

EXPECTATIONS IN BANKING SECTOR AND CREDIT SUPPLY

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Abstract

The role of expectations in the credit cycle is still not completely justified in financial literature. In my project, I explore the interconnection between profits in the banking sector, expectations on future profits and their resulting effect on aggregate credit supply. The mechanism which connects expectations and loan supply is credit standards; which bankers can change as a response to their expectations about the future. Employing this mechanism, I attempt to show the role of expectations in the credit cycle, evaluate whether bankers make expectation errors and explain theoretically this potential discrepancy in expectations.

1. Relevance and Main Literature Review

Understanding the role of expectations in the credit cycle is a fruitful topic in macro-financial research. Such an interest is motivated by the fact that credit is proven to play an important role in business cycle fluctuations. Schularick and Taylor (2013) document that financial crises in credit-intensive economies are associated with more severe recessions; Baron and Xiong (2017) state that credit expansions predict higher probability of equity crashes and further lower returns on bank stocks; Mian et al. (2017) prove that high household debt relative to GDP is followed by subsequent recessions. Connecting expectations and credit, scholars attempt to understand whether households', firms' and investors' expectations can account for "credit over-expansion", what the nature of those expectations are and how potential expectation errors and their influence on leverage level in the economies could be theoretically explained. In my project, I am mainly concerned with the supply side of credit expansions and its connection to expectations; in this regard, the works of Kindleberger (1978) and Minsky (1977) are considered to be the first in defining the link between credit markets and expectations. They describe the periods of high growth as the waves of economic euphoria. In these periods, investors are unrealistically positive what makes them neglect the potential risks and to over-invest with borrowed money. When some shock happens and the risks that had not been appreciated before become visible, over-investment results in subsequent stocks' fire sales and severe crises.

Modern research, especially after the financial crisis in 2008, progressed significantly in understanding the reasons for such distortion in expectations and its effect on credit supply. We can follow the line in economic thinking which, block by block, brings us closer to the exciting answers. Reinhart and Rogoff (2009) underline, that, inability of investors to assess risks appropriately contributes to credit expansions and puts financial systems under threat. Geanakoplos (2010) warns that errors in expectations have power to ruin a leveraged system. A pioneering work of Greenwood and Hanson (2013) points out biased investors' beliefs lead to mis-pricing of credit. The new wave of papers connects firms' and investors' past success in profitability with their over-positive expectations about future earnings. This connection leads to highly intensive investment, including borrowed money, into future projects (Greenwood and Hanson, 2015; Gennaioli et al., 2016). The later papers attempt to describe the mechanism behind over-positive expectations. Bordalo et al. (2017), Bordalo et al. (2018) propose their model on Diagnostic Expectations explaining firms' and investors' distortions in beliefs by excess representativeness of high past profits in their memory. As a result, they exaggerate the likelihood of future high profits and take riskier borrowing and lending decisions. The paper of highest pertinence to this proposal is by Richter and Zimmermann (2019). The authors demonstrate the link between high profits in the banking sector and subsequent lending expansion. They claim that one of the connecting channels is future earnings expectations of bankers and prove it by employing US data. What is the mechanism that transforms bankers' expectations into intensive credit supply is still an open topic in research that I attempt to shed light on in my project.

2. Research Questions

The mechanism which connects bankers' expectations and credit supply, which I introduce in my project, is the tightening/easing of credit standards applicable to different categories of borrowers. The mechanism works in the following way: based on past profits, bankers build their expectations on future earnings. Expecting their profits to be high or low in the future, bankers decide whether they ease or tighten credit standards to households and enterprises. That has an influence on aggregate credit supply in the next periods. Employing this channel, I plan to answer the following three questions in the project:

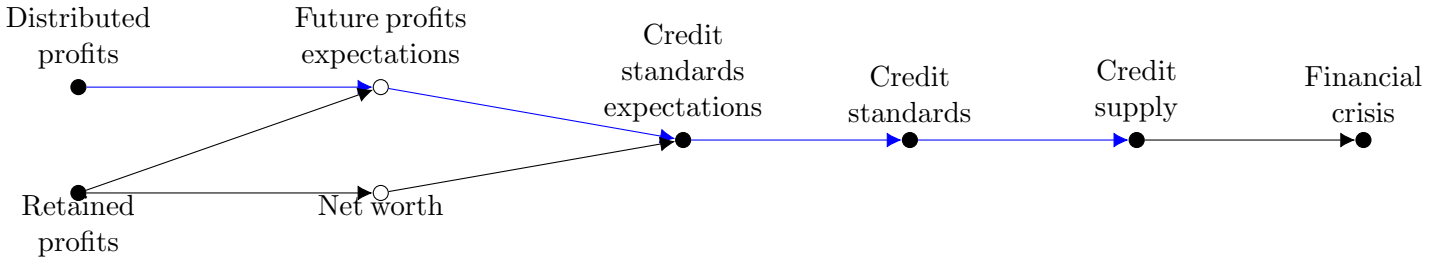
1. Do future profits expectations define the bankers' decision to change credit standards and, therefore, contribute to the aggregate lending growth?
2. Do bankers make expectation errors about credit standards when they consider their past profits?
Potential credit standards expectation errors verify the errors in future profits expectations.
3. What model better explains potential discrepancy in future profits expectations in the banking sector?

In later sections, I present the strategy to answer the research questions; data; first results and next steps.

3. Strategy

Following the main mechanism, I explore this interconnection: past banks profits \rightarrow future profits expectations \rightarrow expectations on credit standards \rightarrow change of credit standards \rightarrow credit supply; however, this relationship does not fully describe what is going on in the decision process of bankers. In theory, bankers can expect to ease credit standards not only because their past profits were high and they are positive about the future, but also because of their high past profits, their constraints are relaxed and bankers have more capacity to lend to households. This channel can be interpreted as the net worth channel. As partly described by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997), higher profits relax financing constraints and firms have a possibility to spend their undistributed profits on future investment and, in the case of banks, lending expansion. To derive the clear effect of expectations, I have to distinguish between two channels. In this, I follow Richter and Zimmermann (2019): I divide profits into two groups: distributed and retained profits. The causal graph is presented on the Figure 1:

Figure 1. Causal graph



I assume that in every period bankers decide whether they want to change credit standards. They take such a decision by considering past profits of their banks. Future profits expectations and net worth channels both can influence the decision; this fact that they are not observable complicates the situation. Distinguishing between distributed and retained profits, however, helps divide between two channels. The profits that are distributed to shareholders in the form of dividends do not relax the constraints and, therefore, cannot increase net worth (as illustrated in Figure 1). Controlling for retained profits and considering distributed profits, I expect to derive the effect of future profits expectations on credit standards. Additionally, by proving the link between the change in credit standards and aggregate credit expansion, I answer my first question.

To answer the second question, I consider both credit standards expectations and realized decisions. Regressing them on past profits provides a possibility to understand whether bankers fully realize their

credit standards expectations or just that they make expectation errors. This strategy also helps to understand the direction of expectations: do bankers expectations about changing credit standards, based on their future earnings expectations, reflect their actions? Are these potential errors significant?

In the third part, I run few empirical tests and calibrate few theoretical models to understand what explains the potential discrepancy in credit standards expectations of bankers and, hence, their future profits expectations. I consider five models from modern literature in finance and macroeconomics attempting to explain the nature of economic agents' expectations: rational expectations (Muth, 1961); adaptive expectations (Cagan, 1956); sticky-information model (Mankiw and Reis, 2002), noisy-information model (Sims, 2003); and diagnostic expectations (Bordalo, 2017). To test the first two models, I run a number of simple empirical tests in the style of Mankiw et al. (2004) to obtain the picture on their explanatory power. To test the sticky-information model, I follow the empirical framework of Sarte (2013): he assumes that information flows in a firm are imperfect, which means, some firms' decision makers readily update in the presence of new information - and others do not. Employing the ISM survey of companies' executives, Sarte shows how this kind of discrepancy in information stickiness influences expectations. I use a similar structure considering bankers and their information stickiness to past profits in predicting credit standards. To continue, the noisy-information model suggests an explanation of potential expectations errors by the fact that bankers can never fully observe the true state of their profitability in past periods. For now I leave the question of reliability of profits data and assume that information in banks' financial reports reflects the true state. Finally, I test diagnostic expectations model by adjusting and calibrating Bordalo et al.(2018) model and by employing credit standards expectations and profits data. Some models, for instance, sticky-information and diagnostic expectations models, are not mutually exclusive: it can be the case that the agents do not update their information and overreact to the information they obtain.

4. Data Sources

Credit Standards and Credit Standards Expectations: the main data source is the Bank Lending Survey (BLS) quarter results from the European Central Bank (ECB). The questions regarding credit standards are formulated in the following way: (1) Over the past three months, how have your bank's credit standards changed? (2) How do you expect your bank's credit standards to change over the next three months? The respondents are provided with the possible answers: tighten considerably, tighten somewhat, remain basically unchanged, ease somewhat, ease considerably, N/A. The final indicator is the diffusion index = $1 \times \text{tighten considerably} + 0.5 \times \text{tighten somewhat} - 1 \times \text{ease considerably} - 0.5 \times \text{ease somewhat}$. The data from other surveys similar to BLS comes from the countries' central banks. Summary:

Country	Survey	Source	Period
EU countries (18)*	Bank Lending Survey	ECB	2003q1-2019q2**
Japan	Senior Loan Officer Opinion Survey	Bank of Japan	2000q1-2019q2
Scandinavian countries	Survey of Bank Lending	Central banks	2008q1-2019q2
Switzerland	Bank Lending Survey	Swiss National Bank	2014q4-2019q2
UK	Credit Conditions Survey	Bank of England	2007q3-2019q2

* 144 EU banks participated in the last survey; ** for some countries the data is available only after 2008

The use of survey data, however, is a controversial topic in the literature: some authors claim that this data is not informative or reliable (Manski, 2004; Cochrane, 2011). The others, such as Gennaioli et al.(2016), prove that the information in this data is consistent across different surveys and it has highly predictive value. To test the validity of BLS data, I employ the results of the Household Finance and Consumption Survey (HFCS) and the Survey on the Access to Finance of Enterprises (SAFE) by the ECB, which contain the questions on credit availability for households and enterprises. The results of these surveys and BLS have to be consistent to consider data in these surveys reliable.

Retained and Distributed Profits: OECD Statistics, Income Statement and Balance Sheet, period 1999 - 2009. I create retained/distributed return on assets = $\text{retained/distributed profits} / \text{assets} * 100\%$. There are two bottlenecks regarding the OECD data. Firstly, it contains the data for not all countries from my credit standards sample. For instance, I have to exclude the Netherlands, Portugal, Greece and other countries. Secondly, the data discontinues in 2009, which makes it impossible to infer about expectations after the financial crisis in 2008. Overall, with the available OECD data, I have a sample of 8 countries (Austria, Belgium, France, Germany, Ireland, Italy, Japan, Spain) for the period 2003 - 2009, which gives me around 60 observations. To produce more valuable and reliable results, more data is imperative. My solution: I plan to gather the data on retained and distributed profits from the financial reports of the top 5-10 biggest banks in every country and then to aggregate this data. This will allow me to produce a sample with 24 countries and approximately 350 observations which will count for important and reliable results.

Loans: for EU countries - ECB, MFI loans to households and enterprises, period Jan2003 - Jun2019, for another countries - central banks of these countries.

Macrocontrols: yearly and quarterly OECD data.

5. First Results

To illustrate a semblance of my future research results that includes the full sample, I present the first stage results with the limited sample. The first stage results do not pursue the goal of explaining the economic environment; their only goal is to show the representativeness and value of potential final results. Firstly, I prove that change in credit standards does have an influence on aggregate credit growth. If it does not, my main hypothesis is not valid. The specification:

$$Y_{i,t} = \alpha_i + X_{i,t} + MC_{i,t} + \epsilon_{i,t}, (1)$$

where $Y_{i,t} = \Delta_{1-3}L_{i,t}$ represents the log change (in %) in loans between 1, 2 or 3 periods in the future and period t; $X_{i,t} = \Delta CS_{i,t-1}$ - change in credit standards between periods t and t-1; $MC_{i,t}$ - macrocontrols (GDP growth, short and long interest rates); α_i - country fixed effects. I employ the small sample with 8 countries for the period 2003-2009. Since the data on credit standards and loans is available quarterly, the number of observations is more than 400. The results are presented in columns (1)-(3) of Table 1:

Table 1: Proving the link: past profits - credit standards - loan supply

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\Delta_1 L_{i,t}$	$\Delta_2 L_{i,t}$	$\Delta_3 L_{i,t}$	$\Delta ECS_{i,t}$	$\Delta CS_{i,t}$	$ER_{i,t+1}$	$\Delta ECS_{i,t}$	$\Delta CS_{i,t}$	$ER_{i,t+1}$
$\Delta CS_{i,t-1}$	-0.042*** (-4.09)	-0.102*** (-5.16)	-0.166*** (-5.87)						
$P_{i,t}$				-8.135** (-2.68)	-2.269 (-0.62)	-7.001** (-2.10)			
$DP_{i,t}$							-43.33*** (-3.22)	-38.55** (-2.17)	-8.236 (-0.47)
$RP_{i,t}$							-3.802 (-1.14)	2.607 (0.72)	-6.849* (-1.92)
N	452	444	436	60	68	60	60	68	60

t statistics in parentheses

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Change in credit standards, not surprisingly, has a significant effect on the change in aggregate credit supply. Interpreting the results, one BLS answer from a bank about considerably tightening credit standards translates to a -0.04% change in aggregate loans in one period.

The next step is the link between profits and credit standards. The specification is the same as (1), but the variables are different. $Y_{i,t}$ represents $P_{i,t}$ - profits in banking sector of a country i in period t ; $DP_{i,t}$ - distributed profits in period t ; or $RP_{i,t}$ - retained profits in period t . $X_{i,t}$ represents $\Delta ECS_{i,t}$ - expectations on change in credit standards between periods $t+1$ and t ; $\Delta CS_{i,t}$ - change in credit standards between periods $t+1$ and t ; or $ER_{i,t+1}$ - error in expectations about period $t+1$. The number of observations is around 60: European banks normally pay dividends annually, that is why profits data is available on an annual basis. The picture with the results is the following. According to the columns (4)-(6), overall past banks' profits have a significant influence on credit standards expectations. Here we see the effect of two channels: future earnings expectations and net worth. After distinguishing between profits and considering the columns (7)-(9), it is clear that distributed profits is an important factor in defining credit standards; hence, the future earnings expectations channel is responsible for the change in credit standards. The results for retained profits are insignificant and of lesser magnitude. However, the results for both distributed and retained profits show the same pattern: if profits are higher, bankers' expectations of easing credit standards are greater than their actual easing behavior. The expectation errors also have a negative direction: higher profits are associated with errors which bankers make when expecting to ease credit standards. The first potential explanation that comes into mind is that bankers extrapolate the future or/and they become over-positive about the future based on high past profits; however, I am testing four models of expectations to verify which one provides a better explanation.

The first one is the rational expectations hypothesis. According to this hypothesis, efficient expectations do not produce predictable errors. I start testing the hypothesis with the overall credit standards expectations and after, I turn to future profits expectations channel. In the former, I follow Mankiw et al. (2004): column (1) of Table 2 represents mean error: $ER_{i,t+1} = \alpha$. On average, bankers tightened credit standards more than they expected and this error is significant. Column (2) shows whether information in expectations can be used to predict expectation errors: $ER_{i,t+1} = \alpha + \beta \Delta ECS_{i,t}$. It does- therefore, expectations have a predictive power which contests the rational expectations hypothesis. Column (3) shows the persistence of the errors: $ER_{i,t+1} = \alpha + \beta ER_{i,t}$; there is no evidence of errors auto-correlation:

Table 2: Models testing

	(1) $ER_{i,t+1}$	(2) $ER_{i,t+1}$	(3) $ER_{i,t+1}$	(4) $\Delta ECS_{i,t}$
α	0.996*** (2.63)			
$\Delta ECS_{i,t}$		-0.127*** (3.09)		
$ER_{i,t}$			0.032 (0.47)	
$\Delta CS_{i,t(1-5)}$				0.157** (1.68)
$GDP_{i,t(1-5)}$				-0.539*** (3.43)
$Lint_{i,t(1-5)}$				-0.284 (0.23)
$Sint_{i,t(1-5)}$				0.227 (0.14)
N	404	404	346	289

t statistics in parentheses

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Overall, we can reject the hypothesis that credit standards expectations are rational. With respect to future profits expectations channel that is partly responsible for credit standards expectations, the results are already presented in columns (6) and (9) of Table 1. I regress expectation errors on past profits. Since in the distributed profits case expectation error is insignificant, we cannot completely reject the idea that future earnings expectations are rational. To confirm or reject hypothesis I need full sample data.

The second model is adaptive expectations model. According to this model, expected change in credit standards should be equal to the change in the past period. If this assumption is true, then future profits expectations channel obviously do not play a role in decision-making process of bankers. In the case of adaptive expectations, bankers simply extrapolate the past credit standards into the future. I test that by regressing credit standards expectations on 5 lags of change in credit standards, GDP and short/long interest rates: $\Delta ECS_{i,t} = \alpha + \beta \Delta CS_{i,t(1-5)} + \theta GDP_{i,t(1-5)} + \gamma Lint_{i,t(1-5)} + \kappa Sint_{i,t(1-5)}$. Results for $\beta, \theta, \gamma, \kappa$ represent the sums of coefficients. According to column (4) of Table 2, credit standards expectations do depend on credit standards past changes; however, GDP growth overweighs this effect, opposite to what the adaptive expectations model predicts. Hence, employing this simple framework, we can reject adaptive expectations model and conclude that bankers do not only extrapolate the past but they also look into the future and build their expectations. Since testing sticky-information and diagnostic expectations models requires more detailed description of the empirical and theoretical frameworks, I leave it for the final report.

6. Conclusion and Next Steps

In my project, I present the mechanism that connects bankers' expectations and aggregate credit supply: the change in credit standards. Based on their past profits, bankers build their expectations on future earnings and, afterwards, decide whether they want to ease or tighten credit standards. The main goal of my project is to prove that bankers' future earnings expectations do play a role in aggregate credit expansion. Furthermore, I want to see whether bankers make predictable errors in their expectations and, if they do, how to explain the potential discrepancies in expectations.

By now, I have a sample of data covering 8 countries in the period 2003-2009. With this data, I can already make some conclusions and predictions. That is what I do in the first results section: I prove the link future profits expectations - credit supply, show that bankers make expectations errors and describe testing of two models aiming to explain the nature of bankers' expectations. Of course, these results do not carry statistical credibility since the number of observations is relatively low. That is why my next step is to gather the missing data on retained and distributed profits from the financial reports. As a result, I plan to obtain approximately 350 observations. Afterwards, I plan to run all the above described tests and regressions to build a reliable and informative conclusion about the nature of future profits expectations in banking sector.

My research is valuable for a few reasons. First of all, it proves the role of expectations in the credit cycle and, therefore, in the business cycle too. Secondly, it allows us to evaluate whether expectation errors take place in decision-making process about credit supply. Thirdly, it explains why this potential discrepancy in expectations occurs. These results have a broad field to imply: from macroeconomic to financial regulation decisions - it creates a huge space for the further research I plan:

1. Credit standards is not the only mechanism that connects banks' profits and credit expansion. Exploring other mechanisms will provide more opportunities to understand the nature of expectations;
2. Past profits is not the only indicator bankers consider in building their expectations. Looking into different indicators and their interactions has potential to produce fruitful results;
3. Finally, employing two of the above described points with a big data sample significantly increases the possibilities to construct more complex models and to run more sophisticated tests that give a theoretical explanation of discovered stylized facts.

References

1. Baron, M., Xiong, W. (2017). Credit expansion and neglected crash risk. *Quarterly Journal of Economics*, 132(2), 713-764.
2. Bernanke, B., Gertler, M. (1989). Agency costs, net worth, and business fluctuations. *American Economic Review*, 79(1), 14-31.
3. Bordalo, P., Gennaioli, N., La Porta, R., Shleifer, A. (2017). Diagnostic expectations and stock returns. *NBER Working Paper No. w23863*.
4. Bordalo, P., Gennaioli, N., Shleifer, A. (2018). Diagnostic expectations and credit cycles. *Journal of Finance*, 73(1), 199-227.
5. Cagan, P. (1956). The monetary dynamics of hyperinflation. In: Friedman, M., Ed., *Studies in the quantity theory of money*, 25-117. The University of Chicago Press, Chicago.
6. Cochrane, J. H. (2011) Presidential address: discount rates. *Journal of Finance* 66(4), 1047-1108.
7. Geanakoplos, J. D. (2010). The leverage cycle. *Cowles Foundation Discussion Paper No. 1715*.
8. Gennaioli, N., Ma, Y., Shleifer, A. (2016). Expectations and investment. *NBER Macroeconomics Annual*, 30(1), 379 – 431.
9. Greenwood, R., Hanson, S.G. (2013). Issuer quality and corporate bond returns. *The Review of Financial Studies*, 26(6), 1483–1525.
10. Greenwood, R., Hanson, S.G. (2015). Waves in ship prices and investment. *Quarterly Journal of Economics*, 130(1), 55–109.
11. Holmstrom, B., and Tirole, J.,(1997). Financial intermediation, loanable funds, and the real sector. *Quarterly Journal of Economics*, 112(3), 663–691.
12. Jordà, Ò., Schularick, M., Taylor, A. M. (2015). Betting the house. *Journal of International Economics*, 96(1), 2-18.
13. Kindleberger, C. (1978). *Manias, panics, and crashes: a history of financial crises*. Basic Books, New York/
14. Kiyotaki, N., Moore, J. (1997). Credit cycles. *Journal of Political Economy*, 105(2), 211–248.
15. Mankiw, G., Reis, R., Wolfers, J. (2004). Disagreement about inflation expectations. *NBER Macroeconomics Annual 2004*, 18, 209-270.
16. Mankiw, G., Reis, R. (2002). ‘Sticky information versus sticky prices: a proposal to replace the New Keynesian Phillips Curve. *Quarterly Journal of Economics*, 117(4), 1295–1328.
17. Manski, C. F. (2004). Measuring expectations. *Econometrica* 72(5), 1329-1376.
18. Mian, A., Sufi, A., Verner, E. (2017). Household debt and business cycles worldwide. *Quarterly Journal of Economics*, 132(4), 1755–1817.
19. Minsky, H. (1977). The Financial instability hypothesis: an interpretation of Keynes and an alternative to standard theory, *Challenge*, 20(1), 20-27.
20. Muth, J.F. (1961). Rational expectations and the theory of price movements. *Econometrica*, 29(3), 315-335.
21. Reinhart, C. M., Rogoff, S.K. (2009). The aftermath of financial crises. *American Economic Review*, 99(2), 466-72.
22. Richter, B., Zimmerman, K. (2019). The profit-credit cycle. *Working paper*.
23. Sarte, P. D. (2014). When is sticky information more information? *Journal of Money, Credit and Banking*, 46(7), 1345-1379.
24. Sims, C.A. (2003). Implications of rational inattention. *Journal of Monetary Economics*, 50(3), 665-690.