)	(-0.95)			(-0.95)
Forward guidance (t-2)		-0.003		-0.004		-0.011		-0.015
		(-0.20)		(-0.25)		(-0.39)		(-0.49)
Forward guidance (t-3)			-0.007	-0.011			-0.013	-0.02
			(-0.14)	(-0.21)			(-0.22)	(-0.33)
Federal funds rate	-0.071**	-0.071**	-0.071**	-0.070**	0.149*	0.151*	0.150*	0.151**
	(-2.49)	(-2.46)	(-2.51)	(-2.43)	(1.93)	(1.96)	(1.96)	(1.98)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y				
Firm fixed effects	Y	Y	Y	Y				
Firm × year fixed effects					Y	Y	Y	Y

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	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Forward guidance (t-1)	-0.019			-0.02	-0.025			-0.026
	(-0.79)			(-0.77)	(-1.26)			(-1.27)
Forward guidance (t-2)		-0.005		-0.008		-0.017		-0.020
		(-0.17)		(-0.27)		(-0.63)		(-0.68)
Forward guidance (t-3)			-0.012	-0.018			-0.044	-0.050
			(-0.31)	(-0.44)			(-0.72)	(-0.79)
Federal funds rate	0.250***	0.250***	0.250***	0.251***	0.096	0.098	0.096	0.100
	(2.95)	(2.94)	(2.95)	(2.99)	(1.53)	(1.56)	(1.55)	(1.61)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Bank × firm fixed effects					Y	Y	Y	Y

Table B8. Response of loan spreads to forward guidance, controlling for federal funds rate (for the pre-financial crisis sample period)

This table reports the regression results for the baseline specifications using the federal funds rate as an alternative proxy for the conventional monetary policy stance. The dependent variable is the log of loan spread. Forward guidance indicator variables capture all forward guidance issued one, two, or three months before the loan origination date. The sample period is from May 1999 to September 2008. Columns (1) – (4) use bank fixed effects and firm fixed effects, columns (5) – (8) use firm × year fixed effects, columns (9) – (12) use bank × year fixed effects and columns (13) - (16) use bank × firm fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forward guidance (t-1)	0.029			0.032*	0.031			0.035
	(1.58)			(1.67)	(1.01)			(1.12)
Forward guidance (t-2)		0.028		0.032		0.024		0.028
		(1.33)		(1.49)		(0.66)		(0.78)
Forward guidance (t-3)			0.022	0.025			0.013	0.018
			(1.22)	(1.37)			(0.44)	(0.61)
Federal funds rate	-0.051***	-0.051***	-0.051***	-0.050***	-0.017*	-0.017	-0.017*	-0.016
	(-11.41)	(-10.63)	(-11.46)	(-10.70)	(-1.68)	(-1.61)	(-1.68)	(-1.57)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y				
Firm fixed effects	Y	Y	Y	Y				
Firm × year fixed effects					Y	Y	Y	Y

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	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Forward guidance (t-1)	0.016			0.018	0.026			0.027
	(0.49)			(0.57)	(0.89)			(0.93)
Forward guidance (t-2)		0.024		0.026		0.017		0.019
		(0.65)		(0.68)		(0.52)		(0.57)
Forward guidance (t-3)			0.000	0.004			0.001	0.004
			(-0.01)	(0.13)			(0.04)	(0.14)
Federal funds rate	0.000	0.001	0.000	0.001	-0.020**	-0.020**	-0.021**	-0.020**
	(0.02)	(0.05)	(0.02)	(0.06)	(-2.36)	(-2.26)	(-2.38)	(-2.20)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Bank × firm fixed effects					Y	Y	Y	Y

Table B9. Response of loan spreads to forward guidance, after controlling for additional economy-level variables

This table reports the regression results for the baseline specifications, after additionally controlling for two economy-level variables, namely credit spread (Moody's AAA-ABB corporate bond spread) and 3-month T-bill rate. The dependent variable is the log of loan spread. Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Columns (1) – (4) use bank fixed effects and firm fixed effects, columns (5) – (8) use firm × year fixed effects and columns (9) – (12) use bank × year fixed effects. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forward guidance (t-1)	-0.039*			-0.061***	-0.082***			-0.131***	-0.065**			-0.107***
	(-1.90)			(-2.73)	(-2.98)			(-4.22)	(-2.41)			(-3.27)
Forward guidance (t-2)		-0.049***		-0.071***		-0.121***		-0.167***		-0.082***		-0.125***
		(-2.76)		(-3.52)		(-4.28)		(-5.26)		(-2.96)		(-3.69)
Forward guidance (t-3)			-0.084***	-0.100***			-0.138***	-0.179***			-0.136***	-0.170***
			(-4.02)	(-4.55)			(-3.92)	(-4.81)			(-3.63)	(-4.17)
Shadow rate	0.020***	0.019***	0.019***	0.014***	-0.010	-0.011	-0.013	-0.023	-0.016	-0.017	-0.020	-0.028
	(3.39)	(3.19)	(3.10)	(2.75)	(-0.54)	(-0.64)	(-0.70)	(-1.39)	(-0.77)	(-0.81)	(-0.91)	(-1.33)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y								
Firm fixed effects	Y	Y	Y	Y								
Firm × year fixed effects					Y	Y	Y	Y				
Bank × year fixed effects									Y	Y	Y	Y
Observations	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493

Table B10. Response of loan spreads to forward guidance: Triple interactions, after controlling for additional economy-level variables

This table reports the regression results of Eq. (3), with the triple interaction of forward guidance, bank capital ratio and firm risk measures (denoted R). The regressions include additionally two economy-level variables, namely credit spread (Moody's AAA-ABB corporate bond spread) and 3-month T-bill rate. The dependent variable is the log of loan spread. The firm risk measure is book leverage in columns (1) – (4) and *Z*-score in columns (5) – (8). Forward guidance indicator variables capture Odyssean forward guidance issued one, two, or three months before the loan origination date. The sample period is from October 2008 to June 2017. Standard errors are clustered at the bank-year level. Y indicates that the set of control variables or fixed effects is included. The list of control variables and their definitions are provided in Table 1. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent, respectively.

	R=Book leverage				R=Z-score			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forward guidance (t-1)*Capital ratio	-11.080**			-11.370**	-5.977**			-6.016**
	(-2.26)			(-2.27)	(-2.27)			(-2.13)
Forward guidance (t-2)*Capital ratio		-8.454***		-9.342***		-4.370**		-4.697**
		(-3.03)		(-3.06)		(-2.35)		(-2.18)
Forward guidance (t-3)*Capital ratio			0.870	-1.296			2.498	1.247
			(0.18)	(-0.25)			(1.06)	(0.50)
Forward guidance (t-1)*R*Capital ratio	-24.100**			-25.140**	5.052**			5.125**
	(2.40)			(2.54)	(2.52)			(2.55)
Forward guidance (t-2)*R*Capital ratio		-15.550**		-18.470**		2.280		2.725
		(2.21)		(2.50)		(1.47)		(1.64)
Forward guidance (t-3)*R*Capital ratio			-2.440	-6.975			-2.383	-1.374
			(0.27)	(0.71)			(-1.26)	(-0.73)
Shadow rate	-0.621***	-0.604***	-0.654***	-0.585***	-0.336***	-0.319***	-0.343***	-0.334***
	(-6.42)	(-6.11)	(-6.45)	(-6.26)	(-4.62)	(-4.47)	(-4.63)	(-4.99)
Shadow rate*Capital ratio	5.870***	5.685***	6.103***	5.406***	3.134***	2.963***	3.158***	3.012***
	(6.34)	(6.09)	(6.32)	(6.08)	(4.51)	(4.32)	(4.41)	(4.69)
Shadow rate*R*capital ratio	12.61***	12.17***	12.90***	11.26***	-2.485***	-2.303***	-2.403***	-2.312***
	(-6.33)	(-5.86)	(-6.10)	(-5.75)	(-6.89)	(-6.59)	(-6.34)	(-6.98)
Loan-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Bank-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Economy-level variables	Y	Y	Y	Y	Y	Y	Y	Y
Firm × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,493	7,493	7,493	7,493	7,493	7,493	7,493	7,493