# Specialization in Banking

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## Motivation

- Banks traditionally tasked with:
    1. **Loan selection** – i.e. the avoidance of adverse selection (Leland and Pyle (1977))
    2. **Loan monitoring** – the mitigation of moral hazard (Gorton and Pennacchi (1995); Holmstrom and Tirole (1997)).

- This requires the acquisition of information, which is costly ...

- ... as economies of scale may be realised through "specializing"
    - On single firms – i.e. relationship lending (Bernanke (1983), Berger and Udell (1995), Degryse and Ongena (2005), etc.)
    - On types of collateral (Cerqsl (2019))
    - On industries/countries (Paravisini et al. (2020), Giometti and Pietrosanti (2021))

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This paper

1. Do large US banks specialize in certain industries?

   ▶ Yes, even large banks have a preferred industry

2. If so, what drives specialization?

3. Why does specialization matter?

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   - Informational advantages
   - Better screening → banks can offer better loan terms
   - Better monitoring → improved loan and bank performance

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   - a Bank stability
   - b Credit allocation (reshuffling of deposits is not neutral)

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   - **Credit allocation** Reshuffling of deposits is not neutral!

# Roadmap

## Specialization and Bank Information

- Banks provide different services to their customers
  1. **Risk sharing** – reduce idiosyncratic risks for depositors
  2. **Information production** – loan monitoring and screening

# Specialization and Bank Information

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  1. **Risk sharing** – reduce idiosyncratic risks for depositors ⇒ *diversification*
  2. **Information production** – loan monitoring and screening ⇒ *specialization*

**Hypothesis 1.** If banks are unconstrained, banks with informational advantages will show more specialized loan portfolios.

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Informational advantages translate into better screening and monitoring

**Hypothesis 2.** Informational advantages lead to better loan performance in an industry in which a bank specializes.

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  **Hypothesis 2.** Informational advantages lead to better loan performance in an industry in which a bank specializes.

# Measuring specialization

- **Relative specialization:** relative degree of over-investment in a sector.

$$\frac{\frac{LoanAmount_{b,s,t}}{\sum_s LoanAmount_{b,s,t}}}{\frac{LoanAmount_{s,t}}{\sum_s LoanAmount_{s,t}}}$$

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- **Excess specialization:** deviation from the aggregate loan portfolio.

$$\frac{LoanAmount_{b,s,t}}{\sum_s LoanAmount_{b,s,t}} - \frac{LoanAmount_{s,t}}{\sum_s LoanAmount_{s,t}}$$

- Other measures of specialization: loan count, log loan amount, binary for "top" industry, etc.

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# Data

- Our primary data set is the Y14Q database
  - ▶ Covers all stress-tested banks (2012-2020; 40 banks )
  - ▶ Tracks every C&I loan over 1 mil. USD (over 3.5 million loan observations)
  - ▶ Contains: Amount, rate, collateral, maturity, internal rating, performance, etc.
  - ▶ Data on each loan reported quarterly – observe re-negotiations and new originations
  - ▶ Results below focus on **Term Loans**

- We merge in FFIEC-002 (Call Data Y-9C)
  - ▶ Publicly available data on bank balance sheets
  - ▶ Quarterly data at entity-level

- SNC for additional tests

Y14 Data: Excess Specialization
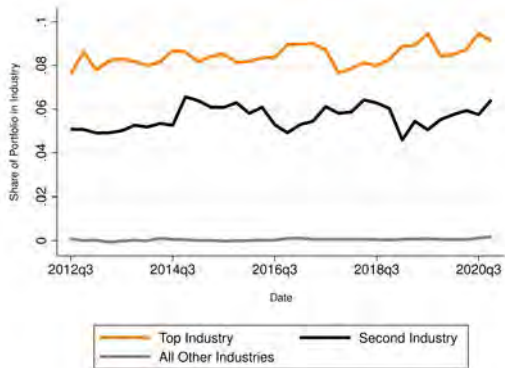


Many banks focused on a "favorite" top industry - consistent across time

# Y14 Data: Distribution of Excess Specialization
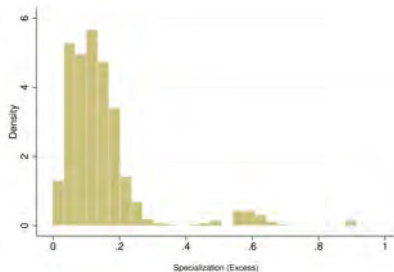


(b) Favorite Industry.
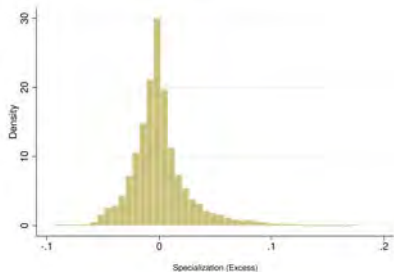
(c) All Other Industries.

Heterogeneity in the degree of excess specialization in top industry

SNC Data: Banks favor a particular industry



Bank Specialization Trends - Average Share of commitment Exposure by Industry
Term Loans

Source: Shared National Credit Data
Industry classification occurs at the 2 digit NAICS code level
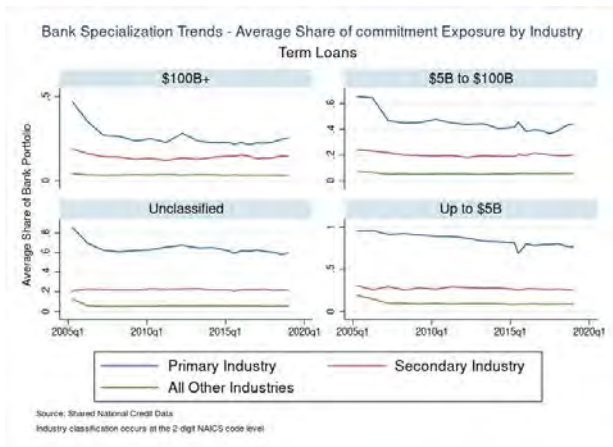
- Highest concentration for small banks, but large banks are concentrated.

Regression analysis

$$Y_{l,i,b,s,t} = \beta_0 + \beta_1 Specialization_{b,s,t}$$
$$+ \beta_2 X_{l,b} + \beta_3 Relationship_{i,b}$$
$$+ \xi_{b,t} + \sigma_{s,t} + \phi_{loanriskrating} + \omega_{loanpurpose} + \epsilon_{l,i,b,s,t}$$

- Outcome $Y$ measures ex-post loan performance (and loan terms in later analyses)
- Coefficient of interest: Specialization
- Controls: relationship, geographical specialization, industry capture
- Regressions account for bank, industry, loan type, loan purpose, and risk fixed effects

# Shortcomings and challenges

1. Do not measure loan demand – only ex-post outcomes

2. Cannot identify exogenous variation in specialization

$\rightarrow$ Regressions not interpreted as causal

$\rightarrow$ We identify patterns, trends, and correlations of interest to academics and policymakers

Specialization is associated with improved loan performance

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  | Loan ever becomes non-performing | | | |
| "Relative" Specialization (2 digit) | -0.006*** | -0.003*** | -0.006*** | -0.004*** |
|  | [0.001] | [0.000] | [0.001] | [0.000] |
| Key Fixed Effects: | Bank*Year-Quarter | | Industry*Year-Quarter | |
| Rating FE: | No | Yes | No | Yes |
| Bank and Loan Controls | Yes | Yes | Yes | Yes |
| Mean of dependent variable | 0.049 | 0.049 | 0.049 | 0.049 |
| $R^2$ | 0.2 | 0.22 | 0.21 | 0.28 |
| N | 2,324,663 | 2,324,663 | 2,324,663 | 2,324,663 |

- Results hold even when we control for **market capture and relationship**
- Controls include: Loan size, rate, maturity, unsecured (0/1), bank size
- Evidence of monitoring *and* screening (rating FE)

Specialization is associated with improved loan performance (2)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | Loan ever becomes non-performing | | | |
| Specialization | -0.006*** | -0.005*** | -0.006*** | -0.004*** | -0.004*** | -0.004*** |
| | [0.000] | [0.000] | [0.001] | [0.000] | [0.000] | [0.000] |
| Interest Rate | No | Yes | Yes | Yes | Yes | Yes |
| Bank-Firm Relationship | No | No | Yes | Yes | Yes | Yes |
| Rating at origination | No | No | No | Yes | Yes | Yes |
| Detailed collateral FE | No | No | No | No | Yes | Yes |
| Regional Specialization | No | No | No | No | No | Yes |
| Controls | Loan size, bank size, bank capital, industry*year-quarter | | | | | |
| $R^2$ | 0.0086 | 0.018 | 0.019 | 0.21 | 0.22 | 0.22 |
| N | 2,317,357 | 2,317,357 | 2,317,357 | 2,316,771 | 2,316,771 | 2,316,771 |

- Result more pronounced with fewer external risk controls...

- But remains even when controlling for a host of public- and
  bank-specific risk metrics...

- Or city-level specialization/concentration

# Specialization and Loan Performance
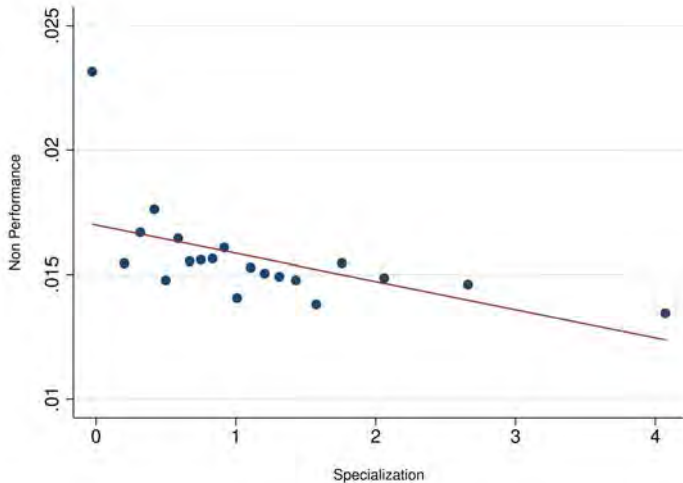
# Performance is consistent with superior information

1 **Fewer loan sales** – loans in industry of specialization less likely to be sold off given insufficient market knowledge

2 **Information vs. constraints** – Larger banks (less likely to be constrained) have better performance in the industry of specialization

3 **SME Lending** – Lending to SMEs more likely if bank is specialized

# 1. Specialization makes sell-off unlikely

| | (1)<br>Loan sold (in part) | (2)<br>Loan sold entirely | (3)<br>Loan sold (in part) | (4)<br>Loan sold entirely |
|---|---|---|---|---|
| Specialization | -0.014** | -0.004** | -0.075*** | -0.006 |
| | [0.006] | [0.002] | [0.024] | [0.006] |
| Fixed Effects | Yes | Yes | Yes | Yes |
| Firm fixed effects | Yes | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes | Yes |
| Sample | All loans | | Syndicated as Agent | |
| Mean of dep. var. | 0.8 | 0.011 | 0.72 | 0.0073 |
| $R^2$ | 0.55 | 0.16 | 0.098 | 0.11 |
| N | 833,920 | 833,920 | 39,453 | 39,453 |

- If specialization is associated with additional information, asymmetric information problem may exist
- Market unlikely to offer 'fair' price for loans from specialized banks – only pooling price

## 2. SNC DAta: Loan Performance Split by Bank Size

|                              | (1)                | (2)             | (3)            |
|------------------------------|--------------------|-----------------|----------------|
|                              | Loan Ever Non-Accruing |             |                |
|                              | Largest Quintile   | Second Quintile | Third Quintile |
| Specialization of the Agent  | -0.028***          | -0.006          | -0.032         |
|                              | [0.008]            | [0.031]         | [0.031]        |
| Bank Effects                 | Yes                | Yes             | Yes            |
| Year-Quarter                 | Yes                | Yes             | Yes            |
| Controls                     | Loan and Bank      | Loan and Bank   | Loan and Bank  |
| $R^2$                        | 0.06               | 0.06            | 0.06           |
| N                            | 69,061             | 69,181          | 69,167         |

- Best performance of loans issued by syndication agent
- Performance highest for loans issued by largest banks
  - → Specialization through info acquisition among unconstrained lenders

# 3. Specialization and SME lending

- Long documented trend: SMEs find it difficult to borrow from large banks
- Opacity of small and young firms makes information acquisition difficult
- However, specialization associated with improved information acquisition
- ...and greater SME lending by specialized banks

3. SME lending is more likely if the bank is specialized
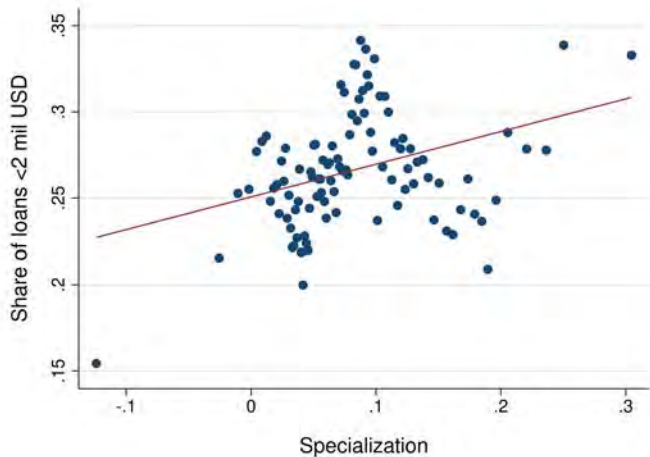


- Banks have more small loans, $< 2m$, the more specialized they are.

# Specialized banks offer "better" loan terms (1/2)

|  | (Panel A) | | | |
|  | (1) Log loan amount | (2) Interest rate | (3) Maturity remaining | (4) Unsecured |
| --- | --- | --- | --- | --- |
| "Relative" Specialization (2 digit) | 0.061*** | -0.050*** | 0.765*** | -0.010*** |
|  | [0.005] | [0.006] | [0.072] | [0.001] |
| Unsecured | 0.562*** | -0.114*** | -3.614*** | |
|  | [0.023] | [0.029] | [0.173] | |
| Interest rate | -0.144*** | | 0.579*** | -0.007*** |
|  | [0.003] | | [0.042] | [0.002] |
| Log loan amount | | -0.228*** | 0.148*** | 0.051*** |
|  | | [0.006] | [0.051] | [0.002] |
| Key Fixed Effects: | Bank*Year-Quarter | | | |
| Bank and Loan Controls | Yes | Yes | Yes | Yes |
| Mean of dependent variable | 8.6 | 3.5 | 18 | .14 |
| $R^2$ | 0.2 | 0.22 | 0.13 | 0.28 |
| N | 2,324,663 | 2,324,663 | 2,089,171 | 2,324,663 |

# Specialized banks offer "better" loan terms (2/2)

- Specialization associated with more favorable terms for borrowers
- This holds for both newly originated loans (see above) and re-negotiations
- Loan more likely to be secured by fixed assets and other collateral, for which specialized knowledge may be necessary
- Effect not driven by firm-bank interactions, geography...
- ... or industry capture, which is associated with monopolistic behavior

# Effects more pronounced if competition is higher

|  | (1) Log loan amount | (2) Interest rate | (3) Maturity remaining | (4) Unsecured |
|---|---|---|---|---|
| "Relative" Specialization | 0.038*** | -0.011** | 0.617*** | -0.005*** |
| (2 digit) | [0.005] | [0.006] | [0.072] | [0.001] |
| | | | | |
| Specialization * "Other Lenders" | 0.041*** | -0.055*** | 0.654*** | -0.025*** |
| | [0.009] | [0.008] | [0.071] | [0.003] |
| | | | | |
| Borrower interacts | 0.648*** | -0.205*** | -1.393*** | 0.056*** |
| with other lenders | [0.023] | [0.019] | [0.118] | [0.008] |
| Key Fixed Effects: | Bank*Year-Quarter | | | |
| Bank and Loan Controls | Yes | Yes | Yes | Yes |
| Mean of dependent variable | 8.6 | 3.5 | 18 | 0.14 |
| $R^2$ | 0.24 | 0.22 | 0.13 | 0.28 |
| N | 2,324,663 | 2,324,663 | 2,089,171 | 2,324,663 |

- Multiple lenders defined as having borrowed from >1 lender in period
- Sample: Origination and re-negotiations

# Aggregate results: Why does bank specialization matter?

1. Specialization is associated with better performance at the industry level even in times of industry downturn
2. Specialization is associated with lower but more stable returns for banks
3. Reductions in Tier-1 ratio associated with rising specialization
4. Banks focus on their preferred industry following a shock to deposits
   - Improvements in firm performance

# Inflows correlated with increases in specialization in preferred industry

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  | Relative Specialization | | Change Relative Specialization | |
| Deposit Drop | -0.016 | | -0.003 | |
|  | [0.023] | | [0.007] | |
| Deposit Increase | -0.017 | | -0.005 | |
|  | [0.021] | | [0.008] | |
| Favourite Industry$_{t-1}$ | 1.925*** | 0.169*** | 0.052*** | 0.004*** |
|  | [0.037] | [0.001] | [0.012] | [0.000] |
| Dep. Drop * Fav. Ind.$_{t-1}$ | 0.128 | | -0.014 | |
|  | [0.125] | | [0.041] | |
| Dep. Inc * Fav. Ind$_{t-1}$ | 0.232** | | 0.077** | |
|  | [0.100 | | [0.002] | |
| Change Dep. | | -0.004 | | 0.001 |
|  | | [0.005] | | [0.434] |
| Change Dep. * Fav. Ind$_{t-1}$ | | 0.156*** | | 0.030*** |
|  | | [0.024] | | [0.009] |
| Industry, Bank, and Time FE | Yes | Yes | Yes | Yes |
| $R^2$ | 0.31 | 0.92 | 0.44 | 0.97 |
| N | 22,714 | 22,714 | 22,714 | 22,714 |

# Inflows correlated with increases in specialization in preferred industry

- Banks may attract deposits in times of lucrative investment opportunities in their preferred

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- COVID: unsolicited increase in deposits
  - increased specialization in a banks preferred industry
  - Reshuffling of deposits in the banking sector can change the distribution of credit and have firm-level effects

More

# Conclusion

1. Large banks specialize by concentrating on single "favorite" industries

2. Specialization is consistent with banks' having informational advantages

   - Better loan performance
   - Banks to offer generous terms to valuable clients (especially if competition is high)

3. Bank specialization has aggregate implications

   - Specialized banks are more stable
   - Banks allocate credit disproportionately to their preferred industry after positive deposit shocks

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- Broader agenda on bank specialization
  - In progress: "Bank Competition with Specialized Lenders"

# Summary Statistics for Specialization

| | Specialization Type | Top Industry | | | | All Other Industries | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | 25-pct | 75-pct | Mean | SD | 25-pct | 75-pct |
| Two Digit | "Relative" Specialization | 3.13 | 1.27 | 1.91 | 4.75 | 1.10 | 0.91 | 0.47 | 1.41 |
| | "Excess" Specialization | 0.09 | 0.05 | 0.07 | 0.17 | 0.00 | 0.03 | -0.01 | 0.01 |
| Four Digit | "Relative" Specialization | 5.71 | 1.54 | 5.48 | 6.58 | 3.72 | 2.22 | 5.48 | 6.58 |
| | "Excess" Specialization | 0.06 | 0.02 | 0.06 | 0.07 | -0.00 | 0.01 | -0.01 | 0.01 |

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## Aggregate Results: Loan Performance

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | | Non-Performing Loans | | |
| Avg. non-perf loans in industry | 1.382*** | 1.381*** | 1.370*** | 1.327*** |
| | [0.005] | [0.005] | [0.005] | [0.007] |
| | | | | |
| Interaction: | | | | |
| Avg. non-perf loans in industry | | -0.696*** | -0.676*** | |
| * favourite industry | | | | |
| | | [0.143] | [0.138] | |
| Favourite industry | | -0.008** | -0.009*** | |
| | | [0.003] | [0.003] | |
| | | | | |
| Interaction: | | | | |
| Avg. non-perf loans in industry | | | | -0.164*** |
| * Specialization | | | | |
| | | | | [0.003] |
| Specialization | | | | -0.001*** |
| | | | | [0.000] |
| Fixed Effects: | | Quarter-Year | Bank*Quarter-Year | |
| $R^2$ | 0.61 | 0.63 | 0.75 | 0.7 |
| N | 2,324,663 | 2,324,663 | 2,324,663 | 2,324,663 |

# Aggregate Results: Bank Performance

|  | (1) | (2) | (3) | (4) |
| --- | --- | --- | --- | --- |
|  | Charge Off Ratio | | Net Income Ratio | |
| Specialization (scaled) | -0.699*** | | -0.602*** | |
|  | [0.001] | | [0.030] | |
| Bank HHI | | -0.377*** | | -0.410*** |
|  | | [0.000] | | [0.000] |
| Fixed Effects | Year*Quarter | | | |
| $R^2$ | 0.4 | 0.29 | 0.46 | 0.38 |
| N | 932 | 932 | 932 | 932 |

- Avg. specialization in bank's top industry related to stability
- ...but lower profitability

# Aggregate Results: Tier 1 rate

|  | (1) | (2) | (3) |
|---|---|---|---|
|  |  | Aggregate Bank HHI |  |
| T1-Ratio$_{t-1}$ | -2.859* | -7.349*** | -6.694** |
|  | [1.927] | [2.609] | [2.610] |
|  |  |  |  |
| Charge-off Ratio |  |  | 2.001 |
|  |  |  | [1.323] |
|  |  |  |  |
| Net-Income Ratio |  |  | -1.512 |
|  |  |  | [1.127] |
|  |  |  |  |
| Bank Assets |  |  | -10.389*** |
|  |  |  | [3.859] |
| Key Fixed Effects | Year-Quarter | Bank * Year |  |
| R$^2$ | 0.019 | 0.67 | 0.68 |
| N | 1,148 | 1,148 | 1,148 |

# Aggregate Results: Firm growth during COVID

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Change in Liabilities | | | Change in EBITDA | | |
| Most Specialized Lender | 0.013*** | 0.008** | 0.016*** | 0.011** | 0.020*** | 0.035*** |
| | [0.003] | [0.003] | [0.006] | [0.005] | [0.006] | [0.010] |
| Assets$_{t-1}$ | -0.000 | -0.000 | -0.000*** | -0.000*** | -0.000*** | -0.000** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Count other lenders$_{t-1}$ | -0.013*** | -0.010*** | -0.008*** | 0.004 | -0.001 | -0.005 |
| | [0.001] | [0.001] | [0.003] | [0.003] | [0.003] | [0.005] |
| Liabilities to EBITDA$_{t-1}$ | -0.001*** | -0.001*** | -0.002*** | 0.020*** | 0.019*** | 0.021*** |
| | [0.000] | [0.000] | [0.000] | [0.001] | [0.001] | [0.001] |
| Leverage$_{t-1}$ | -0.116*** | -0.127*** | -0.114*** | -0.167*** | -0.155*** | -0.134*** |
| | [0.008] | [0.008] | [0.010] | [0.022] | [0.023] | [0.033] |
| Industry and Time FE | No | Yes | Yes | No | Yes | Yes |
| $R^2$ | .036 | .067 | .096 | .13 | .19 | .19 |
| N | 8844 | 8844 | 4506 | 7164 | 7164 | 3397 |

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