

Zombie Lending in the United States: Prevalence versus Relevance

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Current Policy Concerns

Laeven et al. (2020); Schivardi et al. (2020):

COVID-19 policy interventions as a lifeline for non-viable firms?

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If the answer is “YES”:

What are the Economic Consequences?

The “Zombie”-Narrative

Zombification / Zombie-Lending

- Productivity ↓ Caballero et al. (2008), McGowan et al. (2018), Acharya et al. (2020).
- Misallocation of Resources ↑ Caballero et al. (2008), McGowan et al. (2018), Acharya et al. (2020).
- Investment ↓ Hallak et al. (2018), Acharya et al. (2020).
- Business Dynamism ↓ Hallak et al. (2018), Acharya et al. (2019), Acharya et al. (2020).
- Monetary Policy Efficacy ↓ Acharya et al. (2020).

Related Literature

- **Japan:** Caballero et al. (2008).
- **Europe:** McGowan et al. (2018), Andrews and Petroulakis (2019), Acharya et al. (2019), Acharya et al. (2020), Acharya et al. (2021).
- **Italy:** Schivardi et al. (2021).
- **World-wide:** Banerjee and Hofmann (2018), Banerjee and Hofmann (2020).

Related Literature

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- **Italy:** Schivardi et al. (2021).
- **World-wide:** Banerjee and Hofmann (2018), Banerjee and Hofmann (2020).
- **United States:** Favara et al. (2022).

Goal of the Paper

Zombification / Zombie-Lending in the U.S.

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Prevalence

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On Aggregate:
Not widespread
(see: [Favara et al. \(2022\)](#))

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Relevance



???

Data

- **Balance Sheet:** Compustat
- **Debt Structure:** Standard & Poor's Capital IQ
 - Bank credit (BC)
 - Bonds & Notes (BN)
- **Time:** Annual; 2002 - 2020
- **Industries:** NAICS (2-digit)
→ Excluded: 11, 22, 52, 81, 92

Classifying Zombies (I)

No uniform Definition

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Narrow Definition

Banerjee and Hofmann (2018)

- I) $ICR_{i,t-2:t} \equiv \frac{XINT_{i,t-2:t}}{EBITDA_{i,t-2:t}} > 1$
- II) $Age_{i,t} \geq 10$
- III) $tq_{i,s,t} < \widetilde{TQ}_{s,t}$
→ $\widetilde{TQ}_{s,t}$: median Tobin's Q in industry s

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Bargagli Stoffi et al. (2020)

Positive correlation between firm default and non-reporting of financial information.

Classifying Zombies (III)

Extension of **Narrow Definition**:

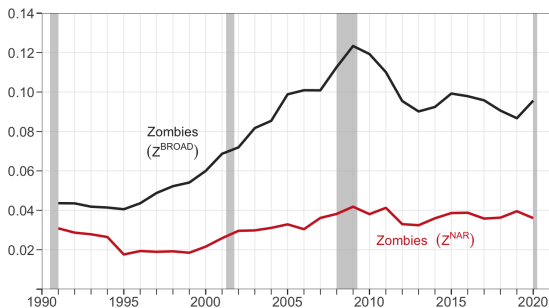
$$\text{III) } tq_{i,s,t} < \widetilde{TQ}_{s,t} \quad \text{OR} \quad tq_{i,s,t} = NA$$

Classifying Zombies (III)

Extension of **Narrow Definition**:

$$\text{III) } tq_{i,s,t} < \widetilde{TQ}_{s,t} \quad \text{OR} \quad tq_{i,s,t} = NA$$

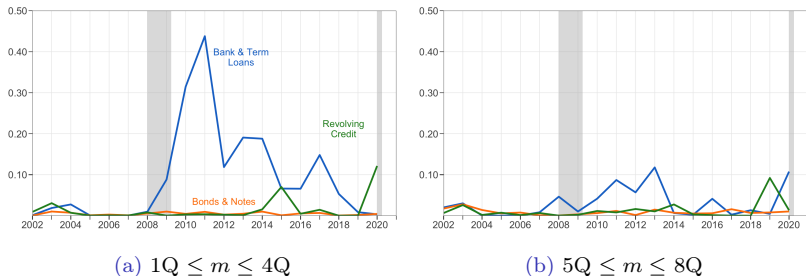
Figure 1: Zombie Prevalence under Different Zombie-Definitions



Notes: Shaded areas mark NBER recessions.

Zombie-Lending

Figure 2: Share of Newly Granted Credit Sunk with Zombies



Summary - So Far (I)

Zombification / Zombie-Lending in the U.S.

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Figures 1 & 2:

Not widespread



In Agreement with [Favara et al. \(2022\)](#).

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Industry-Share of Zombie-Credit

Zombie – Credit – Share_{s,t} (Credit_{s,t}^Z):

Share of newly granted credit to industry s that sits with zombies

$$Credit_{s,t}^Z = \frac{\sum_{i \in s} Credit_{i,t}^{Zombies}}{\sum_{i \in s} Credit_{i,t}^{Zombies} + Credit_{i,t}^{Non-Zombies}}$$

where

- $Credit_{i,t}^{Zombies}$: Amount of credit granted to zombie i in year t
- $Credit_{i,t}^{Non-Zombies}$: Amount of credit granted to non-zombie i in year t
- $Credit_{i,t}$: Bank-credit ($BC_{i,t}$) or Bonds & Notes ($BN_{i,t}$)

Zombie-Lending & Non-Zombie Performance (I)

Total-Factor-Productivity ($TFP_{i,t}$)

$$TFP_{i,t} = \mathbb{X} + \beta_{BC} NZ_{i,t-1} \times BC_{s,t-1}^Z + \beta_{BN} NZ_{i,t-1} \times BN_{s,t-1}^Z + \varepsilon_{i,t} \quad (1)$$

Capital Growth ($\Delta \log(K_{i,t})$)

$$\Delta \log(K_{i,t}) = \mathbb{X} + \beta_{BC} NZ_{i,t-1} \times BC_{s,t-1}^Z + \beta_{BN} NZ_{i,t-1} \times BN_{s,t-1}^Z + \varepsilon_{i,t} \quad (2)$$

Employment Growth ($\Delta EMP_{i,t}$)

$$\Delta EMP_{i,t} = \mathbb{X} + \beta_{BC} NZ_{i,t-1} \times BC_{s,t-1}^Z + \beta_{BN} NZ_{i,t-1} \times BN_{s,t-1}^Z + \varepsilon_{i,t} \quad (3)$$

Zombie-Lending & Non-Zombie Performance (II)

Figure 4: Zombie-Lending & Non-Zombie Performance

| Maturity (m) | 1Q $\leq m \leq$ 4Q | 1Q $\leq m \leq$ 4Q | 1Q $\leq m \leq$ 4Q |
|----------------------------------|---------------------|------------------------|---------------------|
| | (1) | (2) | (3) |
| Variables | $TFP_{i,t}$ | $\Delta \log(K_{i,t})$ | $\Delta EMP_{i,t}$ |
| $NZ_{i,t-1}$ | -0.010 | 0.196*** | 0.780*** |
| $NZ_{i,t-1} \times BC_{s,t-1}^Z$ | -0.100 | -0.257 | -0.227 |
| $NZ_{i,t-1} \times BN_{s,t-1}^Z$ | 0.202 | 0.091 | -0.227 |
| Years | 2002 - 2020 | | |
| Observations | 41,098 | 72,381 | 66,926 |
| Firms | 5,826 | 9,709 | 8,928 |
| Fixed Effects | X | X | X |
| Controls | X | X | X |
| Within- R^2 | 0.03 | 0.12 | 0.05 |

Notes: Each estimation includes firm-, industry-, year- and -industry-year-fixed effects.

Standard errors are clustered at the firm-level.

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Summary - So Far (II)

Zombification / Zombie-Lending in the U.S.

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Figures 1 & 2:

Not widespread



In Agreement with [Favara et al. \(2022\)](#).

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Not widespread



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Relevance



Table 4:
Not at all, **BUT...**

Fundamentals: Zombies vs Non-Zombies

Table 1: Summary Statistics – Full Sample: 2002-2020

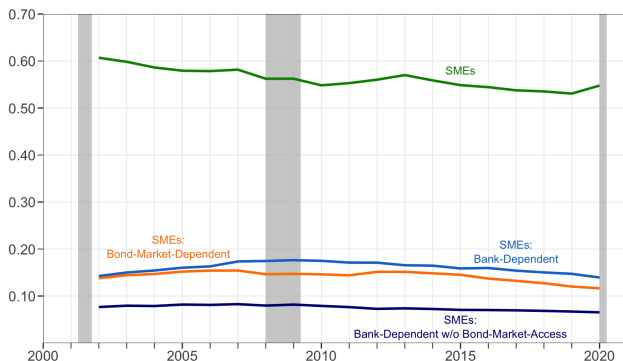
| | Median | | Units |
|-------------------|-------------|-------------|-------------------|
| | Z^{NAR} | Non-Zombies | |
| TFP | 0.10 | 0.10 | |
| Assets | 0.03 | 0.19 | Bill. USD |
| (Book) Leverage | 0.13 | 0.22 | |
| ROA | -0.18 | 0.01 | |
| Asset Tangibility | 0.08 | 0.15 | |
| CapX / Assets | 0.01 | 0.03 | |
| Value Added | -0.26 | 46.67 | Mill. USD |
| Employees | 0.09 | 0.78 | ($\times 10^3$) |
| Tobin's Q | 1.13 | 1.74 | |

Notes: The numbers show the time-series and cross-sectional median of the given variable..

Focus: Small & Medium-Sized Companies

Small- & Medium-Sized (Chodorow-Reich, 2013):
Employees < 1,000

Figure 5: Share of Small & Medium-Sized Companies



Zombie-Lending & Non-Zombie Performance (III)

Figure 6: Total Factor Productivity & Zombie-Lending

| Maturity (m) | 1Q $\leq m \leq$ 4Q | 1Q $\leq m \leq$ 4Q | 1Q $\leq m \leq$ 4Q |
|---|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) |
| Variables | $TFP_{i,t}$ | $TFP_{i,t}$ | $TFP_{i,t}$ |
| $NZ_{i,t-1}$ | 0.011 | 0.057 | 0.032 |
| $NZ_{i,t-1} \times SM_{i,t-1}$ | -0.019 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BC_{s,t-1}^Z$ | 0.072 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BN_{s,t-1}^Z$ | -0.513*** | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i$ | | -0.051 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | 0.000 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times BC_{s,t-1}^Z$ | | -0.418 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | -0.871* | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i$ | | | -0.020 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | | -0.015 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i \times BC_{s,t-1}^Z$ | | | -0.946** |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | | -0.920* |
| Years | | 2002 - 2020 | |
| Observations | 38,490 | 23,986 | 23,986 |
| Firms | 5,396 | 2,727 | 2,727 |
| Within- R^2 | 0.03 | 0.04 | 0.04 |

Notes: Each estimation includes firm-, industry-, year- and -industry-year-fixed effects. Standard errors are clustered at the firm-level.
Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Zombie-Lending & Non-Zombie Performance (III)

Figure 6: Total Factor Productivity & Zombie-Lending

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| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i$ | | -0.051 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | 0.000 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times BC_{s,t-1}^Z$ | | -0.418 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | -0.871* | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i$ | | | -0.020 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | | -0.015 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i \times BC_{s,t-1}^Z$ | | | -0.946** |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | | -0.920* |
| Years | | 2002 - 2020 | |
| Observations | 38,490 | 23,986 | 23,986 |
| Firms | 5,396 | 2,727 | 2,727 |
| Within- R^2 | 0.03 | 0.04 | 0.04 |

Median TFP:

-15.3%

Median TFP:

-40.6%

Notes: Each estimation includes firm-, industry-, year- and -industry-year-fixed effects. Standard errors are clustered at the firm-level.
Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Zombie-Lending & Non-Zombie Performance (IV)

Figure 7: Capital Growth & Zombie-Lending

| Maturity (m) | 5Q $\leq m \leq$ 40Q | 5Q $\leq m \leq$ 40Q | 5Q $\leq m \leq$ 40Q |
|---|------------------------|------------------------|------------------------|
| | (4) | (5) | (6) |
| Variables | $\Delta \log(K_{i,t})$ | $\Delta \log(K_{i,t})$ | $\Delta \log(K_{i,t})$ |
| $NZ_{i,t-1}$ | 0.205*** | 0.187*** | 0.175*** |
| $NZ_{i,t-1} \times SM_{i,t-1}$ | -0.016 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BC_{s,t-1}^Z$ | -0.225 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BN_{s,t-1}^Z$ | 0.256 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i$ | | -0.033* | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | 0.003 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times BC_{s,t-1}^Z$ | | 0.117 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | -0.718*** | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i$ | | | -0.032 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | | 0.009 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i \times BC_{s,t-1}^Z$ | | | 0.435 |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | | -0.713** |
| Years | | 2002 - 2020 | |
| Observations | 66,216 | 56,644 | 56,644 |
| Firms | 8,796 | 6,647 | 6,647 |
| Within- R^2 | 0.12 | 0.12 | 0.12 |

Capital Growth:
-1.85%

Notes: Each estimation includes firm-, industry-, year- and -industry-year-fixed effects. Standard errors are clustered at the firm-level.
Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Zombie-Lending & Non-Zombie Performance (V)

Figure 8: Employment Growth & Zombie-Lending

| Maturity (m) | 5Q $\leq m \leq$ 40Q | 5Q $\leq m \leq$ 40Q | 5Q $\leq m \leq$ 40Q |
|---|----------------------|----------------------|----------------------|
| | (4) | (5) | (6) |
| Variables | $\Delta EMP_{i,t}$ | $\Delta EMP_{i,t}$ | $\Delta EMP_{i,t}$ |
| $NZ_{i,t-1}$ | 0.010 | 0.016 | 0.046*** |
| $NZ_{i,t-1} \times SM_{i,t-1}$ | 0.082*** | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BC_{s,t-1}^Z$ | -0.053 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times BN_{s,t-1}^Z$ | 0.026 | | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i$ | | 0.077*** | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | 0.079*** | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times BC_{s,t-1}^Z$ | | -0.197 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | 0.282 | |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i$ | | | 0.049*** |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i$ | | | 0.064*** |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bank.dep_i \times no.bond_i \times BC_{s,t-1}^Z$ | | | -0.326** |
| $NZ_{i,t-1} \times SM_{i,t-1} \times bond.dep_i \times BN_{s,t-1}^Z$ | | | 0.277 |
| Years | | 2002 - 2020 | |
| Observations | 67,006 | 56,922 | 56,922 |
| Firms | 8,931 | 6,680 | 6,680 |
| Within- R^2 | 0.06 | 0.07 | 0.07 |

Employment Growth:

-0.82%

Notes: Each estimation includes firm-, industry-, year- and -industry-year-fixed effects. Standard errors are clustered at the firm-level.
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Zombie-Lending & Business Dynamism

Figure 9: Zombie-Lending & Business Dynamism

| Maturity (m) | $1Q \leq m \leq 4Q$ | $5Q \leq m \leq 40Q$ |
|--|----------------------------|----------------------------|
| | (1) | (2) |
| Variables | $\frac{NB_{s,t}}{N_{s,t}}$ | $\frac{NB_{s,t}}{N_{s,t}}$ |
| $BC_{s,t-1}^Z$ | 0.004 | -0.041** |
| $BN_{s,t-1}^Z$ | 0.011 | 0.049 |
| $bank.dep_{s,t-1} \times BC_{s,t-1}^Z$ | -0.021** | -0.005 |
| $bond.dep_{s,t-1} \times BN_{s,t-1}^Z$ | 0.013 | -0.042 |
| Years | 2002-2020 | 2002-2020 |
| Observations | 326 | 338 |
| Industries | 18 | 18 |

Notes: Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Conclusion

Zombification / Zombie-Lending in the U.S.

Prevalence

Relevance



Not widespread



In Agreement with Favara et al. (2022).

Conclusion

Zombification / Zombie-Lending in the U.S.

Prevalence



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Relevance



No one-size-fits all answer

Size
Bank-Dependency
Access to Bond-Market

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