

Artificial intelligence and relationship lending

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Banks Information and Relationship Banking.

Relationship lending is a form of financing in which a bank develops a long-term, close relationship with a firm to gather private, qualitative information over time.

Because the bank benefits from an ex post monopoly of information it has a cost for the firm. So, in exchange, the firm may face better conditions in a downturn.

In terms of signals, in relationship lending, the bank receives a private signal in addition to the public signal other banks observe.

From a theoretical perspective, it is clear that a higher AI investment implies a lower marginal cost of screening and therefore generates a better signals, more credit at a lower cost. Empirically this is confirmed by Di Maggio and Yao (2021), Branzoli et al. (2022), Gambacorta et al. (2023) and Bech et al. (2023).

Yet this tells us nothing regarding the impact of AI on relationship lending.

Impact of AI on relationship lending

- 1 AI improves the quality of the public signal, credit supply increases and cost of credit decreases. As a consequence, some firms that preferred relationship banking switch to cheaper arm's length banking. Also, higher-risk borrowers are financed by AI banks (financial inclusion, Bech et al. (2023)).
 - 1 Implication: the firms' credit worthy demand for relationship banking may decrease. Also, the average firm that prefers relationship banking is riskier which implies a higher interest rate on loans.
- 2 AI makes the private signal "less private", allows AI banks to better process soft information or generates a signal that is a substitute for the private one. The benefits of relationship banking decrease (Gambacorta and Shin, 2018):
 - 1 Implication: the benefits of relationship banking decrease.
- 3 AI diminishes the cost of obtaining and/or the increases the quality of the private signal.
 - 1 Implication: the benefits of relationship banking increase.

Relationship banking is offered both by traditional and AI banks. It seems reasonable to think that traditional banks (with a higher marginal cost of screening) are the marginal banks.

Question: where do AI have a higher margin? (comparative advantage): if the public signal is better or the private signal is less valuable, AI banks will engage less in relationship banking; if instead AI increases the precision of the private signal, they might engage in more relationship banking.

The authors build a very impressive data set.
In particular, the 2022 Regional Bank Lending Survey provides detailed information regarding the use of AI for credit scoring. The survey allows to identify whether the bank "considers AI adoption for credit scoring".
(Much more precise than other studies)
Strategy: define a firm's exposure to an AI bank as the main lenders share of credit if it is an AI bank, zero otherwise.
The analysis allows to examine 1) the AI impact on relationship banking and 2) the AI impact on relationship firms' employment and investment.

Impact on the volume of credit

Impact of log(duration) on the percentage increase in term loans		
	Traditional Banks	AI Banks
Normal Times	-0.762	0.693
COVID	1.255	-1.275

Impact on interest rates

Impact of $\log(\text{duration})$ on interest rates		
	Traditional Banks	AI Banks
Normal Times	0.16	Not significant
COVID	0.07	Not significant

The impact of duration on the ratio of labor costs over total lagged assets is positive for traditional banks but less so for AI banks (at the 10% significance threshold). Same for impact of duration on the ratio of investment over total lagged assets.

The effect is weaker than for the credit volume.

Some comments

A minor caveat: AI is not machine learning.

AI banks are large banks; traditional banks are smaller banks. As acknowledged by the authors, size is the main determinant of a bank becoming an AI bank. So, could it be that the results are driven by size? (Berger et al. ,2005)

The difference between term loans and credit lines is the possibility to post government guarantees on term loans. Then, firms prefer term loans, but signals obtained on the firm are more important for credit lines since these are risky. So, shouldn't the impact of relationship lending be more important?

Results on employment and investment are statically weak but economically significant as it excludes zombie lending as the main reason of lending by traditional banks.

To conclude:

Excellent empirical strategy

Important relevant result: AI reduces the "insurance" role of relationship lending