Small Business Lending and Household Credit Shocks

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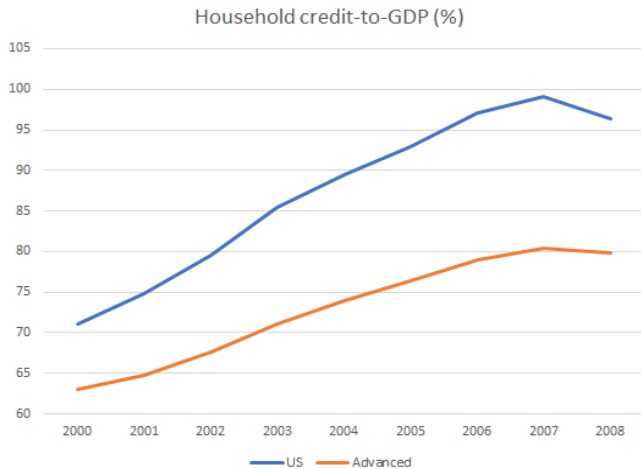
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Household credit-to-GDP (%)

Motivation

Household credit expansions have attracted significant attention in the literature

- Generate financial instability and contribute to financial crises (Mian & Sufi 2009; Buyukkarabacak & Valev 2010; Jordà, Schularick, & Taylor 2016)

- Exacerbate recessions; lower GDP and raise unemployment in the medium run (Mian, Sufi, & Verner 2017; Mian and Sufi 2018)

- How are household and business credit related?

    ⇒ How do household credit expansions impact small business lending?

Contribution

Two opposing channels in the literature:

- **Crowding out channel** (negative)

    - If there is a limited supply of funds then an increase in one type of lending will tend to crowd out other types

    - Chakraborty, Goldstein, & MacKinlay (2018); Martín, Moral-Benito, & Schmitz (2021)

- **Collateral channel** (positive)

    - An increase in credit to one type of borrower can raise local real estate prices and thus relax credit constraints faced by the other type (because their collateral has a higher value), leading to an increase in lending

    - Iacoviello (2005); Iacoviello & Neri (2010); Liu, Wang, & Zha (2013)

Contribution

- Develop a closed economy general equilibrium model to study the effects of an exogenous change in household credit

  - Compare the effects of the opposing channels on business credit and quantify their relative strengths

- Use the 1998 amendment of Texas' state constitution to empirically test the model's predictions

  - Investigate how liberalization of home equity loans in Texas impacted small business lending

Household credit expansions have a negative effect on small business lending

- Results from the theoretical model show the crowding out channel dominates

- Empirical evidence agrees: small business loan growth declines by $\sim$ 20 percentage points in Texas counties

Theoretical Analysis

Model outline

- The model follows Iacoviello (2005)

- Borrowing by impatient households and entrepreneurs is financed by savings of patient households

- Borrowing is constrained by the collateral agents own and loan-to-value (LTV) ratios

- Fixed stock of housing used by all agents: households get utility from housing services and entrepreneurs use real estate in production

- Study the effects of an exogenous household credit shock on business credit

Patient Household's Problem

Patient household maximizes expected lifetime utility given by

$$E_0 \sum_{t=0}^{\infty} (\beta^p)^t \left[\ln \left(c_t^p \right) - (n_t^p)^{\eta} / \eta + \gamma \ln h_t^p \right], \qquad (1)$$

subject to

$$c_t^p + R_{t-1} b_{t-1}^p + q_{h,t} (h_t^p - h_{t-1}^p) = w_t^p n_t^p + b_t^p \qquad (2)$$

Impatient Household's Problem

Impatient household maximizes expected lifetime utility given by

$$E_0 \sum_{t=0}^{\infty} (\beta^h)^t \left[\ln \left(c_t^h \right) - (n_t^h)^{\eta} / \eta + \gamma \ln h_t^h \right], \tag{3}$$

where $\beta^h < \beta^p$ and face the constraints

$$c_t^h + R_{t-1} b_{t-1}^h + q_{h,t}(h_t^h - h_{t-1}^h) = w_t^h n_t^h + b_t^h \tag{4}$$

$$R_t b_t^h \leq m_t^h E_t \left(q_{h,t+1} h_t^h \right) \tag{5}$$

Entrepreneur's Problem

Entrepreneur maximizes expected lifetime utility given by

$$E_0 \sum_{t=0}^{\infty} (\beta^e)^t \ln(c_t^e), \tag{6}$$

where $\beta^e < \beta^p$ and face the constraints

$$c_t^e + w_t^p n_t^p + w_t^h n_t^h + i_t + q_{h,t}(h_t^e - h_{t-1}^e) + R_{t-1} b_{t-1}^e = y_t + b_t^e \tag{7}$$

$$R_t b_t^e \leq m^e E_t(k_t + q_{h,t+1} h_t^e) \tag{8}$$

given the production function

$$y_t = k_{t-1}^{\alpha} (h_{t-1}^e)^{\mu} (n_t^h)^{\nu(1-\alpha-\mu)} (n_t^p)^{(1-\nu)(1-\alpha-\mu)} \tag{9}$$

- Study the effects of a change in household credit generated through a shock to impatient household's LTV ratio, which is modeled as a stochastic process:

$$\boldsymbol{m_t^h} = \bar{m}^h \exp(\tilde{m}_t^h),$$

and

$$\tilde{m}_t^h = \rho^h \tilde{m}_{t-1}^h + \varepsilon_t^h$$

where ε_t^h are normally distributed and serially uncorrelated

- Crowding out channel:
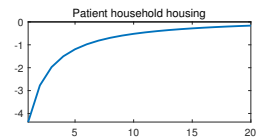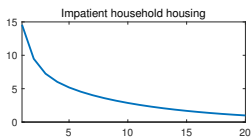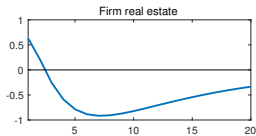 - $\varepsilon_t^h > 0 \rightarrow \boldsymbol{m_t^h} \uparrow \rightarrow b_t^h \uparrow \rightarrow R_t \uparrow$

$$\implies \quad \underline{R_t} \ \underline{\boldsymbol{b_t^e}} = m^e E_t(k_t + q_{h,t+1} h_t^e)$$
$$\uparrow \ \downarrow$$

- Collateral channel:
  - $\varepsilon_t^h > 0 \implies \boldsymbol{m_t^h} \uparrow \implies b_t^h \uparrow \implies q_{h,t+1} \uparrow$

$$\implies \quad R_t \underline{\boldsymbol{b_t^e}} = m^e E_t(k_t + \underline{q_{h,t+1}} h_t^e)$$
$$\uparrow \qquad\qquad\qquad \uparrow$$

Impulse Response Analysis

- Total effect on firm borrowing is negative $\Rightarrow$ crowding out effect dominates

- Next, we compare firm borrowing from the benchmark model with a case where collateral effect is shut down

  - Remove real estate from the borrowing constraint of the firm so that house price changes do not have any effect on firm collateral
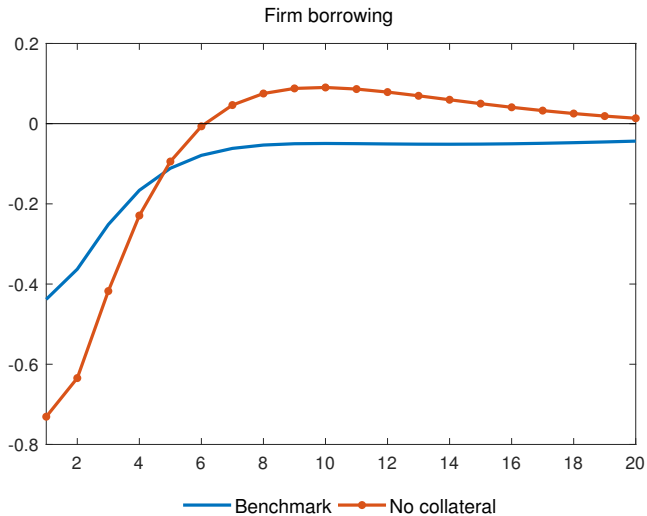
Firm borrowing

Takeaways from the model

1. Crowding out channel dominates

   - Firm borrowing negatively impacted by an exogenous increase in household credit

2. Collateral channel exists but is subsidiary

   - Firm borrowing decreases more when the collateral effect of real estate is shut down

Texas liberalization of home equity lending:

- Prior to 1998, state constitution banned home equity loans

- Amendment passed in late 1997 removed the ban

Clean empirical example of a positive household credit shock

- Abdallah & Lastrapes (2012); Kumar and Liang (2018, 2019);
  Zevelev (2021); Lastrapes, Schmutte & Watson (2022)

Empirical Framework

Differences-in-differences regression:

$$\Delta log(L_{cst}) = \alpha_c + \delta_t + \beta_1 HELoan_{st} + X_{st}\gamma + Z_{ct}\psi + \epsilon_{cst}$$

- $\Delta log(L_{cst}) =$ small business loan growth in county c, state s, year t

- $HELoan_{st} = 1$ if county is in Texas post-1997

- $X_{st} =$ state-level controls

- $Z_{ct} =$ county-level controls

Data: Credit Outcomes

<u>Primary outcome variable</u>: county-level small business loan originations

- Annual new loan originations $< \$1$ million to all businesses
    - Use a symmetric sample of 1997-1998
    - Drop loans $< \$100,000$ in baseline estimation

<u>Secondary outcome variable</u>: bank-level small C&I loans

- C&I loans under $\$1$ million on bank balance sheets
    - 0.87 correlation with originations from 1997-1998
    - Allows us to look at a longer 1995-2003 sample
    - $HELoan_{st} = 1$ in 1998 for banks that operate in Texas only

Data: Control Variables

State-level

- Rice-Strahan (2010) index of interstate banking restrictions
  - Controls for varying bank regulatory environments
- Fraser Institute's economic freedom index
  - Controls for differences in overall business climates

County-level: annual growth rates of

- Per capita income
- Population
  - Control for local economic conditions

Control Groups

Use three different control groups:

1. All non-Texas counties/banks in the US

2. Counties/banks in states with similar banking regulation to Texas

3. Counties/banks in states that border Texas or that border-a-border-state

Results: Small Business Loan Originations (county-level)

Dependent variable: Small Business Loan Originations			
	(1)	(2)	(3)
HE Loan Liberalization	-0.206***	-0.215***	-0.158***
	[0.030]	[0.032]	[0.035]
P.C. Personal Income	0.028*	0.027	0.034
	[0.016]	[0.028]	[0.031]
Population	0.009	-0.005	-0.015
	[0.015]	[0.032]	[0.032]
Rice-Strahan Index	-0.062**	-	0.102
	[0.027]		[0.060]
Economic Freedom Index	0.250	-0.738***	-0.478
	[0.202]	[0.233]	[0.352]
Constant	-1.689	4.679***	2.804
	[1.139]	[1.339]	[2.077]
Observations	5,136	1,666	1,612
R-squared	0.464	0.469	0.468
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Results: Small C&I Loans (bank-level)

Dependent variable: Commercial & Industrial Loans < $1 Million			
	(1)	(2)	(3)
HE Loan Liberalization	-0.016**	-0.026***	-0.014**
	[0.006]	[0.006]	[0.006]
P.C. Personal Income	0.001	0.001	0.002
	[0.002]	[0.002]	[0.002]
Population	0.004	0.003	0.005
	[0.003]	[0.004]	[0.003]
Rice-Strahan Index	-0.004	0.003	0.003
	[0.005]	[0.005]	[0.006]
Economic Freedom Index	0.032***	0.044*	0.044**
	[0.011]	[0.022]	[0.016]
Constant	-0.096	-0.194	-0.198*
	[0.070]	[0.147]	[0.105]
Observations	37,119	12,096	11,052
R-squared	0.255	0.250	0.253
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Results: HH Loans Secured by Real Estate (bank-level)

Dependent variable: Household Loans Secured by Real Estate			
	(1)	(2)	(3)
HE Loan Liberalization	**0.044*****	**0.042*****	**0.027*****
	[0.008]	[0.006]	[0.007]
P.C. Personal Income	-0.081	-0.072	-0.046
	[0.077]	[0.093]	[0.068]
Population	0.111	-0.151	-0.249
	[0.423]	[0.495]	[0.531]
Rice-Strahan Index	-0.019*	-	-0.033*
	[0.011]		[0.015]
Economic Freedom Index	-0.016	-0.092*	0.007
	[0.030]	[0.048]	[0.048]
Constant	0.216	0.697**	0.070
	[0.175]	[0.306]	[0.308]
Observations	15,484	6,556	5,420
R-squared	0.628	0.608	0.614
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

What about the collateral channel?

Empirical results agree with theoretical analysis: crowding out channel dominates collateral

- Zevelev (2021) shows that house prices increased in Texas following the 1998 liberalization

- Under the collateral channel, a positive household credit shock leads to an increase in real estate prices which can ultimately relax the credit constraints faced by firms.

- Can we find any evidence of a subsidiary collateral channel at work?

$$\Delta log(L_{cst}) = \alpha_c + \delta_t + \beta_1 HELoan_{st} + \beta_2 (HELoan_{st} \times HPI_c)$$
$$+ X_{st}\gamma + Z_{ct}\psi + \epsilon_{cst}$$

Results: House Price Interaction (county-level)

Dependent variable: Small Business Loan Originations			
	(1)	(2)	(3)
HE Loan Liberalization	**-0.295***	**-0.303***	**-0.245***
	[0.030]	[0.032]	[0.034]
HE Loan * House Price Index	**0.135***	**0.134***	**0.132***
	[0.002]	[0.004]	[0.004]
PC Personal Income	0.028*	0.027	0.034
	[0.016]	[0.028]	[0.031]
Population	0.010	-0.003	-0.013
	[0.015]	[0.030]	[0.030]
RS Index	-0.062**	-	0.103
	[0.027]		[0.060]
Economic Freedom Index	0.250	-0.738***	-0.480
	[0.202]	[0.233]	[0.352]
Constant	-1.700	4.662***	2.778
	[1.138]	[1.341]	[2.076]
Observations	5,136	1,666	1,612
R-squared	0.465	0.471	0.470
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Results: House Price Interaction (bank-level)

Dependent variable: Commercial & Industrial Loans < $1 Million			
	(1)	(2)	(3)
HE Loan Liberalization	-0.023***	-0.027***	-0.019***
	[0.005]	[0.006]	[0.004]
HE Loan * House Price Index	**0.003***	**0.003***	**0.003***
	[0.000]	[0.000]	[0.000]
PC Personal Income	0.001	-0.001	0.001
	[0.002]	[0.002]	[0.002]
Population	0.003	0.002	0.002
	[0.002]	[0.003]	[0.003]
RS Index	-0.004	0.000	0.002
	[0.004]	[0.004]	[0.005]
Economic Freedom Index	0.026**	0.043*	0.053***
	[0.011]	[0.024]	[0.015]
Constant	-0.072	-0.193	-0.258**
	[0.066]	[0.156]	[0.102]
Observations	33,646	11,400	10,233
R-squared	0.198	0.217	0.216
Bank fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

External Validity

Texas home equity loan liberalization great for causal identification.

- But, took place 25 years ago in a unique institutional environment. Still relevant today?

- Examine relationship between small business lending and household credit nationally from 2000-2019

$$\Delta log(L_{cst}) = \alpha_c + \delta_t + \beta HHDebt_{c,t-1} + X_{st}\gamma + Z_{ct}\psi + \epsilon_{cst}$$

- $log(L_{cst})$ = small business loan growth in county c in year t

- $HHDebt_{c,t-1}$ = county c's median household debt-to-income ratio lagged by one year

Results: External Validity

Dependent variable: Small Business Loan Originations			
	(1)	(2)	(3)
HH Debt-to-Income Ratio	**-0.015*****	**-0.015****	**-0.013****
	[0.005]	[0.005]	[0.005]
P.C. Personal Income	0.002	-0.004	0.003
	[0.110]	[0.087]	[0.076]
Population	0.539*	0.500**	0.461**
	[0.311]	[0.226]	[0.184]
Rice-Strahan Index	0.005	0.006	0.006
	[0.015]	[0.010]	[0.008]
Economic Freedom Index	-0.001	0.003	0.004
	[0.012]	[0.011]	[0.010]
Constant	0.036	0.012	0.003
	[0.054]	[0.053]	[0.051]
Observations	56,315	56,315	56,315
R-squared	0.065	0.078	0.087
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Summary

What's the effect of household credit shocks on small business credit?

- Theoretical model

    - Effect of an exogenous increase in household credit on small business lending is negative

    - Crowding out channel dominates collateral channel

- Empirical verification

    - Small business loan growth declines following 1998 liberalization of home equity loans in Texas

        - Decline is mitigated in counties with higher house price growth

    - Negative association between household credit and small business lending for all US counties from 2000-2019

Policy implications

- Rapid household credit expansions have additional negative effect of directing credit away from small businesses

- Further support for designing macroprudential tools specifically aimed at restraining household credit growth

    - e.g., higher LTV ratios on mortgages/household loans, changing tax incentives, financial institution supervision

Future work

- Does the negative impact on small business credit translate to real effects?

    - e.g., lower small business investment or employment

Thank You!